

February 2018

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Ocean News & Technology

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FEATURE STORY

**ACOUSTIC DOPPLER
CURRENT PROFILER (ADCP)**

**Measures Supraglacial River Flow
on Greenland's Ice Sheet**

PAGE 10





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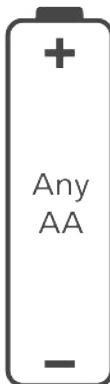


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A vibrant underwater photograph showing a bottlenose dolphin swimming gracefully over a coral reef. Sunlight filters down from the surface, illuminating the clear blue water and the sandy ocean floor. Various marine plants and corals are visible, creating a rich, textured environment.

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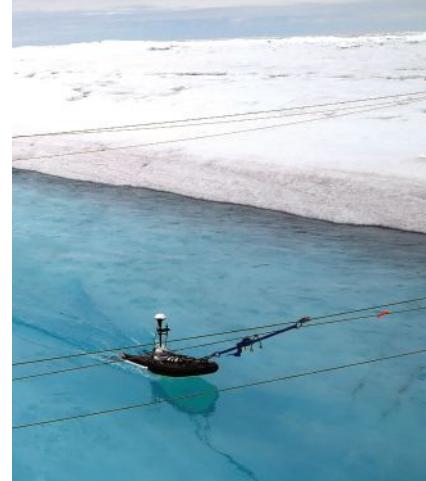
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ON THE COVER:

Flotation platform used by an UCLA-led team of researchers to measure Greenland's melting glaciers from the top of the ice sheet. Photo courtesy of UCLA Department of Geography.

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EDITORIAL

SIRAJ A. SHAIKH

Professor of Systems Security,
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THE FUTURE of Maritime Cyber Security

The UK National Cyber Security Strategy has identified maritime infrastructure and vessel as a class of cyber-physical systems potentially vulnerable to interference from cyber threats. This potential vulnerability stems from a combination of increased connectivity and reliance on digital components, increased levels of autonomous control, and globally accessible navigation systems.

In 2017, I authored a review entitled *Future of the Sea: Cyber Security*, which was commissioned as part of the UK government's Foresight Future of the Sea project. The views expressed in that review do not represent the policy of any government or organization, but are based on a range of sources including peer-reviewed publications, industry reports, government reports, and media sources vetted for credible reporting. The following is a summary of that review.

Within the maritime sector, three broad categories of cyber attacks have been identified with a range of demonstrable impacts. These categories are defined by the target of the attack; enterprise and information assets, GPS, and navigation systems; or critical control systems. Across these three types of attacks, a rise in criticality has been observed in terms of threat motivation, technical competence of attackers, and complexity of employed attacks. The published evidence for the maritime threat landscape is sparse beyond the reported attacks.

Some potential technological developments for the maritime industry merit special attention as they are expected to occur during the

next 3 to 5 years. These include advances in communication, improved sensing, and intelligent and autonomous control systems. All three pose cyber security challenges as they build over existing digital technologies, allowing for broader access to ships and vessels as well as making potential software-dependent weaknesses easier to exploit for malicious gain.

Traditional engineering has focused on safety-critical design and development. Safety, however, is distinct from cyber security. Lessons from other sectors with parallel challenges suggest that both security and safety need to be incorporated across the engineering lifecycle to ensure such systems are safe from accidents and secure from deliberate threats.

Enterprise IT systems used for typical office functions within the maritime sector need to be better protected with previously existing security mechanisms to counter commonly known threats. Navigation systems, which are critical to the maritime sector, should be paid particular attention in order to protect against skilled and targeted attacks.

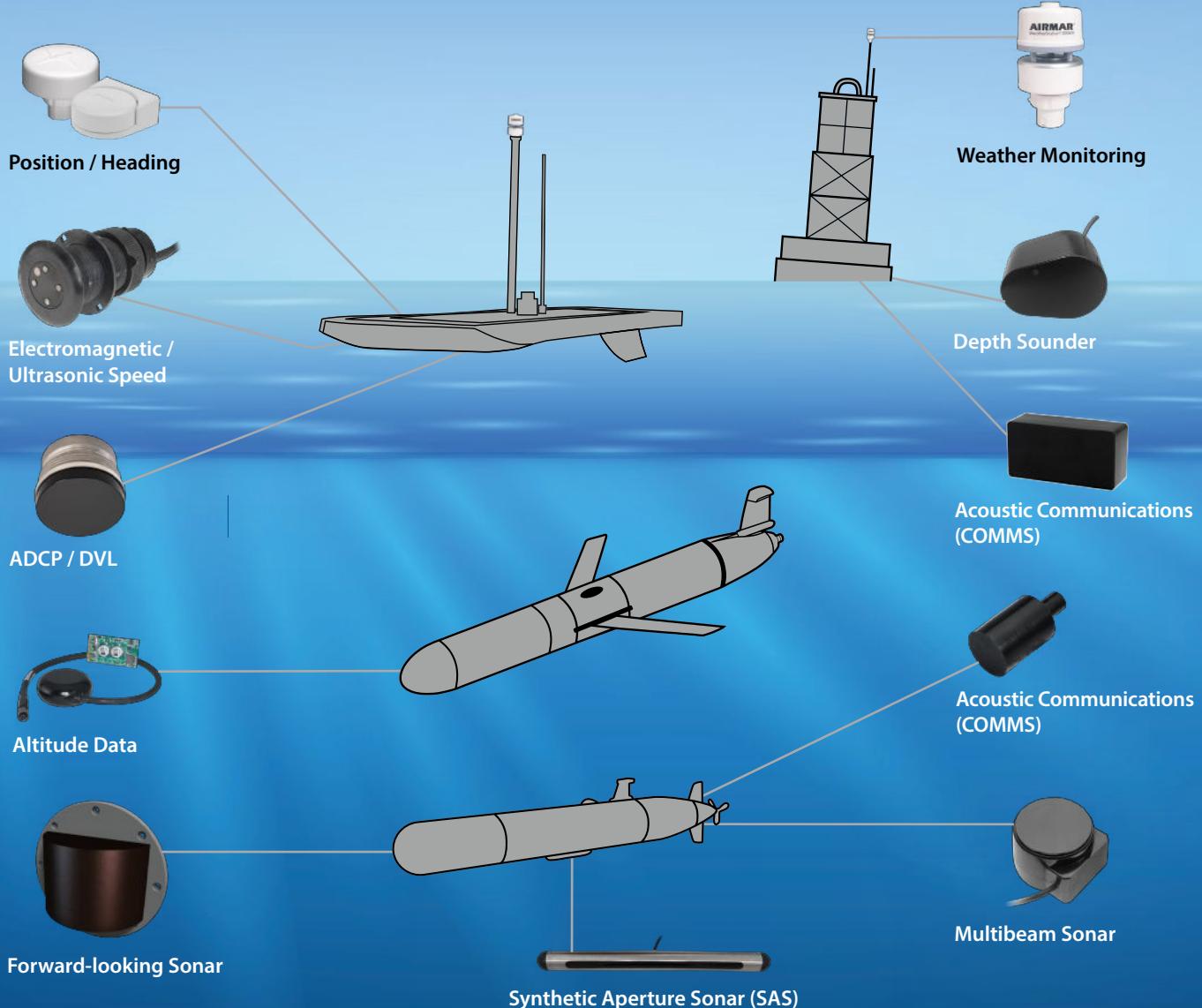
Advanced and sophisticated attacks may target a range of electronic and control systems for ships, vessels, offshore units, and port systems. These need particularly highly coordinated responses, including support from national technical authorities such as the UK's National Cyber Security Centre (NCSC). Other responses to mitigate against cyber security risks are also required to be cross-sector, including threat sharing and attack reporting systems and coordinated incident adoption.

The Cyber Security review, along with other Future of the Sea reviews, is available for download at www.gov.uk/government/collections/future-of-the-sea.

CORRECTION

Our January 2018 Editorial on Manned Submersibles (page 8) included a misspelled author name. The correct spelling is Dr. Michael Haley of Triton Submarines, LLC.

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ICE, RIVÉRS, **AND** CLIMATE MODELS

BY KIRA COLEY | UK CORRESPONDENT



A PRISTINE PANORAMA of white and pale blue greeted the team as they set up base camp on the southwest portion of Greenland's ice sheet. The melting terrain and vast changing network of rivers, lakes, and streams make this one of the most challenging field locations in the world. In 2015, a team of six NASA-funded scientists ventured forth into these extreme conditions to measure meltwater runoff flowing across the ice surface and ground-truth the climate models we rely on for accurate predictions of future global sea level rise. Participant Dr. Vena Chu and Principal Investigator Professor Laurence C. Smith describe the experience and reveal new insights gained from their journey to Greenland's dynamic, fast-changing ice sheet.

Greenland has recently overtaken Antarctica as the leading contributor to rising sea levels, losing on average around 260 billion tons of ice each year.



SINCE 2009,

around two-thirds of this loss can be attributed to increasing meltwater runoff. As the ice surface warms, the runoff passes through a network of streams and rivers on top of the ice (known as supraglacial rivers), before entering giant holes in the ice (called moulins) that lead to the bed. A drainage system forms under the ice sheet, transporting the water towards the ice edge and into the ocean. This movement of water can also cause the ends of sliding glaciers to break off into the ocean, creating icebergs.

While Greenland tends to be dominated by meltwater losses, Antarctica is dominated by the loss of solid ice that breaks away from the main ice sheet, melts, and contributes to rising sea levels.

Scientists use gravity measurements captured by satellites to estimate the total mass of lost ice. For meltwater runoff, computer models are used to simulate physical processes and provide an estimate of the amount of meltwater flowing from the ice into the ocean.

Dr. Vena Chu, expedition participant and Assistant Professor at the UC Santa Barbara Department of Geography, explained: "We are looking at the difference between what the models predict and direct measurements of meltwater runoff in the field. Currently, we don't have a good grasp of what might happen in the future as Greenland starts to melt even more than it is today. We know that melting means higher sea level rise, but are we overestimating or underestimating in our models?"

While climate models tell scientists that the melting on Greenland is accelerating, they have never been tested and validated before against ground measurements. Laurence Smith, principal investigator and Professor of Geography at the University of California, Los Angeles (UCLA), said: "These models are

the only tools that we have to estimate Greenland's sea level rise contribution in the future. It's important to obtain ground-truth measurements on top of the ice sheets to capture, validate, refine, and improve climate models that are used to predict sea level rise both today and in the future."

Today's climate models estimate meltwater runoff using the first principles of energy balance. By using data from a weather station, scientists can use the measurements of incoming solar radiation, reflective solar radiation, and temperature to calculate melting and estimate how much water refreezes as opposed to staying liquid. Whatever is left over, the net difference between calculated melt and calculated refreezing is "runoff," which is then credited to the oceans as a sea level rise contribution in the model.

THE JOURNEY TO GREENLAND'S ICE SHEET

Since 2008, Smith's team of students, researchers, and collaborators have been visiting Greenland to better understand the physical processes involved in the water leaving the top of the ice sheet and reaching the ocean. In July 2015, the team returned to focus on a 27-mi² watershed, camping near a large supraglacial lake feeding a fast-moving supraglacial river, measuring 60 ft wide and around 6 ft deep at the mouth. A helicopter was needed to ferry essential field equipment across the patchwork landscape of solid ice plains and water networks.

Smith explains, "This part of the ice sheet melts so intensely that it creates a network of streams and rivers on top of the ice surface. It's quite astonishing, and it's a very different landscape to what people imagine. In the lower elevations where we were based, there is water everywhere, and camping is very challenging because the ice is melting all around us at several centimeters a day."

"We used high-resolution satellite imagery and flew drones while we were on the ice to map out a complete watershed leading into a large supraglacial river. Our purpose was to map the watershed, collect the discharge measurements in the river, which is very challenging, and run the climate models over that site during that time to compare model calculated runoff versus what we actually measure on the ground. That way we can determine whether the runoff calculations from the model are accurate, too high, or too low."

Smith's team is the first to use an Acoustic Doppler Current Profiler (ADCP) on the Greenland ice sheet to measure supraglacial river flow. The team mounted the ADCP onto a floatable platform supported by ropes and poles on either side of the ice river that was ferried back and forth over 72 hours to record measurements and check the equipment. If one of the researchers fell into the river, the chance of death would be high. Extensive safety precautions were taken, and harnesses were worn by the team as they made their way across the slippery ice towards an ice-cold river receiving up to 430,000 gallons of water a minute. The lengths of the harnesses were controlled to make it impossible for a researcher to fall in.

Working in rotating 12-hour shifts, the field team collected data each hour for three days and three nights. Chu recalls, "Waking up in the middle of the night on an ice sheet was quite painful. We were debating which shift was worse: starting at 3 pm and feeling it get colder and colder or waking up in the dead of night at 3 am. We were taking hourly measurements, but that doesn't mean we're only active for one part of the hour. We are active the entire time trying to take lots of measurements and preparing the equipment so that the data are representative. The other problem we had was with the ADCP batteries."

**“BATTERIES DON’T FUNCTION
VERY WELL IN THE COLD,
so we had to use our
hand warmers to keep
them warm.”**

Smith explains, "Any expedition to the top of the ice sheet involves extraordinary planning. In 2015, Vena oversaw the planning, which is quite an undertaking. This is a rapidly melting dynamic ice surface covered with streams, lakes, and ponds that are changing by the day. It is a dangerous place to work if you're not careful. Even the everyday task of camping on melting ice was a challenge, and we had to invent some clever ways of pitching tents. Greenland is changing very rapidly, so it was critical to the project to use the satellite images and the drone video simultaneously with the field campaign. The issue with the satellites alone is it could be cloudy or something could happen where measurements wouldn't be collected, so the drone footage gave us the redundant video to help support watershed mapping."

UNEXPECTED DISCOVERY

On return to a more comfortable climate at UCLA, the flow measurements showed that current runoff models are overestimating by 20% to around 60%.

Smith said, "What we discovered was that the model runoff was too high, but their fundamental physics were right, so something was happening between the runoff being produced on the ice surface and the runoff appearing downstream. What we thought of as being clear solid glacial ice is actually porous and rotten, so the meltwater runoff gets delayed in the ice. This is similar to what happens on land when the rain soaks into the soil and eventually appears in a river, but the whole process can take a few days to a few weeks. So, what this study has shown is that the watersheds forming on top of the ice are an important process that hasn't been included in past models."



The watersheds found on the ice surface are important as they concentrate, divert, and amplify the injection of meltwater to the bed at specific locations, explains Smith. "This effect is determined by the shape and the pattern of the supraglacial river watersheds that form on the ice surface. It is a land surface hydrology process that is very well studied on terrestrial landscapes, but now needs to be applied to the ice sheet, which becomes more of a hydrological phenomenon. Adding this process to the models will enable us to better use them to predict the timing and volume of meltwater runoff delivered to the bed."

During the project, the team used a variety of high-resolution imagery, coding, and algorithms that could be passed on to other researchers in the field. In 2011, a National Science Foundation (NSF) project, EarthCube, was launched to transform geoscience research by developing cyberinfrastructure to improve access, sharing, visualization, and analysis of all forms of geosciences data and related resources. As well as continuing her work studying meltwater hydrology in Greenland, Chu is part of one of the many groups aiming to develop a platform for the polar geosciences in the hope it will help future generations.

Chu said, "Right now, one revolution in polar science is imagery. There are widely available commercial satellite imagery and tonnes of very high-resolution data, such as the data we used in this study that is now available to NASA and NSF scientists. We are capturing the ice sheets like never before and getting stereo images, which allow us to produce digital elevation models and better map ice sheet topography. What we are doing now is getting involved in this polar cyberinfrastructure project, EarthCube, and figuring out how we can pull together all our code, algorithms, and resources to

provide a much easier online platform for people to download data and stop the need for them to reinvent the wheel."

It is the southwest portion of Greenland's ice sheets where most of the meltwater is produced and where most of the meltwater sea level rise contribution is coming from. With the help of the NASA grant and collaborators, Smith's team has revealed a missing component to vital climate models and highlighted a need for hydrological principles in the field of glaciology.

Smith concluded, "It's very exciting. I feel very fortunate to work in a field having importance and relevance to the world. As a hydrologist, it's great to use my expertise in another field and adapt hydrology into glaciology. And what's most exciting is working with the younger generation of scientists. They do hardcore fieldwork in remote arctic environments; they can code and use advanced remote sensing technology. The abilities of this generation of scientists are really incredible, and they really are much more impressive than I was at that stage. This makes the future of science—both in Greenland and in other areas—even more exciting."

ACKNOWLEDGEMENTS

VENA W. CHU, Participant and Assistant Professor at the UC Santa Barbara Department of Geography

LAURENCE C. SMITH, Principal Investigator and Professor of Geography at UCLA

The research was recently published in the *Journal Proceedings of the National Academy of Sciences (PNAS)*.

Photos courtesy of UCLA Department of Geography.

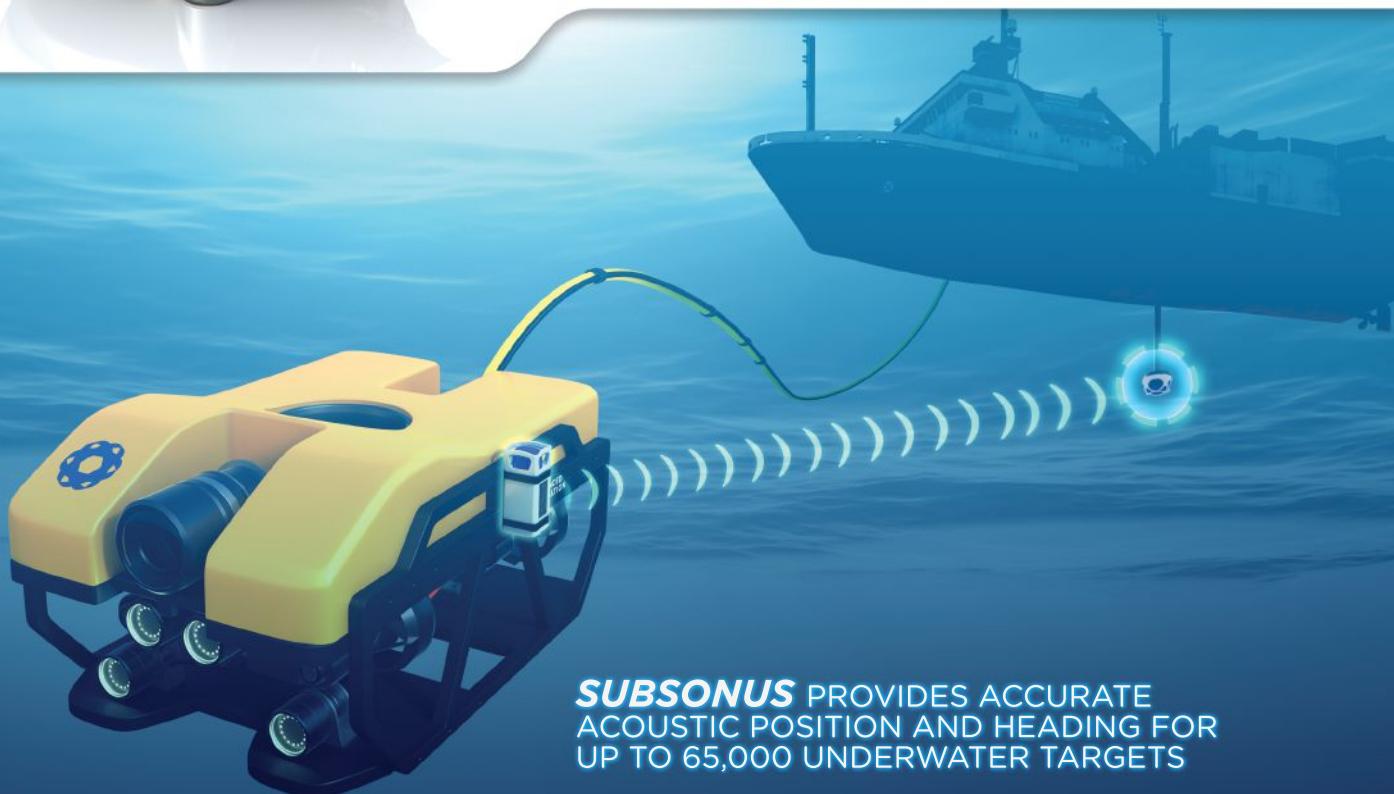




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Discovery of Over 100 MILLION GENES FROM THE MARINE WORLD

The Tara Oceans expedition (2009-13) has enabled the collection of plankton samples in all of the world's oceans on board the schooner Tara, and the creation of catalogues of species and genes on a scale never before undertaken. Continuing the analysis and exploitation of the biggest database compiled on the planktonic ecosystem, the teams from the CEA, CNRS (French National Centre for Scientific Research), EMBL (European Molecular Biology Laboratory), and the French graduate school ENS, among others, have reached a new milestone by analyzing the expression of over 100 million genes belonging to complex organisms, from microscopic algae to small planktonic animals.

These teams have demonstrated that very different genes express themselves depending on the water temperature or the concentration in nutrients of the oceanic areas studied. Half of these genes are unknown, indicating that the ocean—which is already a marvelous breeding ground of biodiversity—harbors, at the same time, an enormous potential of genetic functions awaiting discovery. By using isolation and characterization methods of isolated cells, the researchers have, more specifically, been able to explore the role of the genes present in a little-studied, uncultivated but very abundant compartment of the plankton—the first link in a long food chain. These results are the subject

of two articles published in the journal *Nature Communications* (22 and 25 January 2018).

Researchers from the Genoscope at the CEA, the CNRS, EMBL, and the ENS created the largest gene catalogue ever compiled for a planetary ecosystem. Comprising around 117 million different sequences, this catalogue has been created thanks to the isolation of the genes expressed in over 400 samples collected during the expedition. This massive DNA sequencing approach without the isolation of organisms is called metatranscriptomic. It has enabled the observation of genes expressing themselves in specific ecological conditions. For example, it makes it possible to demonstrate that numerous organisms use different genetic responses depending on the concentration of iron in the environment. The researchers have been able to determine the genes involved according to the groups of species.

This study also reveals a particularly high proportion of genes whose biological functions remain unknown, more than over half of the catalogue obtained. It appears that these genes—with no defined function—express themselves first and foremost in a small number of environmental conditions. They could provide a functional explanation of the immense diversity of the organisms observed in the oceanic plankton.

WHICH GENES FOR WHICH LIFE FUNCTIONS?

Even though the function of the planktonic genes can henceforth be studied globally using this catalogue, the organisms to which they belong still remain to be identified. In a second article, the Tara Oceans researchers characterize the genomes of several major organisms in the environment that, for the moment, are impossible to cultivate. Individual cells were sampled and preserved during the expedition, and their DNA was sequenced using

the "single-cell" genomics methods being developed. Consequently, it has been possible to attribute numerous genes observed in the catalogue to very tiny organisms feeding off algae and bacteria, and forming a fundamental intermediary stage in the food chain. This analysis has revealed a diversity of unexpected functions.

Thanks to this work, small organisms that are more complex than the bacteria that form most of oceanic plankton are beginning to be unveiled. Among other things, it is becoming possible to study the major biogeochemical processes of the ocean based on the expression of these markers. Finally, an understanding of the evolutionary and ecological mechanisms of the ocean ecosystem seems within the reach of research.



OPINION

IS SHIPPING-TECH IN A BUBBLE?

1,000% Increase in Valuation in Three Months

BY LARS JENSEN | CEO, Partner at SealIntelligence Consulting

The past year has seen a plethora of companies launched with a focus on introducing new technology in shipping—and the pace does not seem to be abating.

There is no doubt that the shipping industry is can benefit highly from new technology, and that it is now on a path to become digital—I have even outlined this in my book *Liner Shipping 2025* published in 2017.

Therefore, I am neither questioning the need for digitization in shipping, nor that it will indeed happen.

However, it might be about time to start looking at whether valuations are beginning to diverge from reality. In other words, whether shipping tech valuations are entering a bubble. This does not imply that all shipping-tech companies are overvalued nor that they do not necessarily add value. But it does imply that some valuations perhaps should be considered.

Of course, I know that proponents of every single tech company will have their arguments as to why their particular valuation is perfectly fair and correct.

However, let me show two examples, but more can be found, and let the readers here judge for themselves whether the valuations are

fully justifiable and worth the value or whether we might indeed be entering bubble-territory.

The first example is block-chain based 300cubits who is launching Ethereum smart contracts to address non-conformance to contract terms. For this, they launched their own crypto-currency termed TEU. 300cubits held a pre-ICO funding round that concluded in late September 2017.

At that point in time, 1 TEU had a price of 0.24USD—in turn implying a total market cap of 24 Million USD. In early January 2018—3 months later—the company announced a round for private placement in their Telegram group at a price of 2.8 USD/TEU (given today's price of ETH).

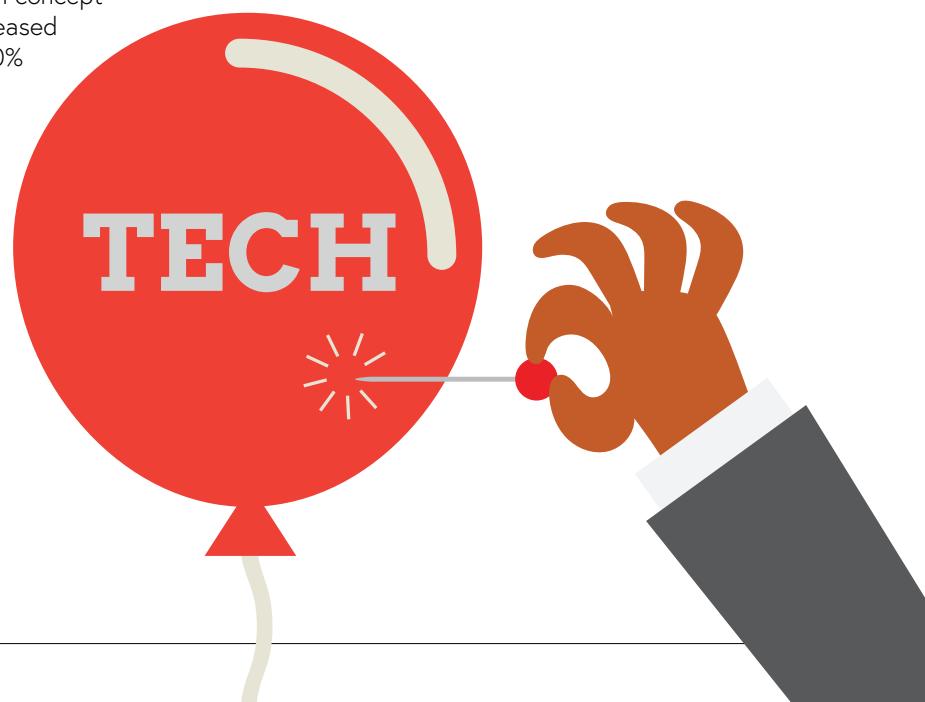
This means that the valuation of this shipping tech concept has apparently increased by more than 1,000% in just 3 months to a market cap of 280 million USD—and this at a point where live-trials according to their road-map are still in the future.

The second example is Flexport, for which there was a good blog post recently here: <https://medium.com/@Kontainers/the-compelling-argument-for-a-digital-freight-platform-be-valued-like-a-tech-company-9a31e56e924e>.

Based on the data, Flexport appears to have a valuation 19 times higher than a traditional freight forwarder. Fundamentally speaking, this boils down to whether you believe an innovative way of moving freight can make you so much more profitable than the traditional way of being a freight forwarder. What if the increased efficiency instead manifests itself as lower costs for the cargo owners, just as we always see when liner shipping companies obtain better efficiencies only to have it eroded by lower freight rates?

I have no doubt that shipping will undergo significant digitization in the coming years. But that does not conversely mean that all tech solutions out there will necessarily thrive—and it may well be that some of the valuations we are beginning to see in shipping are rather optimistic.

SOURCE:
www.linkedin.com/pulse/shipping-tech-now-bubble-1000-increase-valuation-3-months-lars-jensen/?published=t



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www.oceannews.com/news/science-technology/maersk-and-ibm-to-apply-blockchain-technology-to-shipping-industry

MAERSK & IBM to Apply Blockchain Technology to Shipping Industry

A.P. Moller - Maersk and IBM have announced their intent to establish a joint venture to provide more efficient and secure methods for conducting global trade using blockchain technology. The aim of the new company will be to offer a jointly developed global trade digitization platform built on open standards and designed for use by the entire global shipping ecosystem. It will address the need to provide more transparency and simplicity in the movement of goods across borders and trading zones.

The cost and size of the world's trading ecosystems continues to grow in complexity. More than \$4 trillion in goods are shipped each year, and more than 80% of the goods consumers use daily are carried by the ocean shipping industry. The maximum cost of the required trade documentation to process and administer many of these goods is estimated to reach one-fifth of the actual physical transportation costs. According to The World Economic Forum, by reducing barriers within the international supply chain, global trade could increase by nearly 15%, boosting economies and creating jobs.

The attributes of blockchain technology are ideally suited to large networks of disparate partners. A distributed ledger technology, blockchain establishes a shared, immutable record of all the transactions that take place within a network and enables permissioned parties access to trusted data in real time. By applying the technology to digitize global trade processes, a new form of command and control can be introduced into the flow of information, empowering multiple trading partners

to collaborate and establishing a single shared view of a transaction without compromising details, privacy, or confidentiality.

IBM and Maersk began a collaboration in June 2016 to build new blockchain-and cloud-based technologies. Since then, multiple parties have piloted the platform, including DuPont, Dow Chemical, Tetra Pak, Port Houston, Rotterdam Port Community System Portbase, the Customs Administration of the Netherlands, and U.S. Customs and Border Protection.

Maersk and IBM are establishing an advisory board of industry experts to help further shape the platform and services, provide guidance and feedback on important industry factors, and drive open standards. Upon regulatory clearance, solutions from the joint venture are expected to become available within six months.

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ROV/AUV Mounted Sediment Corer from OSIL

UK-based Ocean Scientific International Ltd (OSIL) have released an innovative new sediment corer designed to be mounted to the skids of ROVs or AUVs. The self-contained system will allow sediment samples to be collected during routine ROV operations and can be daisy chained together to allow multiple core assemblies to be installed as one system. The assemblies are powered and controlled by the customers' own skid control unit and have been pressure tested for use in depths of up to 1,200m, with deeper units currently in development.

The design is based around the industry standard multiple (multi) corer, and each assembly recovers a 400mm sample containing 300mm sediment and 100mm supernatant water. Disturbance of the sample is minimal as the core tubes seal after sampling to preserve the

sediment/water interface, and the rate of penetration can be adjusted to suit environmental conditions.

Each complete assembly weighs approximately 12kg in air and exerts a downward penetration force of up to ~15kg. On recovery, the core tubes can be recovered and replaced swiftly and can either be sampled directly or frozen and sampled subsequently.

OSIL's precision engineering facilities allowed a development prototype to be demonstrated to the customer before the final design specification was agreed upon.



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FURUNO INTRODUCES NEW ICE AND OIL DETECTING RADARS



FICE100



FOIL200

Furuno has introduced two specialty add-on components for the award-winning X7 SERIES RADAR LINEUP.

The new FICE100 Ice Radar assists navigation in treacherous arctic waterways, while the FOIL200 Oil Radar aids first responders, helping to minimize damages that can result from costly environmental accidents.

With the addition of the FICE100 Ice Detecting Radar kit, compatible with any Furuno X7 Radar, navigators can easily visualize ice structures and determine the optimum route for the ship to go through the ice. Finding and using these existing lanes means vessels will consume much less power, saving fuel and time. As a supplementary system for existing Navigation Radars, the Furuno FICE100 is a cost-effective alternative to an infrared camera.

The FOIL200 Oil Detection Radar utilizes the raw radar video from the X7 processor to detect oil spills on the surface of the water. When a spill

occurs, the slick created can be mere millimeters thick, and the special, high performance algorithm of the FOIL200 is used to process and analyze raw radar video to detect oil spills and mark them on the radar display. The FOIL200 Oil Radar detects oil automatically, creating a polygon to mark the spill. Vessel operators can also mark oil spills manually with polygons and update the data whenever required.

Both the FICE100 and FOIL200 components allow for the capture of screenshots and provide the ability to record raw radar video to an external hard disc or memory drive for evaluation or training purpose.

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The OCEAN OBSERVATORY INITIATIVE is Up and Running

BY LONNIE LIPPSETT | Woods Hole Oceanographic Institution

After decades of planning, the Ocean Observatories Initiative is up and running. The \$386 million project, funded by the National Science Foundation, establishes long-term platforms that can monitor ocean conditions 24/7 for decades.

ABOUT THE INITIATIVE

Sailors and scientists have gone to sea for centuries to unravel the inner workings of the watery region that covers two-thirds of our planet. But they have always had to return soon to land, so they could only capture snapshots of what's happening in the ocean.

But the ocean is a dynamic place. Scientists aspired to get more than just intermittent glimpses.

In the 1980s, ocean scientists began to dream about changing the game. They envisioned planting sustained outposts in the ocean to collect measurements and monitor conditions 24/7—for decades. Such detailed, ongoing data would enhance scientists' ability to observe complex processes and changes that occur over seasons, years, and decades in the oceans, to understand gradual impacts that might unfold as Earth's climate changes, and to "be there" when unusual phenomena occur.

In 2007, the National Science Foundation launched a \$386 million project to establish a long-term presence in the ocean: the Ocean Observatories Initiative, or OOI. It is the NSF's largest investment in ocean science, consisting of 83 platforms, including moorings anchored on the seafloor or connected to seafloor cables in scientifically strategic locations in the Atlantic and Pacific Oceans. The moorings house a cornucopia of sensors to collect data on chemical, biological, and physical conditions from the water's surface down thousands of feet to the ocean floor. Scientists can also use the platforms for their own instruments.

The observatories generally operate around the clock, 365 days a year, with a planned life of 25 years. They are augmented by remotely controlled robotic vehicles and gliders that swim between and beyond the moorings, collecting data. The growing trove of data is freely available online in near-real time.

The OOI program reached a milestone in 2016 when its network of ocean sensor systems became fully deployed and operational. From OOI's inception, Woods Hole Oceanographic Institution has been a major partner in the project,

along with Oregon State University, Rutgers University, and the University of Washington. In 2009, WHOI began the design and construction of Global Arrays to be deployed in remote high-latitude regions and a Coastal Pioneer Array, off New England. WHOI scientists and engineers now regularly travel to the arrays to maintain and upgrade them.

The goal is to provide data on the ocean to scientists, policymakers, educators, students, and the general public and transform their ability to explore and understand the ocean.





Samuel de Champlain to be First LNG-Converted Dredger

The conversion into dual fuel of Trailing Suction Hopper Dredger (TSHD) *Samuel de Champlain* is now in its active preparation phase. It is the main part of the EU-funded S/F SamueLNG Project, led by French DRAGAGES-PORTS EIG, which has the overall aim to improve the sustainability of marine traffic through the use of marine liquefied natural gas (LNG) as an alternative to conventional ship fuels for vessels.

Following a public tender for the conversion work, in 2017, the contract was awarded, on 6 July, to DAMEN SHIPREPAIR & CONVERSION HOLDING BV by DRAGAGES-PORTS EIG. The TSHD *Samuel de Champlain*, which currently only uses diesel oil, will be converted to dual-fuel (liquefied natural gas/diesel oil). This tender, worth € 20.8 million, includes a major phase for the replacement of gensets and the inboard installation of LNG tanks and networks as well as an optional phase for the maintenance of the genset and associated equipment for a period of 8 years.

Jean-Pierre Guellec, CEO of DRAGAGES-PORTS, said "This LNG conversion of a dredger vessel is the first of its kind in the world. It will generate significant environmental gains through reduction of nitrogen oxides, carbon dioxide, and particles emissions beyond current standards."

Studies and equipment orders started during summer 2017. The conversion operation itself will last 3.5 months, from September 2018 onwards, in DAMEN's Dunkirk shipyard. Alexandre Richerd, DAMEN's sales manager, commented "This contract proves DAMEN Group's ability to offer its customers turnkey solutions for complex conversions integrating engineering and procurement as well as its desire to develop its activities in the LNG sector."

The *Samuel de Champlain* dredger will be equipped with three new dual-fuel MAN 6L35/44DF gensets and two C-type tanks with a working capacity of 153 m³ each, which will allow a full week's operation.

The exemplary nature of this operation, which is part of a larger European project called "S/F SamueLNG," means it has the financial support of the European Union, via the Connecting Europe Facility (CEF)—without which this operation wouldn't have been possible.

Furthermore, this conversion is a step towards the energy transition for the owner (DRAGAGES-PORTS EIG) and the operator (Nantes-Saint Nazaire Port) of the *Samuel de Champlain*.



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BIGGER, BETTER, BRIGHTER.

Running from Tuesday, 13 March to Thursday, 15 March at the ExCel, London, the 2018 Oceanology International (Oi) exhibition and conference is predicted to be the most broad-based undertaking since the biennial event's inception in Brighton, UK in 1969, with more than 500 exhibitors from 79 countries earmarked to attend.

Getting the most out of visiting Oi London is promised to be easier than ever this year, thanks to thoughtful, time-saving incentives, including the MyEvent networking tool, which allows visitors to plan and arrange their schedule in advance; a digital Exhibitor Hub; a series of OceanSocial networking events (staged in the run-up to the show and during it); and an online booking system for securing accommodation.

Indicative of the show's consistently expanding status and influence, Oi London is now compounded by sister exhibitions in the U.S. and China (Oi Americas and Oi China), and this year's event will focus particularly on technological developments such as autonomous systems, advanced sensor technology, and robotics. However, beyond its basic remit as an expansive shop window for the most innovative and

essential advancements in ocean hardware, software, and research, Oi London boasts an equivalent value as a collaborative forum, enabling professionals from a series of different but interrelated disciplines and industries to exchange information and ideas, while granting prospective buyers a direct point of contact with exhibitors.

"Oceanology International has set itself as a benchmark for showcasing the latest technology within the industry," notes Chris Zee, group marketing and digital marketing manager at Oceanscan Ltd (stand number F570), based in Aberdeen. "It continues to



This long-running marine science exhibition and conference showcases the keenest minds and most innovative technology from around the world.

offer us the opportunity to network with our customers and understand their needs even more, while working with our suppliers to make sure we have the right solutions for our clients' needs."

Among the first-time exhibitors confirmed for Oi London 2018 is the Russian firm Romona Inc (stand number H241), a company with more than 25 years of experience that is aiming to promote its marine survey services for the oil & gas industry. Also making its first appearance at Oi London is Zunibal (stand number A405), based in Spain; the firm intends to launch a newly designed wave measurement buoy at the show.

Another company making its show debut is the UK-based KW Designed Solutions (stand number B451), which will be highlighting its existing product range and emphasising its position as a leading supplier of bespoke pressure vessels, pressure testing equipment, and associated pressure control systems. Demonstrations on the KW Designed Solutions stand will include a display of the ability to mate and de-mate electrical connectors during electrical testing within a pressure vessel, while subjecting the connectors to harsh subsea conditions.

"Hopefully, attending the show will develop and strengthen our brand while

showcasing the products and services KW Designed Solutions has to offer," says marketing coordinator Craig Morris. "Ultimately, generating leads increases our customer base."

Alongside these newcomers to Oi London will be long-time exhibitors, including Kongsberg Maritime (stand number D600), a world-leading manufacturer of marine electronics and subsea instrumentation. The firm will be showcasing its latest products for deployment in subsea environments, including seabed mapping, cameras, AUVs, and underwater acoustic positioning and will carry out live demonstrations.

"we've surpassed ourselves in presenting the most comprehensive showcase of products and innovative streams of thought..."



Also in attendance will be the Norwegian company Miros AS (stand number C250), which has been exhibiting at Oi events since 1998. The firm will launch the new stand-alone SM-050 Wave Radar with embedded wave processing and Web interface utilising modern IoT technologies. Miros will also present their entire range of remote sensing wave monitoring and oil spill detection products and metocean system solutions.

In addition to the exhibition element, ExCel London's location—adjacent to the Royal Victoria Dock—will enable suppliers to stage equipment demonstrations on the water. Visitors will be able to experience product demonstrations live on the Royal Victoria Dock, either on-board participating exhibitor vessels or from a covered dockside cabin with a programme of in-and on-water product demonstrations taking place throughout the week.

Meanwhile, the Oi London 2018 conference schedule casts a characteristically wide net in bringing to light some of the most pressing challenges currently facing the marine science community while also discussing the most promising and encouraging

technological advances. Central to the schedule is a series of linked, free-to-attend conference strands, Technical Tracks, which will enable participants to delve into given themes in gratifying detail. The first of these, the Hydrography, Geophysics & Geotechnics track (South Gallery Rooms 7 & 8), takes place on Tuesday, 13 March. The track is split into three areas, beginning with "Focus on Hydrography" from 10:00-11:25, continuing with "Focus on Geophysics" at 11:35 (with a break for lunch at 13:00, resuming from 14:15-15:40), and concluding with "Focus on Geotechnics" from 16:00-17:25.

Also running on Tuesday, 13 March is the first part of the Unmanned Vehicles & Vessels track (South Gallery Rooms 3 & 4). The opening day of this track will concentrate on "Unmanned Multi-Vehicle Collaboration: Maritime Security Applications" (13:00-14:25). "Industry Applications for Unmanned Vehicles" follows between 15:00-16:55.

Two other Technical Tracks take place on Tuesday, 13 March. The Offshore Aquaculture track (South Gallery Room 9) is split into four sections: "Collaborations, Regulations & Research as Aquaculture Moves into

Harsher Environments" (10:00-11:25), "Is this the Future of Offshore Fish Farms?" (11:45-12:50), "Equipment and Services for a Developing Offshore Aquaculture Sector" (13:45-15:30), and "Monitoring Technology for Offshore Aquaculture" (15:45-17:10).

Tuesday's programme of Technical Tracks is rounded out by the Ocean Observation & Sensing track (South Gallery Room 5), which is divided into three sections: "Ocean Observing Systems Design, Methods and Operations" (10:00-12:00), "Developments in Sensors, Instrumentation and Measurement Techniques" (13:00-15:00), and "Developments in and Use of New Platforms for Ocean Observing" (15:15-17:15).

Wednesday, 14 March, day two of the Unmanned Vehicles & Vessels track (South Gallery Rooms 3 & 4) proceeds with sections given over to "Unmanned Multi-Vehicle Collaboration: Ocean Mapping and Monitoring Applications" (10:00-11:55), "Expanding Capabilities of Unmanned Vehicles" (13:00-14:40), and "Unmanned Vehicles: Communications & Data" (15:00-15:55). On the same day, the Offshore Oil & Gas track (South Gallery Rooms 7 & 8, 10:00-17:00)

will concentrate on "Improved Tools & Techniques for Subsea Inspection" and "Digitalisation and Data-Driven Solutions delivering Operational Excellence."

Two new technical tracks round out the programme on Wednesday, 14 March. The Ocean Information & Communications Technology track (South Gallery Room 9) shares its focus between "Ocean ICT Enabling Enhanced Marine Platform Command & Control" (10:00-11:45) and "Widening Access to Ocean Data" (13:00-14:30), while the three-part Underwater Imaging & Metrology track (South Gallery Room 5, 10:00-12:10, 13:00-14:45, 15:15-17:00) takes a close look at emerging techniques and technologies for marine imaging and metrology.

On Thursday, 15 March, the Navigation & Positioning track (South Gallery Rooms 3 & 4) will discuss "Surface Navigation & Positioning: Modern Issues...Modern Solutions" (10:00-12:10) and "Subsea Acoustic Positioning: Faster, Better...and Cheaper?" (13:15-15:25), while another new Technical Track, the Marine Renewables track (South Gallery Rooms 7 & 8), will examine "Feasibility Studies, Data Resources and

"Research" (10:00-12:05), "Pre-installation Survey Activities" (13:00-14:45), and "Structural and Environmental Monitoring" (15:00-16:25).

In tandem with the main conference programme, a series of parallel showcases have also been scheduled, beginning with the half-day Ocean Futures Forum (09:30-13:30, Tuesday, 13 March). This forum, bringing heads of business together with senior strategists, will consider the future trajectory of the blue economy and the implications for emerging science and technology and will be followed with a networking lunch. Registration costs £100 + VAT.

Meanwhile, Catch The Next Wave 2018: Frontiers of Exploration (Platinum Suite, 09:30-17:00, Thursday, 15 March), arranged in association with The Explorers Club, emphasises the fruitful symbiosis between exploration and technology. As Catch the Next Wave 2018 chairman Ralph Rayner points out: "This creatively stimulating conference will draw upon the combined insight and expertise of leading explorers and ocean professionals to highlight demonstrable technological achievements that are aiding exploration and research

while stressing the ongoing importance of technological progress." Registration costs £100 + VAT.

In addition, the Ocean ICT Expo will assemble a line-up of specifically targeted IT and data professionals who will host presentations and discuss the continuous demand for marine and ocean IT, communications, satellite, and data storage solutions. Of paramount interest is the steadily increasing accumulation of data from the ocean space, to which end interoperable systems for data acquisition, transfer, storage, and analysis are already being refined. (At Oi 2016, the technologies identified as "most important in two years' time" were advanced sensors, autonomous systems and robotics, big data and analytics, and satellite and communications.)

An extra source of business-focused advice is provided by the Oiltech Investment Network's (Oiltech) Entrepreneurs' Advisory Workshop in the Investment, Trade & Innovation Theatre. This returning event is intended to assist providers of new technologies (particularly those ready for field trials) in opening up dialogues with potential sources of partner funding as well as tendering

advice in associated areas including legal, intellectual property, and finance.

Also taking place in the Investment, Trade & Innovation Theatre, the New Technology Showcase (Wednesday, 14 March and Thursday, 15 March) will allow a number of exhibitors to display their new products and technologies to a wide variety of representatives from the marine science and ocean technology industries. Presenters confirmed to date include H2O Robotics, Ocean Alpha, Sound Metrics, Teledyne Marine, and Tritech.

Thursday, 15 March has also been designated as the event's Careers Day, presenting university students considering a career in the marine sector with an opportunity to network with exhibitors. An "Oceanology International Exhibition Trail" has been devised to guide students through the show, while two workshops—the SUT Women in Industry Panel (10:00-11:30) and the IMarEST Careers Workshop (13:30-16:00)—will put them directly in touch with young peers who have already gained a foothold on the career ladder and expose them to industry veterans and advice on how to access sources of support and employment.

Finally, the co-located Interspill conference and exhibition (13-15 March) is devoted to the study of potential issues to be raised from future oil spills, including spill prevention, preparedness, response, and restoration. The event will provide a unique platform for oil spill industry professionals, academics, and government representatives to meet, discuss, and network.

"The range and variety of initiatives, incentives, and areas of content to be found across the Oceanology International exhibition and conference are always impressive," remarks David Ince, Oceanology International event manager, Reed Exhibitions. "This year, however, especially when taking the parallel events into consideration, I think we've surpassed ourselves in presenting the most comprehensive showcase of products and innovative streams of thought on the absolute cutting edge of marine science and ocean technology. The challenges facing the ocean community are complex and innumerable, and it's greatly encouraging to see so much demonstrable effort being devoted to confronting these issues head on."

There's Always MORE TO BE DONE

*The innovative life of HOWARD SHATTO,
the father of Dynamic Positioning.*

Howard Shatto, a man beloved by many in the marine technology industry, passed away on 21 January 2018 at age 92. He was known as The Father of Dynamic Positioning, but his contributions to marine technology cannot be summed up in a single phrase.

"In addition to his many awards, patents, and other outstanding professional accomplishments, Howard was one of the nicest people I ever had the pleasure of knowing over four decades in the offshore industry," said Drew Michel, ON&T Advisory Board. "He was a truly a great person and a good friend. Those of us who were fortunate enough to be close to Howard and his family shared many great dinners and other gatherings. He will be missed."

A Yale graduate, Howard Shatto began his career with Shell in 1946, where he built Shell's first diesel electric drilling rig by converting a former swamp rig into an offshore unit. Deployed in the Louisiana Main Pass, it drilled Shell's first offshore wells. This was just the beginning of a career that spanned an unparalleled period of innovation in marine technology.

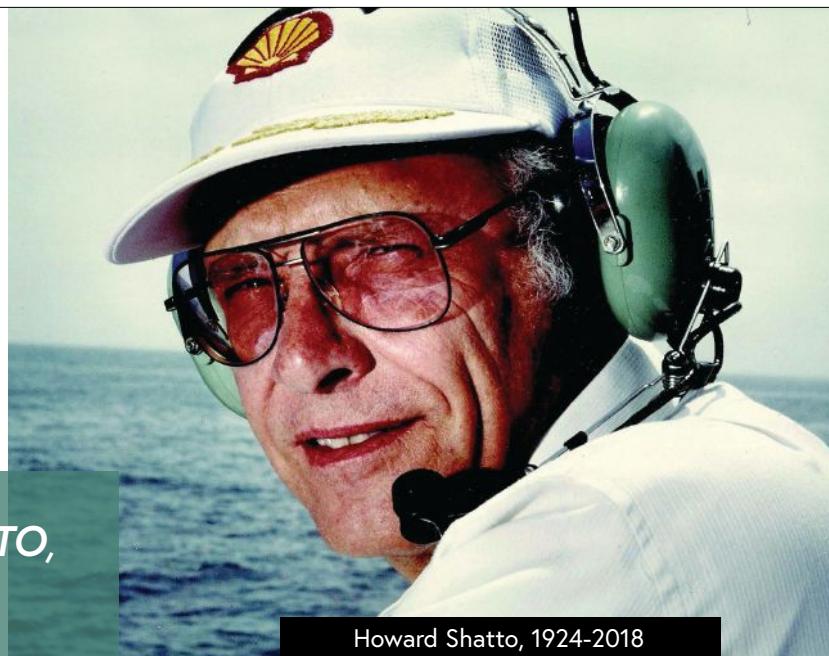
For example, Howard led in the development of ROVs for intervention on the first subsea blowout preventers for drilling and production. He conceived the world's first automatic control for dynamic positioning on

Shell's *Eureka* core drillship in 1960, and in 1970 he made industry history with the *Sedco-445*, the world's first DP oil exploration riser-equipped drillship. Since then, over 4,000 DP systems have been built worldwide using Howard's initial concepts.

“As an innovator, the fact that many of his ideas were initially met with skepticism did not deter him.”

A holder of 35 U.S. patents, his technical achievements are only matched by the number of awards bestowed on him. These include the Offshore Technology Conference Distinguished Achievement Award in 2001, the Dynamic Positioning Committee's Life Achievement Award, the Blakely Smith Medal in 2007, and many others.

Howard served on numerous committees, including the Marine Technology Society (MTS) Dynamic Positioning Committee and the Technical Advisory Panel of the multi-national Ocean Drilling Program for Earth Sciences. He was inducted into the Offshore Energy Center Hall of Fame



Howard Shatto, 1924-2018

in 2000. He authored papers that were presented at the Offshore Technology Conference, Society of Naval Architects and Marine Engineers (SNAME), the World Petroleum Congress, and Dynamic Positioning Conferences. He also wrote the *Ocean Engineering Handbook*'s chapter on ROVs.

Throughout his life, Howard's passion for improving dynamic positioning reliability and sharing of knowledge did not falter. Upon Howard's passing, the Dynamic Positioning Committee of MTS released a statement that said, "While we mourn his passing, his motto 'There's always more to be done' will long stand as an inspiration to the industry he helped shape—and loved—and to those who follow in his footsteps."

Resource: The Dynamic Positioning Committee of the Marine Technology Society.



SHELL & CHEVRON Announce Major Discoveries in Gulf of Mexico

Shell Offshore Inc. ("Shell") has announced one of its largest U.S. Gulf of Mexico exploration finds in the past decade from the Whale deepwater well. The well encountered more than 1,400 net ft (427m) of oil bearing pay. Evaluation of the discovery is ongoing, and appraisal drilling is underway to further delineate the discovery and define development options.

"Deepwater is an important growth priority as we reshape Shell into a world-class investment case," said Andy Brown, upstream director for Royal Dutch Shell. "Today's announcement shows how, through exploration, we are sustaining a strong pipeline of discoveries and future projects to sustain this deep-water growth."

Whale is operated by Shell (60%) and co-owned by Chevron U.S.A. Inc. (40%). It was discovered in the Alaminos Canyon Block 772, adjacent to the Shell-operated Silvertip field and approximately 10 miles from the Shell-operated Perdido platform.

This major discovery in a Shell heartland adds to the company's Paleogene exploration success in

the Perdido area. Through exploration, Royal Dutch Shell has added more than one billion barrels of oil equivalent resources in the last decade in the Gulf of Mexico.

Shell currently has three Gulf of Mexico deepwater projects under construction—Appomattox, Kaikias, and Coulomb Phase 2—as well as investment options for additional subsea tiebacks and Vito, a potential new hub in the region. The Shell group expects its global deepwater production to exceed 900,000 boe/day by 2020, from already discovered, established areas.

Chevron Makes Major Discovery at Ballymore

Chevron Corporation announced a significant oil discovery at the Ballymore prospect in the deepwater U.S. Gulf of Mexico. Ballymore is located in the Mississippi Canyon area of the U.S. Gulf of Mexico, approximately 3mi from Chevron's Blind Faith platform, in water depth of 6,536ft. The initial Ballymore well reached total measured depth of 29,194ft and encountered more than 670ft net oil pay with excellent reservoir and fluid characteristics. A sidetrack well is currently being drilled to further assess

the discovery and begin to define development options. Chevron subsidiary Chevron U.S.A. Inc. is the operator with a 60% working interest in the Ballymore prospect. The co-owner is TOTAL E&P USA Inc. (40%).

The Ballymore well was drilled by Pacific Drilling's Sharav deepwater drillship.

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SHELL to Redevelop Penguins Field in UK North Sea

Royal Dutch Shell plc (Shell) announce a final investment decision on the redevelopment of the Penguins oil and gas field in the UK North Sea. The decision authorizes the construction of a floating production, storage and offloading (FPSO) vessel, the first new manned installation for Shell in the northern North Sea in almost 30 years.

The redevelopment is an attractive opportunity with a competitive go-forward break-even price below \$40 per barrel. The FPSO is expected to have a peak production (100%) of circa 45,000 boe/d. The Penguins field currently processes oil and gas using four existing drill centers tied back to the Brent Charlie platform. The redevelopment of the field, required when Brent Charlie ceases production, will see an additional

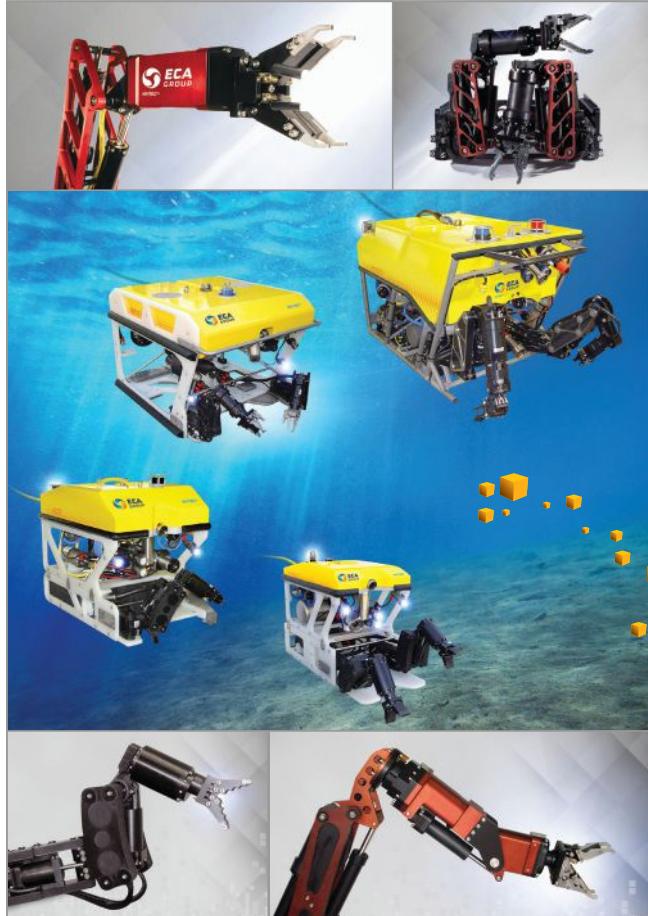
eight wells drilled, which will be tied back to the new FPSO vessel. Natural gas will be exported through the tie-in of existing subsea facilities and additional pipeline infrastructure.

The Penguins field is in 165m of water, approximately 150mi northeast of the Shetland Islands. Discovered in 1974, the field was first developed in 2002 and is a joint venture between Shell (50% [operator]) and ExxonMobil (50%).

A joint venture-owned/Shell-operated Sevan 400 FPSO has been selected as the development option for the field. Oil will be transported via tanker to refineries and gas will be transported via the FLAGS pipeline to the St Fergus gas terminal in northeast Scotland.



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STONE ENERGY Announces Mt. Providence Drilling Success in Gulf of Mexico

Stone Energy Corporation has announced drilling success at the deepwater Mt. Providence development well at Mississippi Canyon Block 28. Stone generated the prospect and owns a 100% working interest in the well.

The Mt. Providence well encountered approximately 153 net ft of high quality, primarily oil pay in one Miocene interval with no visible water level, which exceeded pre-drill expectations. Completion operations on the Mt. Providence well will commence in the second quarter of 2018, with first production expected early in the third quarter of 2018. The well is expected to have an initial production rate of approximately 3,000 to 5,000 boe/d and will be tied back to the 100% Stone-owned Pompano platform through existing subsea infrastructure.

Interim chief executive officer and president James M. Trimble stated, "This successful well will quickly generate additional production and cash flow with minimal incremental operating cost since we can capitalize on existing subsea infrastructure and available capacity at our Pompano platform. I appreciate the efforts of the entire Stone team that contributed to this success."

Separately, the Derbio well is now expected to spud in the first quarter of 2018, with results expected early in the second quarter of 2018. Derbio is a Stone-generated prospect and follows the Rampart Deep success announced in September 2017. If successful, the Rampart Deep/Derbio project could be a multi-well tie back to the Stone 100% owned Pompano platform, with first production expected by late 2019.



Working interest partners in the Derbio prospect are Stone with **40%**, Deep Gulf Energy III, LLC with **30%** (Operator) and entities managed by Ridgewood Energy Corporation (including Riverstone Holdings, LLC and its portfolio company ILX Holdings III, LLC) with **30%**.

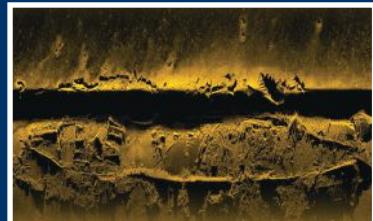
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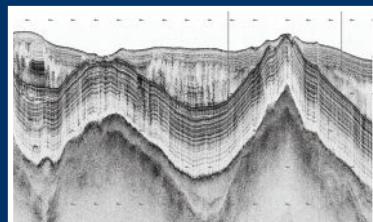
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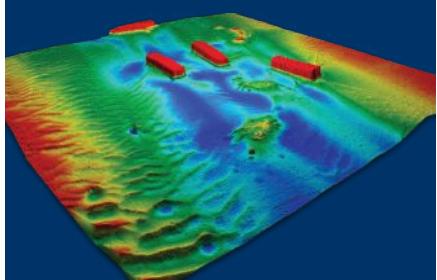
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World Oil and Gas Council Names EXXONMOBIL 2017 EXPLORER OF THE YEAR

ExxonMobil has been named 2017 Explorer of the Year by the World Oil and Gas Council in recognition of excellence and innovation in the global energy industry.

During the year, ExxonMobil announced a number of discoveries, acquisitions, and other activities in various countries, including Brazil, Cyprus, Equatorial Guinea, Guyana, Mauritania, Papua New Guinea, and Suriname.

Significant exploration activity took place offshore Guyana, where ExxonMobil announced four discoveries in 2017 at Payara, Liza Deep, Snoek, and Turbot. These four discoveries added to the earlier Liza discovery, made in 2015.

Mike Cousins, executive vice president of ExxonMobil Exploration Company, accepted the award on behalf of ExxonMobil at an award dinner in London in December. He was accompanied by a number of company representatives, including Kerry Moreland, Guyana Basin exploration manager.

"Guyana has become an exciting exploration area where we have consistently demonstrated our technical ability in deepwater exploration and operations," said Moreland. "We are planning for continued success with our drilling program in 2018."

Since receipt of the award in December 2017, ExxonMobil has announced a sixth discovery offshore Guyana at the Ranger-1 exploration well.

"This award is recognition of ExxonMobil's successful efforts to strengthen our portfolio by accessing and discovering the highest quality resources," said Steve Greenlee, president of ExxonMobil Exploration Company. "This recognition would not be possible without the dedication of our employees and their daily commitment to safety and operational excellence at every stage of exploration."

FOR MORE INFORMATION, VISIT

www.oceannews.com/news/energy/world-oil-and-gas-council-awarded-exxonmobil-2017-explorer-of-the-year



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New Jersey Governor Signs Order to Promote OFFSHORE WIND ENERGY

On 31 January 2018, New Jersey Governor Phil Murphy signed an Executive Order directing the New Jersey Board of Public Utilities to fully implement the Offshore Wind Economic Development Act (OWEDA) and begin the process of moving the state toward a goal of 3,500 megawatts of offshore wind energy generation by the year 2030.

"Little progress has been made on offshore wind development in New Jersey despite a pledge from the previous administration to facilitate our growth of offshore wind," Governor Murphy said. "We cannot allow for stagnation in this growing sector of our energy economy, and we cannot lose sight of the tremendous opportunity for offshore wind at the Jersey Shore. With this Executive Order, we begin the process of making New Jersey a leader in offshore wind, a critical step toward achieving our clean energy goals."

In 2010, Governor Christie signed OWEDA, a piece of legislation allowing state agencies to craft an Offshore Wind Renewable Energy Credit (OREC) program. But despite OWEDA being signed eight years ago, gaps remain in the regulations for implementing the OREC program and offshore wind developers have not obtained the necessary approvals from the New Jersey BPU to move forward.

Governor Murphy's Executive Order directs the BPU to begin the rulemaking process

to fill the gaps in the current regulations governing the OREC program. The Order also directs BPU President Joseph Fiordaliso and New Jersey Department of Environmental Protection Commissioner Catherine McCabe to work together to establish an Offshore Wind Strategic Plan for New Jersey. The plan will focus on critical components of offshore wind development, including job growth, workforce development, data collection, and appropriate determination of facilities as well as ensuring that natural resources are protected.

Under the Order, BPU will implement the OREC program by approving financial plans submitted by offshore wind developers. After the creation of a process to approve such plans, the BPU will issue a solicitation calling for proposed offshore wind projects for the generation of 1,100 megawatts of electric power—the nation's largest such solicitation to date. Finally, the Executive Order instructs the BPU to engage with neighboring states on the potential benefits of regional collaboration on offshore wind.

"Our goal is to grow offshore wind in a way that creates jobs and reduces our dependence on fossil fuels," Governor Murphy said. "New Jersey is committed to growing our clean energy sector, and offshore wind is at the crux of increasing that part of our economy."



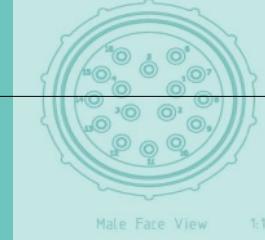
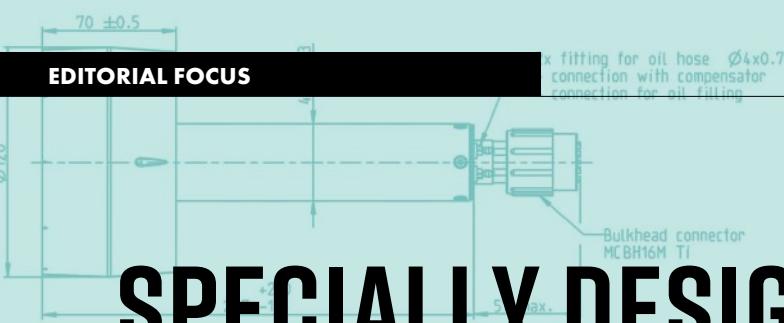
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nj.gov/governor/news/news/562018/approved/20180131a_eo.shtml

A diagram illustrating the RJE Seeker acoustic directional receiver. It shows a vertical line representing depth, with markers at -500m, -1,000m, -6,000m, and -8,000m. At the top, a small cylindrical device labeled "SEEKER" is shown emitting sound waves. Below it, a larger ROV or AUV is depicted with its lights on, tracking a red cylindrical beacon. The RJE logo is visible in the bottom right corner.

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SPECIALLY DESIGNED Underwater Drives

To design and build an energy-efficient and pressure-compensated drive system suitable for weathering the harsh conditions found in deep-ocean applications, the engineering team at maxon motor performed hydrodynamic analyses in order to select the proper components to use as well as provide a customized propeller design.

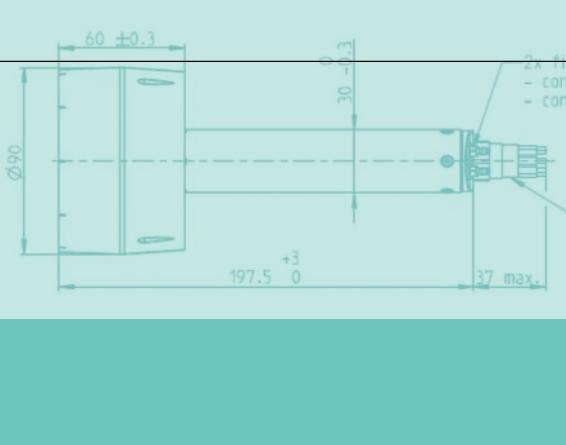
Designing a thruster series like maxon's MT20, MT30, MT40, and MT70 for deep-sea operations such as those found in oil surveying or sea life tracking operations starts with understanding the specific application requirements of the user. For example, a device that will be used to travel long distances to conduct surface measurements underwater would not only require long-life motors, high-power gearheads, and control electronics, but a rotary thruster design with a propeller system geared specifically toward efficient and accurate forward motion. The right motor and gearbox would be needed to produce the torque necessary for the forward thrust as well as the speed required for the application. Such a design in the actuator drive system easily gains capabilities when the design team also matches the nozzle and propeller design and configuration to allow for strict limitations in reverse thrust capabilities.

On the other hand, if an application required the use of a robotic system that needed to move equally well in both forward and backward directions while performing inspections in tight situations or for local area data collection operations, it would require a totally different propeller and nozzle design and configuration. With the proper hydrodynamic analysis, these different propeller and nozzle designs become key system components in the overall thruster operation. Calculation of the bollard thrust often dictates parameters such as the number of blades incorporated into the thruster, the pitch angles used, and the overall diameter of the thruster based on other components in the system. The calculations also help with nozzle dimension and design.

Nozzle characteristics can change depending on the application as well. For greater forward thrust, the nozzle can be closed off at the rear of the propellers, plus be located closer to the blades, driving the water through at a higher rate of force. For more dynamic motion operations, the nozzle can be built open on both sides, allowing for equal forward and backward thrust if necessary. Just as important is that the proper analytical data affect the design of the actual geometry of the blades themselves—where and how curves and slopes appear and at what angle and what rate. Additional concerns, relevant to the internal design of either thruster, include the speed at which the blades will be rotating, the length of time they'll be in operation, and their torque during the variety of operations for which the specific unit is built.



FOR MORE INFORMATION,
contact aquaticsolutions@maxonmotor.com or
visit aquaticsolutions.maxonmotor.com.



MAXON HAS PUT TOGETHER A TEAM OF PROFESSIONALS—FROM RESEARCH, ENGINEERING, AND MANUFACTURING—who understand the system characteristics necessary for these types of deep-sea underwater concerns and can **FIND THE SWEET SPOT** in the final design while maintaining a low-vibration and low-noise system. It's important to note that the nozzle and propeller design portion of the thruster strongly impact the design of every specific component in the system, so **IT HAS TO BE RIGHT**.

INTERNAL SYSTEM DESIGN ELEMENTS

To meet the stringent needs of the deep ocean, components for underwater applications often require specific design modifications. For example, the rotary actuator enclosure had to take into consideration a number of factors, including extreme external pressures; the harshness of the saltwater environment of the open ocean; the special cooling needs of the internal electrical and electronics components being used; and the diameter, shape, and weight of the actuator itself. For example, the diameter of the long cylinder of the actuator critically affects the entire operation of the thruster due to additional water resistance as the diameter increases in addition to the cantilever effects of the cylinder.

The maxon team came up with a design for a strong, sealed enclosure that consisted of a polymer tube, a titanium back flange where a standard connector is attached, a titanium front flange, and a titanium output shaft. The team selected to use titanium for exposed components

to provide the best resistance to the corrosive saltwater environment—the use of various other metals would have created additional problems. For example, most other metals used in the past deteriorated quickly under the harsh saltwater environment. This type of situation, if used on the actuator, would cause the deteriorated elements to leak water into the internal compartment and destroy the electronics or motor, shorting them out. This would cause a loss of the AUV and a great financial loss for the customer, as the AUV would not emerge from the ocean bottom.

The entire actuator enclosure is oil filled, a decision that has multiple purposes for the system. One key reason to use oil is to maintain lubrication for the gearhead. Another is to help keep the motor and electronics cool while in operation for long periods of time. Note that the planetary gearheads used in the "maxon thrusters" are not only lubricated using the oil, but provide circulation for the oil through a minor mechanical modification to the gearhead. During operation, the gearhead pumps the oil through a

small tube, allowing the oil to circulate continually throughout the system. This seemingly minor adaptation is a design modification that allows the overall system to be smaller, lighter, and provide greater efficiencies in operation, always a benefit to the user.

Also, an external pressure compensator is part of the actuator system. The compensator incorporates a spring-loaded membrane and oil reservoir that can be over-pressured at the factory from between 0.2 and 0.7 atmospheres as needed. The compensator is connected to the rotary actuator assembly using a small tube. This standard design is used to help the internal components adjust to the outside pressure variations as the device dives into the depths of the ocean. The entire system was designed for use for up to 6,000m (19,685ft), which puts about 604 bar of pressure (about 8,762psi) on the actuator when at depth. The overall system was tested using a research facility pressure test tank at its maximum capability.

ROVCO Completes Wave Hub Survey Project

UK-based Rovco has successfully completed a subsea cable survey and inspection for the world's largest and most technologically advanced offshore renewables test site, Wave Hub.

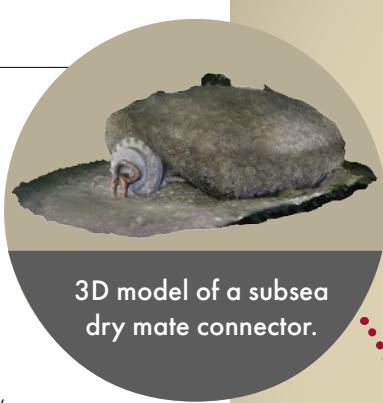
The inspection program included the first commercial trial of Rovco's 3D visualization technology to create scaled, high-resolution models of subsea infrastructure with millimeter accuracy.

Rovco also delivered a detailed bathymetric survey utilizing a state-of-the-art multibeam echosounder (MBES), alongside an ROV video inspection with ultra-short baseline tracking for Wave Hub's entire offshore cable network, off the coast of Saint Ives Bay, Cornwall.

The 3D system collects raw data that are then processed to obtain 3D volumetric information, ensuring a true representation of the underwater environment. With short mobilizations and no need for large specialist vessels or technical support teams, the system generates cost savings of up to 80% compared with traditional survey methods.

The project, won through a competitive tender, was completed in 10 days over short weather windows to avoid strong winds and rough sea conditions. The first phase utilized the MTS Xplorer vessel to carry out the MBES survey. The second stage saw the deployment of Rovco's Sub-Atlantic Mojave ROV equipped with the latest Sonardyne Nano beacons, its own prototype high-resolution camera system, and a fiber optic gyro to gather accurate heading and point references.

The final stage involved the Severn Sea vessel, which was used to complete the ROV visual and 3D survey. The project team lived on board the vessel and worked around three available tide windows to ensure the project was delivered on time and within budget.



Location of the Wave Hub off the coast of Cornwall, England.

Brian Allen, CEO of Rovco, commented: "With underwater 3D visualization, we are improving the quality of subsea ROV inspections, identifying potential problem areas more effectively, and providing a better means of communicating this information."

"We were honored to support Wave Hub on this project, utilizing our now proven 3D modelling technology to provide accurate survey data and provide a clear picture of the subsea environment. There are many applications for ROV 3D visualization, however we expect it to be used most frequently for condition monitoring of subsea assets as well as for damage, corrosion, or decommissioning surveys."

Located 16km from the north coast of Cornwall, at the eastern edge of the Atlantic Ocean, the Wave Hub site offers four cable connection points for testing offshore renewable energy technology as well as purpose-built and commissioned grid-connected infrastructure.

Julius Besterman, head of engineering and operations at Wave Hub, commented: "Periodic subsea inspection is essential to ensuring that the cable system is well maintained to afford projects with a reliable offshore connection, and we were extremely pleased to allow Rovco to trial their 3D system on our site. The results obtained were superb and enabled a

very detailed asset and seabed condition assessment as well as providing valuable information for projects intending to connect at Wave Hub. Rovco has set the benchmark very high for future surveys."

With an expanding fleet of ROVs, sized from micro to large inspection vehicles, Rovco has the resources required to provide inshore/offshore services and inspections anywhere in the world. Offering a unique approach to technical subsea challenges, Rovco has the expertise to deliver a high-quality, cost-effective solution for underwater hydrographic survey and inspection services, using high-resolution state-of-the-art cameras, scanning sonars, and various leading-edge survey technologies.

For more information about Rovco, visit www.rovco.com.

HYDREX Underwater Technology Repairs Tank without Delaying Vessel

Hydrex recently repaired a crack in the port side grey water tank of a 145m chemical tanker. The damage was permanently repaired by Hydrex technicians using an insert during the vessel's routine port call in Amsterdam.

The Hydrex team of diver/technicians began by carrying out a comprehensive inspection of the damaged area, working both underwater and onboard. The crack was found to be 480mm long and had split in two at the port side end. The proposed repair was discussed with the vessel's superintendent and the attending class surveyor, the decision being to install an insert, 700mm long and 300mm wide.

The engineers took measurements of the rounded hull shape using a special frame. This enabled a steel mobdock to be fabricated that would precisely fit the hull profile. The mobdock and insert

plate were both rapidly made from stock materials at the fast response centre of the Hydrex headquarters in Antwerp and transported to Amsterdam without delay.

The Hydrex team on site installed the mobdock and cut away the metal surrounding the crack, including part of the frame above the crack. The diver/technicians then positioned and fixed the new insert plate, using the Hydrex class-approved full-penetration welding procedure.

After the newly fitted insert plate had been closely inspected and approved by

Removal of the
damaged area.



FOR MORE INFORMATION, VISIT
www.hydrex.be

an independent NDT (non-destructive testing) inspector and the class surveyor, the Hydrex team reinstated the frame over the affected area.

The permanent nature of the repair carried out by Hydrex, namely removing the cracked section and installing a new welded insert, means that this area of the ship will not require any further attention during the next drydocking. The repair was carried out during the scheduled port call, well within the stipulated time frame, meaning the ship could sail with no delay.

The maxon thruster.

Oceanology International, 13-15 March 2018 London, visit us at stand A500



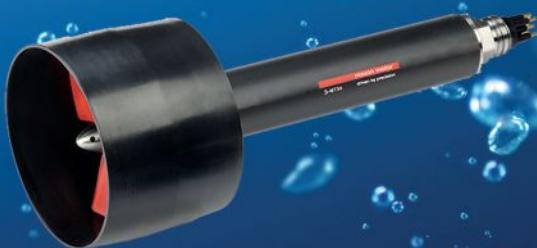
Max. depth limit of up to
6000 meters



High energy efficient of minimum
80 percent



Long service life of up to
1000 operation hours



More information about our maxon thruster
can be found on our website:

aquaticsolutions.maxonmotor.com

maxon motor
driven by precision



£7.5 billion Subsea Industry Supports 45,000 Jobs, Despite Downturn

Subsea UK's latest business activity review reveals that the industry is generating annual revenues of £7.5 billion, compared to £8.9 billion in 2014.

The body that represents the country's subsea industry also revealed that, despite the downturn in oil and gas, the subsea sector still supports around 45,000 jobs in the UK. This compares to around 53,000 three years ago.

Exports account for over half (55%) of annual revenues, while sales in offshore wind have risen from £770 million in 2014 to £1.3 billion today. Sales in renewables are also forecast to increase, with around a quarter of large companies anticipating more than 20% growth in this sector.

Underwater technology, systems, engineering, and manufacturing have been helping recover more hydrocarbons from the North Sea since the 1980s. This expertise honed in the UK has led to the creation of one of the UK's largest industry sectors, which is now involved in defence, oceanology, and offshore wind.

Subsea UK, whose 300 members make up the bulk of the country's subsea supply chain, conducts regular reviews of the sector. The body's chief executive,

Neil Gordon, said: "It's clear that, at the time of our last review, the industry was still riding the crest of a wave with revenues of almost £9 billion. The oil price crash and subsequent, prolonged downturn globally which led to the deferral or cancellation of major subsea projects, particularly in deepwater, has had a material impact on revenues and cost around 8,000 jobs."

“Around 80% of large companies are expecting to grow exports in the next three years...”

"However, the subsea sector appears to have weathered the storm by increasing exports and diversifying, particularly into offshore wind, where the skills and technology are eminently transferable."

The largest export markets for the tier 1 subsea companies are Scandinavia, West Africa, and the Gulf of Mexico. For SMEs, this picture changes with South East Asia being the primary export market, followed by the Gulf of Mexico and the Middle East, Scandinavia, and West Africa.

Respondents expect South East and Central Asia to become more important export markets in the future, along with the Caspian and the Middle East.

Around 80% of large companies are expecting to grow exports in the next three years, with a third expecting export sales to increase by between 10% and 20% and a fifth by over 20%.

Meanwhile, 65% of SMEs believe they will increase exports, with the majority anticipating growth between 10% and 20% and over a fifth anticipating more than 20% growth in international sales.

Gordon believes that with global expenditure estimates for subsea vessel operations and hardware over the next five years around \$141 billion*, the UK can still claim to be a world-leader with around a third of that annualised, global oil and gas marketshare. Similar figures for the offshore renewables markets globally are not available.

He added: "Since the '80s, Britain has pioneered subsea technology and expertise and become recognised as the global-leader in subsea. I'm confident we can still claim to lead the way around the world but we still need greater recognition of subsea as one of the UK's best performing industry sectors to help attract investment and talent and to work collaboratively with government on diversification, internationalisation, innovation and skills."

In 2013/14, Subsea UK estimated there were around 800 companies operating in subsea across the country from the north-east of Scotland to the south-east of England. Around 20% of those have gone into liquidation, merged, been acquired, or retreated from subsea operations.

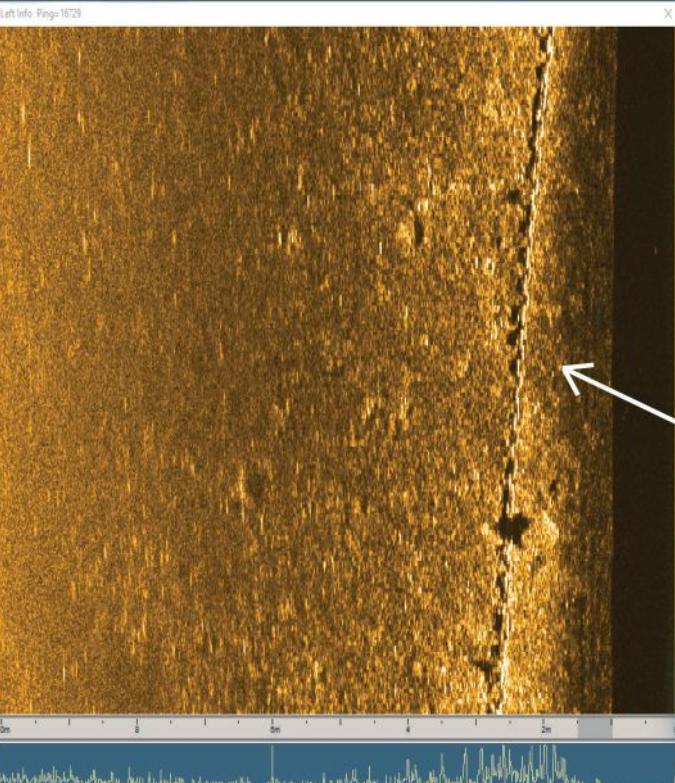
Subsea UK's membership, which was the survey base for this business activity review, makes up around 90% in monetary value of the whole subsea sector.

Subsea UK represents the entire supply chain from small, niche technology companies to the tier 1 contractors such as Subsea 7 and Technip, to the multi-national exploration and production companies.

*Figures from www.douglas-westwood.com/report/oil-and-gas/world-subsea-vessel-operations-hardware-market-forecast-2018-2022.

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OSBIT POWER Completes Innovative Cable Repair System

Osbit Power has successfully completed an innovative new subsea cable repair system for a new customer in Australia.

The standby Quadrant Handling System for SA Power Networks facilitates emergency repairs of subsea power cables. The novel containerized system will be mobilized and installed to a designated repair vessel in the event of a cable fault to ensure power can be restored quickly and efficiently.

SA Power Networks is the sole electricity distributor in south Australia, utilizing a significant network of powerlines, which includes critical subsea cable supplying Kangaroo Island off the coast of Adelaide. Working closely with SA Power

Networks and its repair contractor, Subcom, Osbit developed a comprehensive mobilization plan to ensure the system is primed for swift future mobilizations.

Building on its expertise in producing field-proven Quadrant Handling Systems, Osbit was able to deliver a bespoke engineering solution, which met its client's requirements without compromising functionality.

The system comprises lay chutes, cable quadrant, quadrant trackways, and cable roller units, which are supplied in

FOR MORE INFORMATION, VISIT
[www.oceannews.com/news/subsea-intervention-survey/
osbit-completes-innovative-cable-repair-system](http://www.oceannews.com/news/subsea-intervention-survey/osbit-completes-innovative-cable-repair-system)

a modular assembly arrangement that enables the rapid mobilization from its storage location and installation on the repair vessel.

Designed at Osbit's head office in Northumberland and fabricated in northeast England, the system was completed in 16 weeks (2 weeks ahead of schedule) and dispatched to Australia ready for deployment.



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THE FUTURE IS ELECTRIC

A Breakthrough in Electric Torque Tool Technology from SAAB SEAEDGE & TMT

A new lightweight electric torque tool is being launched globally in a collaboration agreement between Saab Seaeye, a world leader in electric underwater e-robotic systems, and Australia-based Total Marine Technology (TMT).

The tool is smart, light, simple to fit, fast to set-up, and has an advanced, high accuracy torque control system. It can operate across the Saab Seaeye range of e-robotic vehicles, opening up new market opportunities. Considerable savings will come from using compact electric e-robotic vehicles and electric tooling for tasks normally performed by much larger hydraulic vehicles.

No smaller electric Class 1 to 4 torque tool exists on the market—and with a singlehanded weight of just 24kg, it is around half the weight of a typical hydraulic torque tool, reducing the risk of manual handling injuries.

A major benefit for subsea operators is the tool's ability to adapt automatically to Class 1 to 4 fittings and torques whilst performing the integrity-critical task of opening and closing seabed valves and other torque tensioning tasks. Torque accuracy is vital for operators needing to trust a system not to damage a valve when opening and closing. Electric torque systems are far more accurate over the whole

torque range when compared to hydraulic systems and deck calibration is quick, repeatable, and simpler, saving setup cost.

HELPS AVOID RISK TO OLDER VALVES

An electric system can provide highly accurate small torque values so is extremely useful where there is an inherent risk of damage to older valves when turned, as they may be in poor condition. The electric torque tool with its built-in drive and torque measurement is effectively self-calibrating across its full torque range, saving considerable operation and vessel time—and significant costs.

In addition to opening and closing valves, the tool can be used in a wide range of tasks, including installation and recovery of control leads and hoses, and closing and tensioning of connectors and bolts.

A typical hydraulic torque tool weighing around 50kg is generally held out in front of a vehicle by a heavy-duty manipulator, so it needs a large vehicle. As the TMT tool is half the weight, it can be fitted to a smaller robotic work vehicle such as the Saab Seaeye Leopard—and can even be underslung to operate from an even smaller robotic system such as the Tiger.

While on an inspection mission, a compact electric vehicle can intervene to operate a valve, thereby avoiding follow-up intervention and reducing the number of excursions.

This pioneering development demonstrates how electric underwater e-robotics are increasingly undertaking serious intervention work as the market trends towards an all-electric future. Subsea operators worldwide are expected to welcome a new electric torque tool that will enable electric underwater robotic systems to undertake an even wider range of subsea tasks and bring considerable cost savings.

Marine Ventures International, Inc. is actively contracting experienced Subject Matter Experts (SMEs) to join our growing team of recognized oil and gas industry SMEs in the marine environmental field. Individuals with significant experience working for oil and gas companies are preferred. Currently, experience with Natural Resource Damage Assessment (NRDA) for offshore oil spills is of particular interest. Please send resumes to SME@marineventures.com.



MARINE VENTURES
www.marineventures.com

Current hydraulic torque tools operated by hydraulic vehicles are typically set and checked multiple times for a particular torque range before each dive, using a tested and certified calibration unit, whereas in the future the electric torque tool need only be calibrated by an independent body on an annual basis.

Accuracy and control are standout features with the TMT torque tool as the software-managed system allows much finer control and feedback than hydraulic systems. Operators control torque pressures by dialing in torque limits, speed, and number of turns and watch the response on screen immediately. Pitch and roll sensors in the tool aid rapid alignment during critical tasks.

FOR MORE INFORMATION, VISIT
[www.oceannews.com/
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survey/a-breakthrough-
in-electric-torque-tool-
technology-for-rov-s](http://www.oceannews.com/news/subsea-intervention-survey/a-breakthrough-in-electric-torque-tool-technology-for-rov-s)



Mike Bisset, Aleron Subsea Technical Director

ALERON SUBSEA Technology in £145 billion Salvage Operation

Aberdeenshire-based ROV solutions provider, Aleron Subsea, recently utilized its AUXROV subsea system while taking part in a salvage project in the Atlantic Ocean. Aleron and the AUXROV were selected by James Fisher Marine and Britannia's Gold Ltd to assist with a high-profile salvage operation, targeting wrecks that were sunk during the First and Second World Wars.

During both wars, some 7,500 merchant ships were sunk, of which approximately 700 were identified as carrying shipments of gold under UK Government direction.

Britannia's Gold Ltd has been established to finance the recovery of targeted cargoes and return them to the UK for the benefit of the government, investors, and merchant marine charities. This inaugural salvage work scope takes place after 25 years of planning and the successful completion of a significant crowdfunding campaign.

The AUXROV work scope comprised over 850 lifts, moving over 500 tonnes of debris with three different hydraulic grabs, and providing real-time information on the grabbed materials. During simultaneous operations with two work-class ROV systems, it then provided power and assistance in dredging operations on the wreck. Remaining in the water for up to 90 hours at certain stages, the AUXROV was able to enter several constrained, hard-to-reach areas of the site, assisting in the overall efficiency of the operation.

Configured with a 30-ton AHC winch and 30-ton A-frame, the AUXROV combines 300 horse of hydraulic power and 20-ton safe working load, providing the power and lift capability to deal with harsh deepwater subsea project environments.

Aleron Subsea technical director Mike Bisset commented: "This was a complex working environment within which the AUXROV has been able to demonstrate its value and efficiency.

The system can be used for a vast range of subsea excavation, clearance, survey, and tooling tasks and—on this project—was able to demonstrate its capability."

For more information, visit www.aleronsubsea.com.

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A NEW SOLUTION FOR THE SEQUENCING AND SYNCHRONIZATION OF **SUBMARINE OBSERVATION STATION SENSORS**

COSTOF2 (Communication and Storage Front-end – 2nd generation) is a data communication and backup tool designed to serve as the core of marine and submarine observation stations. Initiated within the framework of the European infrastructure EMSO (European Multidisciplinary Seafloor and water-column Observatory), it was developed by Ifremer, who signed an operating contract with RTsys for COSTOF2 in December 2016. Specialists in submarine electronics and acoustics, the company is responsible for industrializing the device.

Deploying and connecting measuring instruments—whether in shallow waters or thousands of meters underwater—can be complex, particularly because of the distance, pressure, tide, swell, biofouling, etc. COSTOF2 offers a solution for marine and underwater stations that allows the reliable and synchronized connection of up to 12 sensors, including hydrophones, sonars, HD (4K) video cameras, multi-parameter sensors (temperature, salinity, depth, etc.), seismometers, ADCPs (Doppler effect current profilers), and several other types. These sensors are then coordinated and can be programmed via COSTOF2.

AUTONOMY UP TO 12 MONTHS

The first-generation COSTOF offered considerable advantages for the connection and synchronization of sensors, and COSTOF2 distinguishes itself from the prior generation and

the current market offering with its capacity to manage significant digital data streams while consuming very little power (1.5 milliwatt on standby mode). In effect, the device can supply the sensors with power and control the power supply. It can be cabled or powered by batteries; in autonomous mode, the programming of continuous or discontinuous measurements also allows for control of the battery life (tested up to 12 months). COSTOF2 is also equipped with an atomic clock that allows a synchronization of the sensors (multi-parameter probe, hydrophones) with an accuracy of about 1.10 to 9 over one year (drift of 30 ms/year) and a consumption of 120 mW (Pulse per second [PPS] transmission and National Marine Electronics Association [NMEA] frame in differential).

Depending on the research requirements and the desired battery life, users can choose to take measurements and record video continuously or for just a few minutes or hours per day. This programming can be done easily via a web interface, and modifications can be made during the mission.

REAL TIME AND ALARMS

The data retrieved by the various sensors are synchronized by COSTOF2 and precisely time stamped. They are stored locally on an SSD (solid-state drive) disk that currently has a capacity as high as 2 terabytes. The data are also sent by cable (RS232/422/485 or Ethernet) or,

for autonomous stations, by WiFi to an ROV (Remotely Operated Vehicle) or by acoustic modem to a ship or a surface buoy. These data are sent in quasi real-time to an onshore archiving and staging center. This use of real time, associated with pre-processing of the data, can be used to generate alarms (exceeding a threshold, detection of some event). All of the raw data are stored, allowing the user to retrieve precise logs. In addition, the user can choose to retrieve an extract of the data daily, by acoustic modem for example, for an overview of the situation with minimal energy cost and then retrieve all of the data at the end of the mission.

TESTED IN AN OBSERVATORY AT -1,700 M

COSTOF2 protects optic sensors against bio-fouling thanks to a micro-chlorination system. It can withstand the pressure down to 6,000 m and is already used to equip the seabed and surface buoy stations of the EMSO-Açores observatory. This Ifremer and IPGP (Institut de Physique du Globe de Paris) observation infrastructure is located at a depth of 1,700 m within an archipelago of the same name, near a submarine hydrothermal vent site. This was used to validate the COSTOF2 system.

Both EMSO-Açores stations include a COSTOF2 unit equipped with sensors for ecological (video, turbidity, temperature, dissolved iron concentration) and geophysical (seismic activity, elevation

Both in the coastal area and several thousand meters deep, COSTOF2 can power and control submarine observatory sensors and retrieve their data in real time. This tool was developed by Ifremer and transferred to the RTsys company, which is now industrializing it.



on the Earth's crust, etc.) studies. Once a day, the data are transmitted via an acoustic path to a surface buoy, also equipped with two COSTOF2 so that it has a redundancy link. The buoy communicates with the Ifremer center at Brest by satellite to provide the data to researchers, including an extract of the video data, which is difficult to transmit due to its considerable size. All of the video data remains stored on the COSTOF2 and are recovered by the researchers during maintenance and battery charging sessions, 12 months apart. In the future, COSTOF2 will be deployed in other observatories of the European EMSO infrastructure. It will equip measurement modules for "essential oceanic variables," intended to be deployed at all nodes of the EMSO network, located in the seas around Europe, from the Arctic to the Atlantic, the Mediterranean, and the Black Sea. This network is intended to study, in real time and over the long term (at least 10 to 20 years), the environmental processes related to climate change, fundamental research, and the durable management of deep marine ecosystems. It will also study volcanic tectonic, hydrothermal, and gravitational processes and their associated natural risks (earthquakes, tsunamis, etc.) for coastal regions with high population densities. Two new units intended for deep stations have been produced by RTsys at the end of 2017, and three coastal units will be produced in early 2018.

MONITORING OFFSHORE INSTALLATIONS

Over and above its scientific applications, COSTOF2 can be used to install a network of sensors, synchronize them, and generate alarms. It is suitable for continuous *in-situ* observation and monitoring of marine environments. It is, therefore, suitable for use in oil & gas, EMR, climate monitoring, and georisk tracking (earthquakes, tsunamis).

COSTOF2 is suitable for coastal monitoring requiring measurements in a water column, in shallow waters, or on the surface. For example, it equips the SCENES buoy of the PHRESQUES (Projet d'Harmonisation et de REnforcement du Suivi haute-fréquence de la QUalité de l'Eau de la vallée de Seine, 2016-2020), a project for the harmonization and homogenization of continuous monitoring of water environments in the Seine Valley. The SCENES platform consists of the following:

- A station on the seabed, housing a current profiler that also measures waves, and a turbidity meter that tracks changes in the bottom sediment; and
- A surface buoy equipped with a multi-parameter sensor (temperature, salinity, turbidity) and a metrological station, both driven by COSTOF2.

FOR MORE INFORMATION, VISIT
RTSYS.EU

Global Marine's Cable Retriever at sea.
Photo courtesy of Global Marine.

SEAIOCMA Extends Cable Maintenance Contract with Global Marine

Global Marine, a market leader in subsea fibre optic cable installation and maintenance solutions to the telecoms and oil & gas sectors and part of the Global Marine Group (GMG), announces that its maintenance contract with SEAIOCMA (South East Asia and Indian Ocean Cable Maintenance Agreement) has been extended for 5 years, running to the end of 2022.

The SEAIOCMA maintenance zone agreement, which is a co-operative club

managed by 46 cable owners, provides the repair of submarine cables that carry international telecommunications traffic. SEAIOCMA spans the area between Djibouti in the west, Perth in the south, Guam in the east, and the northern tip of Taiwan. This is the third and final of Global Marine's three long-term maintenance contracts renewed since the beginning of 2016 (NAZ [North America Zone] announced March 2016 and ACMA [Atlantic Cable Maintenance Agreement] announced January 2017).

Under the terms of the extended contract, which came into effect on 1 January 2018 and expires on 31 December 2022, Global Marine will provide a newly constructed depot in Subic Bay, Philippines. The new depot will continue to serve as the base of Global Marine's vessel the Cable Retriever, a purpose-designed cable ship equipped with a 600hp ROV, capable of burying cable up to 3m below the seabed and mobilising within 24 hours of a call-out.



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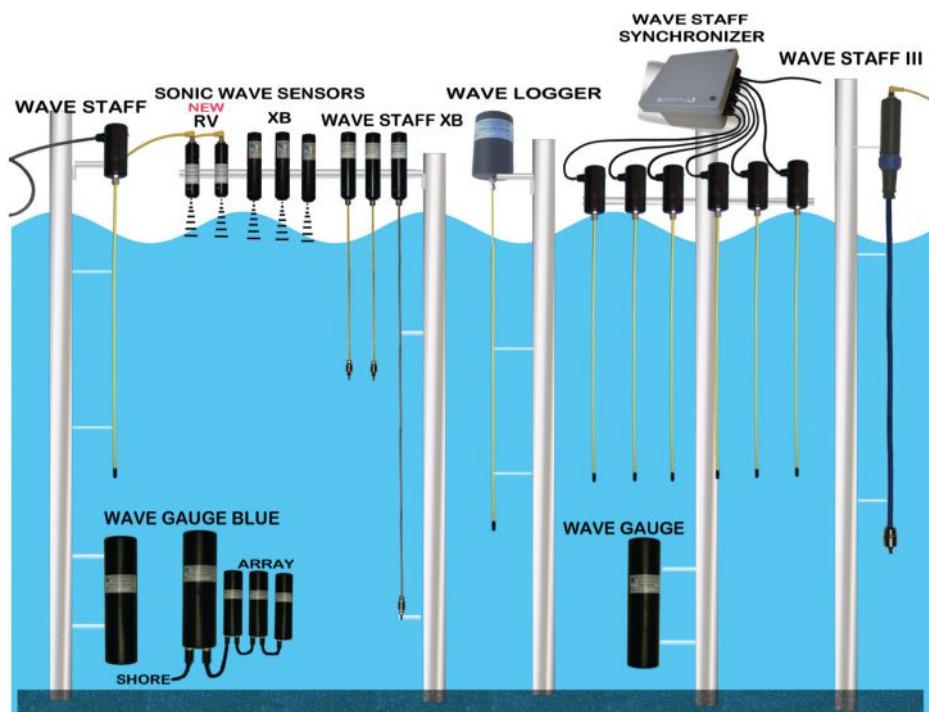
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The Cable Retriever is operated by experienced and fully trained personnel and features specialist equipment.

Global Marine has been providing maintenance services continuously to SEAIOCMA since its inception in 1986 and has completed more than 600 repairs. During that time, the network has expanded from 34,000km of cable maintained to encompass more than 111,000km. The extension of the SEAIOCMA agreement demonstrates

continued customer recognition of Global Marine's reliability in support of long-term contracts and its ability to deliver leading subsea maintenance to customers around the world.

Global Marine currently delivers support in three of the world's six cable maintenance zone agreements. Combined with its joint venture, SBSS, Global Marine maintains 33% of fibre optic cable lying across the world's ocean floor. In the past 5 years, the Company

has achieved 99.7% of the contractual KPIs across all of its maintenance agreements.

For more information, visit www.oceannews.com/news/communication/seaiocma-extends-cable-maintenance-contract-with-global-marine.

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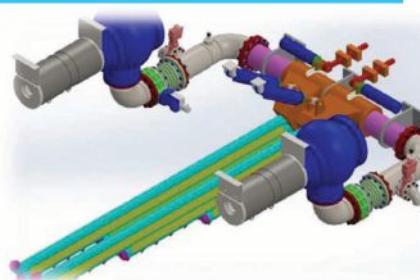
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TE SUBCOM Selected for HAVFRUE Cable System

TE SubCom, with a consortium including Aqua Comms, Bulk Infrastructure, Facebook, and others, announced that they have been signed as the system supplier for the HAVFRUE cable system. HAVFRUE, the Danish word for mermaid, is the first new cable system in almost two decades that will traverse the North Atlantic to connect mainland Northern Europe to the United States. Route survey operations for the system have begun, and system ready-for-service (RFS) is expected in Q4 2019.

The system is comprised of a trunk cable connecting New Jersey, U.S.A. to the Jutland Peninsula of Denmark with a branch landing in County Mayo, Ireland. Optional branch extensions to Northern and Southern Norway are also included in the design. The cable will bring modern, high-capacity connectivity to Northern Europe, where data center construction has been increasing to support the need for cloud services.

As supplier for the system, SubCom will incorporate their Wavelength Selective Switching Reconfigurable Optical Add Drop Multiplexer (WSS-ROADM) for flexible wavelength allocation over the system design life. The HAVFRUE cable system will be optimized for coherent transmission and will offer a cross-sectional cable capacity of 108Tbps, scalable to higher capacities utilizing future generation SLTE technology. The combination of these elements will make the HAVFRUE system a powerful and flexible solution for current uses while also providing an easy upgrade path to accommodate future advances in subsea connectivity technology.

The system will be owned and operated by multiple parties, including Aqua Comms, Bulk Infrastructure, Facebook, and others. Aqua Comms, the Irish cable owner/operator and carriers' carrier, will serve as the system operator and landing party in U.S.A., Ireland, and Denmark.

Bulk Infrastructure of Norway will be the owner and landing party for the Norwegian branch options.

For more information, visit www.oceannews.com/news/communication/te-subcom-selected-as-the-system-supplier-for-the-hafvture-cable-system.

Curie Cable to Connect California and Chile

TE SubCom has been awarded the Curie Submarine Cable system contract from Alphabet Inc. The system will add dedicated capacity to Google's global network and link Los Angeles to Valparaiso, Chile, with future connectivity to Panama.

<http://ont.news/2BA4N1P>

Tampnet Selects GTT for Transatlantic Connectivity

Tampnet selected GTT's optical transport services to connect its offshore telecommunication assets in the North Sea and Gulf of Mexico. Tampnet serves more than 240 oil and gas platforms, floating production storage and offloading units, and exploration rigs.

<http://ont.news/2GKeNcN>

Hawaiki Transpacific Cable System Ready for Service in June 2018

More than half of the 15,000km of undersea fiber-optic cable that comprise the Hawaiki transpacific cable system have been implemented by TE SubCom.

<http://ont.news/2nJrgVB>

Inmarsat Adapts Fleet Xpress for Offshore Support Vessels

Inmarsat has launched a new set of Fleet Xpress plans designed specifically to meet the technical and commercial requirements of offshore support vessels (OSVs).

<http://ont.news/2DYb0uC>

Dynamic Cable to Connect Kincardine Floating Offshore Wind Farm

Prysmian Group has been awarded a new contract by Cobra Wind International Ltd to provide the cable system to connect the Kincardine Floating Offshore Wind Farm to mainland UK.

<http://ont.news/2EC6L53>

Radio Holland Receives NavCom Order from Wijnne Barends

Radio Holland Netherlands has won a tender to supply Navigation/ Communications packages for six newbuild vessels of Dutch shipping company Wijnne Barends.

<http://ont.news/2s2qzMI>

Noble Drilling Awards Speedcast Communications Contract

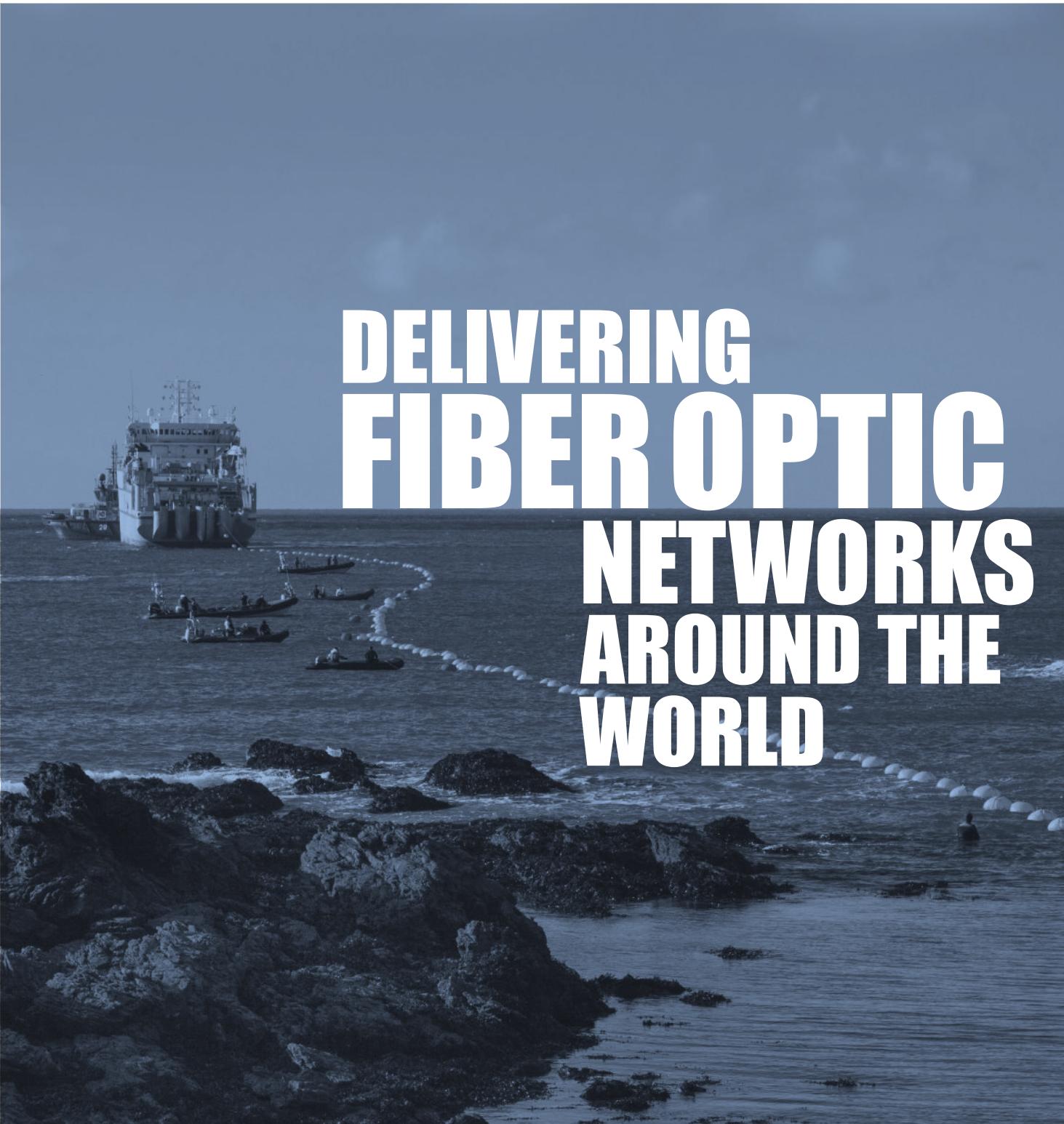
Speedcast International Limited has been selected by Noble Corporation to provide new IT communications equipment and fully managed connectivity services to their global drilling fleet.

<http://ont.news/2FHfS3T>

Xtera® to Supply ARBR SubseaCable System

Xtera® has been selected as the supplier of the ARBR submarine fibre optic cable system developed jointly by Seaborn Networks and the Werthein Group. The 2,700km system will connect Argentina and Brazil.

<http://ont.news/2nCkZLZ>



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The Design of ARIS Defender is unprecedented as it actually combines “two sonar models” in one complete package at a tremendous cost savings. The ARIS Defender is unique in its design and offers a wide array of deployment scenarios. The Defender can be deployed foremost as a diver-held imaging sonar and is also capable of being tethered or operating autonomously. When a tethered deployment is engaged, topside personnel are able to view the sonar data in real-time along with the diver.

For projects that do not require the use of a diver, the ARIS Defender is easily converted for use as a compact, fully functional ARIS Explorer. In Explorer mode, the sonar can be deployed in a multitude of different scenarios, including being integrated on underwater vehicles.

Likewise, existing customers who have invested in the purchase of an ARIS Explorer system have not been forgotten. They now have the option to purchase a “Defender Upgrade Kit” for their Explorer sonar. This option affords the customer the added benefit to convert their Explorer for use as a Defender diver-Held system at a fraction of the cost compared to purchasing a new diver-held sonar.

SOUND METRICS

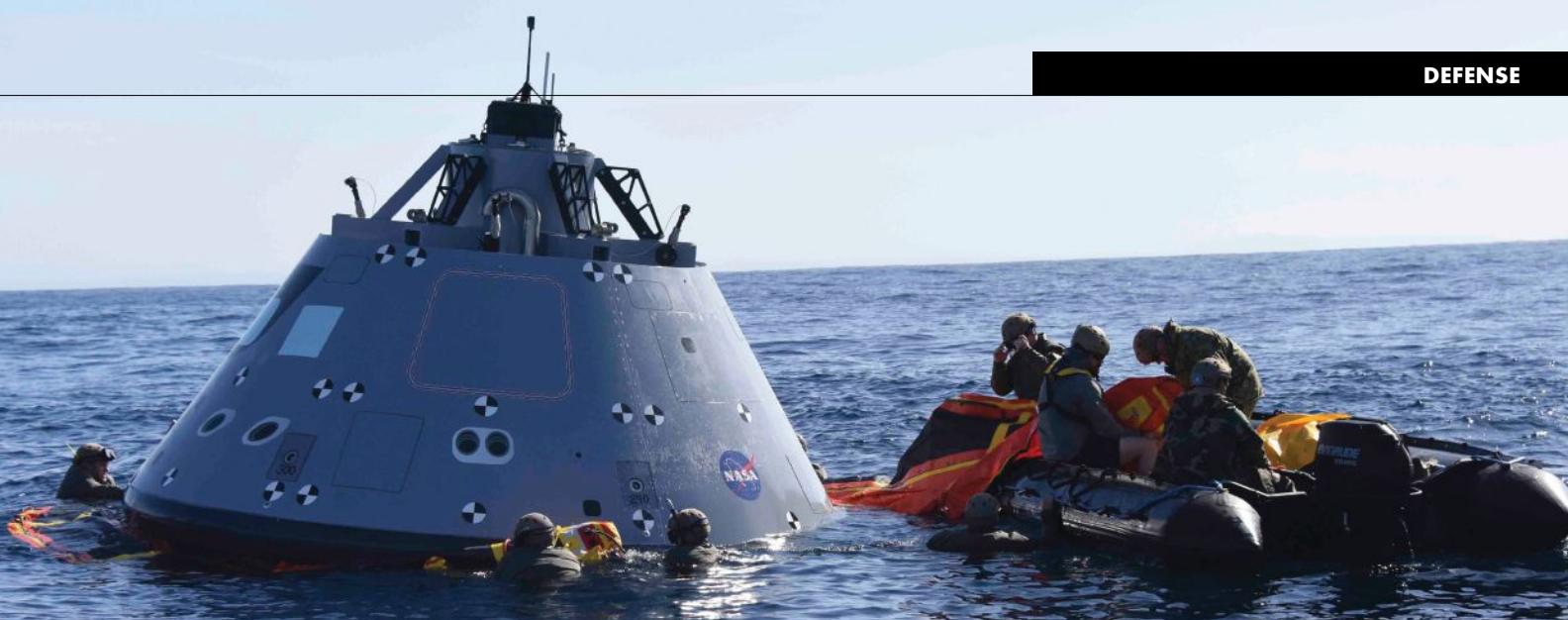
Provides U.S. Navy Special Operations Command with ARIS Defender Diver-Held Sonars

Sound Metrics completed delivery of (four) ARIS Defender Diver-Held High-Resolution Imaging Sonars and associated Topside Supervisory Packages to the Pacific Special Operations Command in Hawaii. The ARIS Defender 3000 systems will be used to provide an accurate identification and classification of previously mapped suspicious underwater targets.



“Four days out of the week, we utilize a longer range, low-resolution sonar for target detection purposes. We compile a list of suspect targets complete with location. On the fifth day, we revisit each suspected target location and use the ARIS Defender 3000. The sonar imagery we collect on Day 5 offers the resolution and detail required to accurately identify and size the target.”





U.S. NAVY & NASA Complete Underway Recovery Test

The whole recovery is a high-risk evolution..."

San Antonio-class amphibious transport dock USS Anchorage (LPD 23) successfully completed test recovery operations of NASA's Orion test article, 23 January. The Underway Recovery Test-6 (URT-6) is part of a U.S. government interagency effort to safely retrieve the Orion crew module, which is capable of carrying humans into deep space.

This marks the fourth completion of a URT aboard Anchorage. NASA engineers worked alongside sailors from the Anchorage, the San Antonio-class amphibious transport dock USS New Orleans (LPD 18), Special Boat Team 12 and Navy divers from Explosive Ordnance Disposal Mobile Unit 3 to test recovery operations of the Orion test article. Tests were conducted in varying sea states, during the day and at night.

"Our crew has actually been training for several months closely with NASA on everything from planning conferences to on-site training to be ready for the mission," said Capt. Dennis Jacko, Anchorage commanding officer. "I think the ship and the crew are doing a great job for a historic tasking we have added to a very busy schedule as we prepare for deployment. Everybody stepped up and provided the best support with our NASA partners for a very successful test."

With their main role of conducting amphibious operations, San Antonio-class ships have unique capabilities that make them an ideal partner to support NASA's mission. One of the more important capabilities is the ship's ability to recover the test capsule using the ship's well deck, which was designed to launch and recover amphibious craft. Anchorage also has the ability to carry and deploy multiple small boats to aid in the recovery process of the capsule and contains an advanced medical facility ideal for treating the returning astronauts.

URT-6 consisted of releasing the test capsule from the well deck, then carefully maneuvering the ship alongside the capsule at slow speed. Once the test article was far enough from the ship, the lines attaching the capsule to the ship were released. Then, divers attached a stabilization ring designed by NASA that would help in sustaining the astronauts in the capsule for up to three days. Divers then removed the collar, attached lines from the small boats to steady and guide the capsule toward Anchorage, where Rigid Hull Inflatable Boats (RHIB) would then assist in attaching lines from a NASA-designed winch, which then hauled the capsule into the well deck.

"The whole recovery is a high-risk evolution, especially when the capsule is being towed closely behind the ship, but NASA took our inputs and modified the equipment for this URT mission," said Chief Petty Officer Beau Lontine, a Navy diver assigned to Explosive Ordnance Disposal Mobile Unit 3. "There are so many things that could go wrong if just one person isn't paying attention. We've conducted training with the hardware and rigging to allow for a safe recovery of the capsule. It might seem like a basic recovery, but it is far from a simple evolution."

The tests allowed NASA and the Navy to continue to demonstrate and evaluate the recovery processes, procedures, hardware, and personnel in real, open-ocean environment before conducting actual recovery operations.

For more information, visit
[www.oceannews.com/news/defense/
us-navy-and-nasa-complete-underway-recovery-test](http://www.oceannews.com/news/defense/us-navy-and-nasa-complete-underway-recovery-test)

U.S. Navy divers from Explosive Ordnance Disposal Mobile Unit (EODMU) 3 attach an inflatable ring to NASA's Orion test vehicle to the San Antonio-class amphibious transport dock ship USS Anchorage. Anchorage is underway to support NASA's Orion spacecraft Underway Recovery Test 6. Photo courtesy of U.S. Navy Mass Communication Specialist 3rd Class Natalie M. Byers.



AUSTAL LCS Completes Acceptance Trials

The future *USS Manchester* (LCS 14) has successfully completed acceptance trials in the Gulf of Mexico. This is the last significant milestone required by the U.S. Navy prior to delivery, scheduled for early 2018. This milestone achievement involved an intense series of tests on the vessel at sea conducted by U.S. Navy, Austal and Industry. During the two-day tests, approximately 250 personal were on board operating and demonstrating the performance of all of the ships systems and equipment. The vessel returned to port carrying a broom in its mast signifying a "clean sweep" of successful tests was achieved.

LCS 14 will be the second Independence-variant LCS Austal has delivered to the Navy in less than six months. Austal has delivered six Independence-variant LCS, one of which, *USS Coronado* (LCS 4), recently returned to San Diego Navy Base after completing a successful 14-month deployment with the Pacific Fleet.

The LCS program is at full rate production and is continuing its momentum at Austal USA with seven ships currently under construction. Tulsa (LCS 16), Charleston (LCS 18), and Cincinnati (LCS 20) are preparing for trials. Final assembly is well

underway on Kansas City (LCS 22) and Oakland (LCS 24), and the first aluminum was cut on the future *USS Mobile* (LCS 26) on December 12. Austal also recently received new construction contracts for LCS 28 and LCS 30—two of the three LCS awarded in FY 2017.

For more information, visit
www.oceannews.com/news/defense/austal-designed-and-built-lcs-completes-acceptance-trials

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GENERAL ATOMICS Awarded Contract from Office of Naval Research

General Atomics Electromagnetic Systems (GA-EMS) announced that it has been awarded a contract from the Office of Naval Research (ONR) to design and deliver an advanced permanent-magnet propulsion motor intended for use in large displacement unmanned undersea vehicles (LDUUVs).

"GA-EMS has taken a leadership role and committed significant internal resources to researching and developing new and unique electric power and energy technologies to support a variety of undersea vehicles and platforms," stated

Rolf Ziesing, vice president of programs at GA-EMS. "After completing a review of our motor's capabilities and the applicability for undersea operations, we are very excited to take the next step to design and deliver a second-generation propulsion motor to ONR for further evaluation and eventual on-vehicle testing."

Over the next 18 to 20 months, GA-EMS will design, build, and test the advanced permanent-magnet propulsion motor and deliver a complete motor system to ONR. Characterization and testing of the

motor system will be conducted by the Pennsylvania State University Applied Research Laboratory (PSU-ARL). PSU-ARL is a center of excellence supporting the U.S. Navy and ONR for undersea propulsion modeling and testing. In 2015, ONR funded a successful year-long study with GA-EMS and PSU-ARL to assess the operating characteristics of the motor's design.



1. Kraken Real-Time Sonar Deployed on Navy AUV

Kraken Robotic Systems Inc. has completed development of a real-time Synthetic Aperture Sonar (SAS) system that has been successfully integrated and tested onboard a U.S. Navy REMUS 600 AUV.

<http://ont.news/2FuD3xW>

2. Navy to Evaluate Anti-Submarine System

Saab will demonstrate its anti-submarine warfare (ASW) training system, the AUV62-AT, for the U.S. Navy. The AUV62-AT is an artificial acoustic system that mimics a submarine. The demonstration is planned for summer 2018, with an option to continue into 2019.

<http://ont.news/2nwSv5g>

3. Royal Navy Accepts New OPV

Guto Bebb MP, the recently appointed UK Minister for Defence Procurement, visited BAE Systems' Clyde shipyards to announce the formal acceptance of the first River Class Offshore Patrol Vessel (OPV), FORTH, by the Ministry of Defence and witness progress as production started on the second hull section of GLASGOW, the first of the City Class frigates.

<http://ont.news/2FugyJJ>

4. JFD Providing Vital Submarine Rescue Expertise

JFD, part of James Fisher and Sons plc, has commenced a training program for 72 Indian Navy personnel on its new 3rd generation submarine rescue systems, due to be delivered in March 2018. Under a £193 million contract, JFD is providing two complete flyaway submarine rescue systems to the Indian Navy.

<http://ont.news/2norUbw>

5. Germany, Norway Join HST Strike Group

Two coalition naval vessels arrived at Norfolk naval base in late January. The Royal Norwegian Navy frigate HNoMS Roald Amundsen and the Sachsen-class German frigate Hessen arrived to participate in the Harry S. Truman Carrier Strike Group group's upcoming Composite Training Unit Exercise.

<http://ont.news/2nosnui>

Russian 'Hybrid War' Tactics Targeting Underwater Communications Cables

According to an article by defense technology expert Ihor Kabanenko, the Russian Navy has the capability to target subsea cables under the cover of oceanic research or search-and-rescue activities.

<http://ont.news/2sfSzfq>



Iver3 Autonomous Underwater Vehicles



RAYTHEON to Deliver Anti-Air Warfare Technology to Australian Navy

Raytheon Company has completed design, development, and testing of its Cooperative Engagement Capability system, which will be certified by the U.S. Navy for the system's first international installation. On board the Royal Australian Navy's HMAS Hobart, CEC will expand the ship's battlespace awareness by sharing sensor data among a network of other Australian and allied CEC-equipped ships and aircraft.

CEC is a real-time "sensor-netting" system that brings together radar data from geographically dispersed ships, aircraft, and ground-based units. This integrated picture improves task force effectiveness by enabling longer range, cooperative, or layered engagements. Today's CEC benefits from advancements in commercial and specialized technologies, as well as from the experience and expertise the Raytheon team has gained throughout more than 30 years as the U.S. Navy's CEC Design Agent.

"The addition of CEC is a major building block for Australia in their defense against anti-air warfare threats in the Pacific Region," said U.S. Navy Captain Jonathan Garcia, CEC major program manager, Program Executive Office Integrated Warfare Systems 6.0. "This delivery to Australia marks a significant

first—expanding the CEC network globally and increasing the U.S. Navy interoperability with a valued, strategic ally."

The equipment—certified hardware and software—will transfer to Australia for installation on HMAS Hobart (DDG-39), and NUSHIP Brisbane (DDG-41) over the coming months, followed by an extensive integration, test, and evaluation period. Raytheon will actively support CEC system integration and testing, including scheduled sea trials, similar to support provided for the U.S. Navy fleet.

Enhancing the capabilities of U.S. forces, CEC is currently deployed on ships and land-based test sites, E-2C/D aircraft, and U.S. Marine Corps network systems. The system continues to evolve, advancing capability and affordability through developments in core technologies.

For more information, visit www.raytheon.com.

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Boost Optimism for Energy's Recovery

BY G. ALLEN BROOKS | Author, *Musings From the Oil Patch* | www.energymusings.com

The tonic to cure low oil prices is low oil prices. That has been the mantra for surviving the energy industry's periodic bouts of bad times. Low oil prices shrink producer cash flows, forcing them to curtail activity that would lead to increased output, which would further pressure the root cause of the oil price downturn—an oversupply of oil. While limiting future oil supply growth, low oil prices also stimulate economic activity, including encouraging people to drive their cars more often and for further distances, helping to use up the surplus oil. These two market forces will bring the market back into a semblance of balance, the only question is how long the process takes.

Crude oil prices are now trading in a range not seen for over three years. Although producers are reluctant to embrace these higher prices as a new floor for the commodity, the thought that

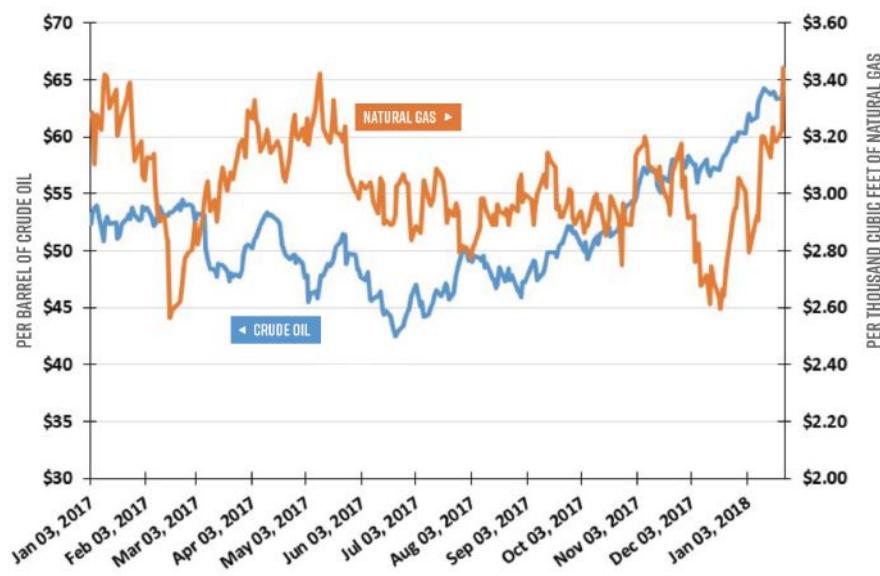
they just might stay in the \$60s a barrel range is promoting a sense of optimism about increased drilling and production for 2018 and beyond. Yes, producers are counting on the continued compliance of OPEC member countries with their agreed upon production cut, as well as further support from Russia, a major oil exporter. That belief is predicated on comments from the players that they will continue to coordinate their output targets even beyond the December end to the OPEC production cut agreement, as well as the realization that higher oil prices is what everyone needs to ease the financial pain of the past three years.

To appreciate how optimism is creeping back into the energy business, one needs only to look at the trend in energy equity prices, especially compared to that of oil prices. Our chart showing the trend in crude oil prices, energy shares, and the overall stock market during the past

decade highlights how poorly energy shares have done. This is due to the financial devastation wrought by poor economics despite high oil prices, and then from the devastation due to low oil prices. While the energy companies were enjoying extremely high oil prices that drove robust drilling and production activity, the stock market was discounting those good times, recognizing, correctly, that they would turn into bad times. No one understood exactly how bad those days might become, however.

Now, we have witnessed six months of rising oil prices. Starting late last year, energy stock prices began to recover. While there are many reasons why the share prices climbed, the principle one is that the wisdom of the market recognized the improving energy industry fundamentals, as well as how company managements were embracing greater capital discipline over their spending.

OIL & GAS FUTURES
PRICES REFLECT
DIFFERENT MARKET
CONDITIONS



That discipline will be important in determining the length of the recovery, as better control over growing producer cash flows will ensure that output growth is more moderate and consistent, which should help sustain the higher oil price environment.

In contrast to an improving global oil market, the U.S. natural gas business continues to be the tail wagged by the weather animal. The Polar Vortex early in January drove temperatures to record lows across the Midwest and Eastern portions of the country and as far south as Galveston, Texas and the Gulf Coast. Other than the supply-constrained Northeast, the natural gas futures market was unimpressed by the record cold and the record weekly withdrawal from gas storage. In the Northeast, spot natural gas prices soared into the upper \$30 per thousand cubic feet compared with national gas futures prices that barely exceeded \$3.

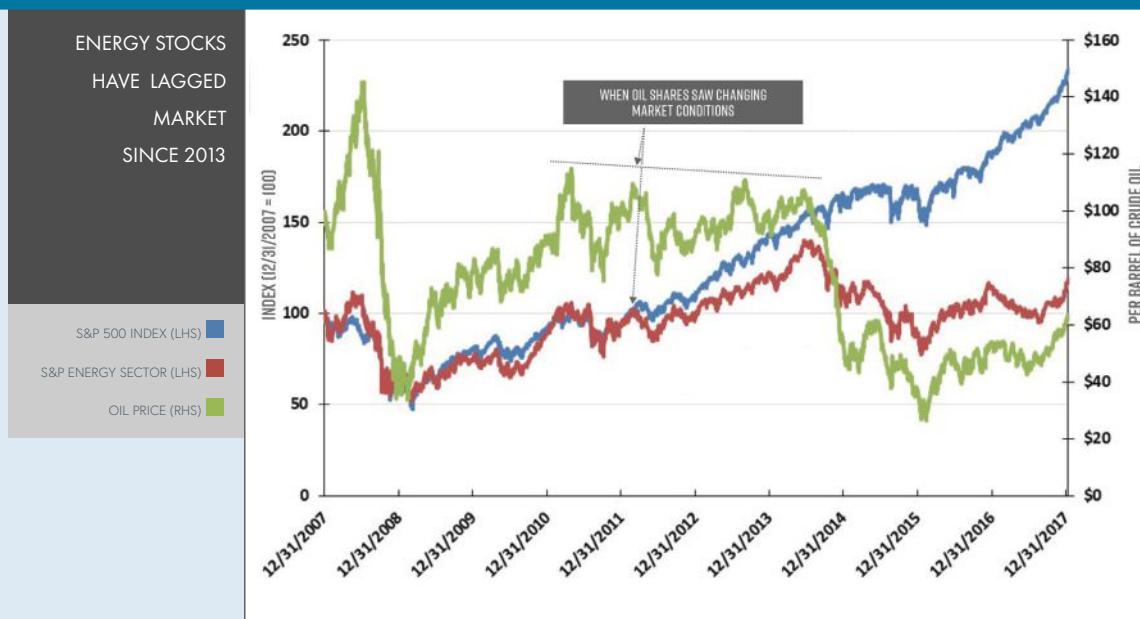
What will you do for me next seems to be the mantra currently guiding natural gas traders. Now, however, weather forecasters are pointing to a second blast of arctic temperatures for the eastern half of the nation by the end of January. Natural gas futures prices have come to life—rallying into the mid \$3/Mcf range.

“What will you do for me next seems to be the mantra currently guiding natural gas traders.”

Expectations for what the cold weather might do for U.S. gas storage reserves, which could put pressure on the industry to aggressively compete to secure supply to refill the storage caverns this summer, is what has gas futures prices rising.

Adding to the weather-induced strengthening in gas prices are similar upward pressures on global liquefied natural gas markets. As the U.S. is now a factor in the global LNG trade, higher or lower prices will impact gas prices. While the impact now is minor, it will potentially grow and drive domestic gas prices up. As LNG exporters find more profitable LNG trades, they will suck more domestic supply out of the market, resulting in upward pressure on U.S. gas futures prices. An improved natural gas price environment will further aid the recovery in U.S. energy stocks, as natural gas is a significant revenue component for many oil and gas producers.

To appreciate the forces at work within the energy commodity markets, one needs to pay attention to trends in oil and gas equities. The stock market functions on the principle of discounting the future growth in a company's earnings, cash flow, and dividends. If the market perceives that forces in the global oil and gas commodity markets will produce a better than anticipated outcome, energy company share prices will rise. On the other hand, if they fall while commodity prices remain healthy, one should read the negative price move as a signal to look deeper into the drivers at work in commodity markets. Is supply growing faster than expected, or is demand slowing? Either one of these trends will impact future oil and gas prices, and thus future producer earnings. Crude oil and natural gas price trends, along with energy stock price movements, are a shorthand way to stay on top of changing trends in the energy business.



CRUDE & NATURAL GAS Spot Prices

PRICES IN US DOLLARS AS OF JANUARY 15, 2018

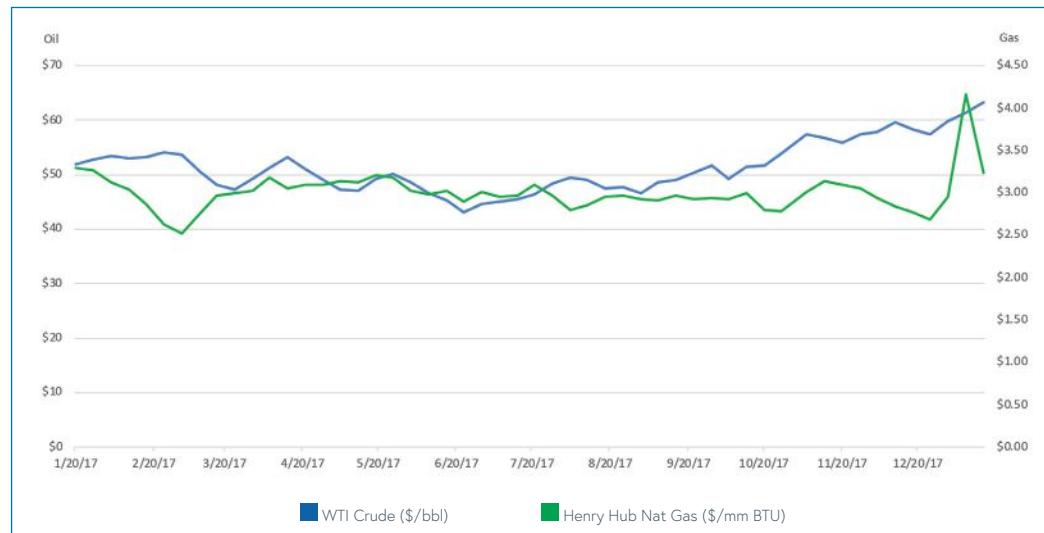
Oil prices surged in early January, partly due to civil unrest in Iran that is causing tensions in the Persian Gulf region (although production and exports have not been affected) and bitter cold temperatures in the United States (which is increasing

demand). Prices also are supported by continuing OPEC efforts to reduce global inventories. The EIA reported that U.S. oil inventories had dropped to 424.5 million barrels at the end of 2017, down 54.5 million from a year earlier. WTI crude prices finally

broke the \$60 per barrel mark in early January and reached \$63.00 by the middle of the month.

Henry Hub natural gas spot prices dropped during December, reaching a low of \$2.63, but rebounded in early

January \$4.00 per million BTU as the extreme cold in much of the U.S. drove up demand. The spike was short lived, however, as prices fell to \$3.24 by the middle of the month as milder weather set in.

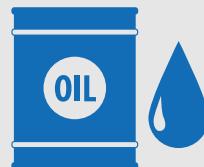


\$63.26

+\$5.45 previous month



TRENDING UP



Cushing, OK
WTI Spot Price

\$3.24

+\$0.03 previous month



TRENDING UP



Henry Hub
Spot Price

KEY EQUITY Indexes

PRICES IN US DOLLARS AS OF JANUARY 15, 2018

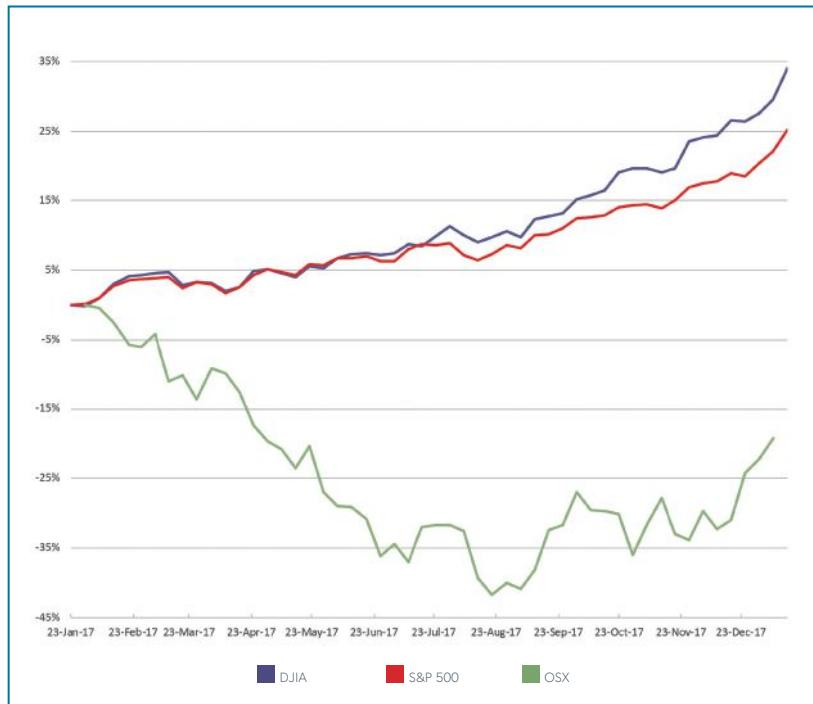
U.S. EQUITY MARKETS
jumped considerably since
last month's report.

The DJIA continued its string of records, passing the 25,000 market in late December and the 26,000 mark in January. Strong earnings and job reports were major factors in the advance.

The S&P 500 also advanced to record levels, crossing the 2,700-point mark in December and surpassing 2,800 in January.

The Philadelphia Oilfield Services Index (OSX) also gained, closing above 160 in mid-January on higher oil prices.

SELECTED EQUITY INDEXES



CUMULATIVE PERCENTAGE CHANGE
Last 52 Weeks

26,071.72

+1,703.69 from previous month



TRENDING UP

DJIA

2,810.30

+150.31 from previous month



TRENDING UP

S&P 500

160.40

+24.35 from previous month



TRENDING UP

OSX



UTC

Bergen, Norway
June 12-14
www.utc.no

Offshore Northern Seas

Stavanger, Norway
August 27-30
www.ons.no/2018

InterSpill

London, UK
March 13-15
www.interspillevent.com

Oceanology International

London, UK
March 13-15
www.oceanologyinternational.com

MAST Advanced Workshop

Portsmouth, UK
May 15-17
mastconfex.com/future

Unmanned Maritime Systems

London, UK
May 16-17
www.smi-online.co.uk/defence/uk/Unmanned-Maritime-Systems

ICCOE

Shanghai, China
April 27-29
www.iccoe.org

OTO'18

Kobe, Japan
May 28-31
www.oceans18mtsieekobe.org

Asia Pacific Maritime

Singapore
March 14-16
www.apmaritime.com

OTC ASIA

Kuala Lumpur, Malaysia
March 20-23
2018.otcasia.org

AOG Subsea Forum

Perth, Australia
March 14-16
www.sut.org/event/perth-aog-exhibition-conference-5

ICPC Plenary Meeting

Cape Town, South Africa
April 10-12
iscpc.org/events

2018 EDITORIAL CALENDAR

CALENDAR

JANUARY

EDITORIAL: Underwater Navigation; Manned Submersibles; Deepwater Pipeline/Repair/Maintenance

FOCUS: Multibeam and Side Scan Sonar; Oil Spill Prevention and Clean-Up Services

FEBRUARY

EDITORIAL: Oceanology; Maritime Security

FOCUS: Buoys and Monitoring Instrumentation; Diver Detection Systems; Training & Safety

MARCH

EDITORIAL: Offshore Technology; Subsea Fiber Optic Networks

FOCUS: Connectors, Cables & Umbilicals; Environmental Monitoring/Testing Services

APRIL

EDITORIAL: Meteorology; Ocean Mapping & Survey; Decommissioning & Abandonment

FOCUS: Subsea Tools & Manipulators; Data Acquisition Products; Seismic Imaging

MAY

EDITORIAL: Ocean and Coastal Engineering, Infrastructure, and Construction; Bathymetric Mapping

FOCUS: Cranes, Winches & Control Systems; Water Dredges and Airlifts

JUNE

EDITORIAL: UW Imaging and Processing; UW Archaeology

FOCUS: UW Imaging and Processing; Tracking and Positioning Systems; Magnetometers

JULY

BUYER'S GUIDE

AUGUST

EDITORIAL: ROV and AUV Technology

FOCUS: Cameras, Lights and Imaging Sonars; Vehicle Sensor Suites

SEPTEMBER

EDITORIAL: Offshore Wind Installation and Maintenance; Offshore Supply & Emergency Vehicles

FOCUS: Offshore Support; Turbines; Offshore Wind Inspection Services

OCTOBER

EDITORIAL: Offshore Communications; Subsea Telecom; Subsea Inspection, Monitoring, Repair & Maintenance

FOCUS: Marine Communications; Cable Installation Services

NOVEMBER/DECEMBER

EDITORIAL: Year in Review; Commercial Diving and Salvage; Ocean Observing Systems; Ocean Science & Exploration

FOCUS: Acoustic Modems, Releases and Transponders; Diving Equipment and Services; Salvage; Buoyancy Materials

SHOW DISTRIBUTION

JANUARY

GoM Oil Spill & Ecosystem - February 5-8

Underwater Intervention - February 6-8

Subsea Expo - February 7-9

Decomm & Abandonment Summit - February 20-21

FEBRUARY

Oceanology International - March 13-15

Asia Pacific Maritime - March 14-16 *

CUCE - March 25-27 *

MARCH

Int'l Offshore Wind Forum - April 3-6

ICCOE - April 27-29 ^*

OTC - April 30 - May 3

Int'l Telecoms Week - May 6-9 ^

APRIL

TBD

MAY

Int'l Conf on Ocean Energy - June 12-14 ^

Clean Pacific - June 19-21

Int'l Conf on Coastal Engineering - July 30-Aug 3 ^

JUNE

UDT - June 26-28 ^

JULY

TBD

AUGUST

SMM - September 4-7 ^*

OCEANS '18 - October 22-25 ^

SEPTEMBER

Submarine Networks World - September 24-26 ^*

WindEnergy Hamburg - September 25-28 ^

AWEA Offshore Wind - October 16-17 ^

Pacific Marine Expo - TBD

OCTOBER

MTS Dynamic Positioning - October 9-10 ^

Offshore Energy - October 22-24 ^

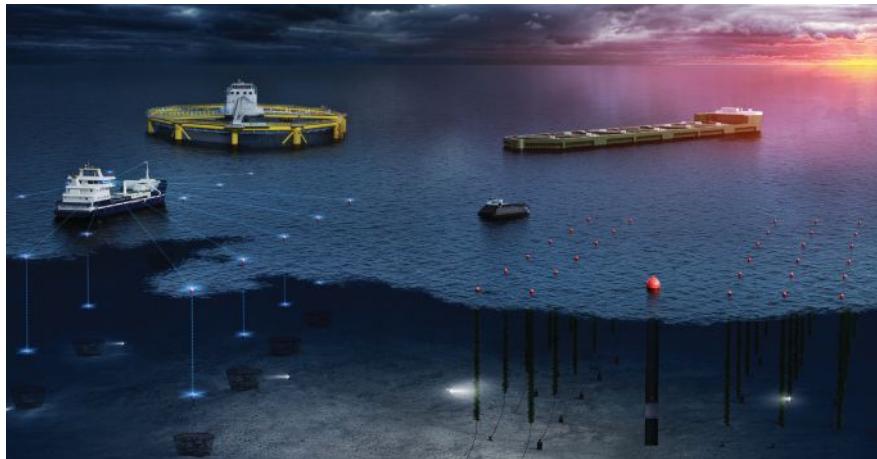
Offshore Well Intervention GoM - TBD

NOVEMBER/DECEMBER

Clean Gulf - November 13-15 ^

* Digital Distribution

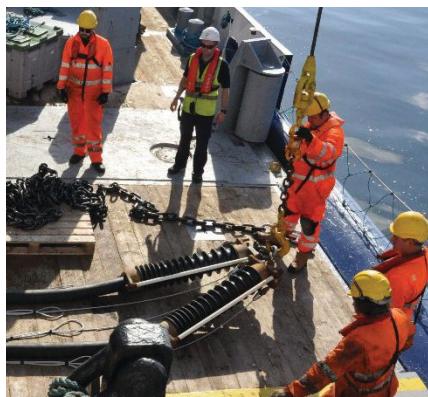
^ Pending



Nor-Shipping Launches Opening Oceans in Denmark in 2018

Nor-Shipping is making its first move outside Norway, with a new initiative to help maritime and ocean industry players realize the business potential of the ocean space. Nor-Shipping's Opening Oceans Conference takes place in Copenhagen from 2-3 May 2018.

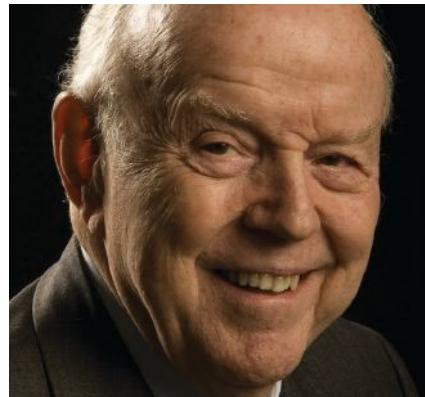
<http://ont.news/2nkDoN7>



FORESEA Approves Funding for Offshore Renewable Energy Technologies

The €11 million EU-funded FORESEA has approved funding for six developers to deploy technologies at the SmartBay Marine and Renewable Energy Test Site in Ireland: Sea Power, Bluwind Power, Marine Power Systems, Blue Ocean Monitoring, UGen, and Calwave.

<http://ont.news/2EFPsQx>



R.J. Brown, Offshore Pipeline Pioneer, Passes Away

R.J. (Bob) Brown, one of the top offshore pipeline engineers of his generation, has passed away at age 89. During his distinguished career, Brown made marine pipelining more efficient and much safer. In 2008, he was inducted into the Offshore Energy Center's Hall of Fame.

<http://ont.news/2nLasgR>



Danos Announces Two New Executive Leadership Appointments

David Cedro has joined the Danos executive team as vice president of finance and administration, with responsibility for overseeing the company's domestic and international administration, finance, and accounting activities. James Callahan, who previously held the senior finance position, moves into a new role as vice president of project services.

<http://ont.news/2FtmnqN>



Industry Body Subsea UK Announces New Board for 2018-19

Subsea UK has unveiled its new board for 2018-19. Following a members' ballot at its Annual General Meeting (AGM), nine members have been re-elected and two have stepped down. The newly elected board will continue to ensure the UK maintains a strong representation across the global subsea industry under the leadership of chairman, Bill Edgar, and chief executive, Neil Gordon.

<http://ont.news/2nk49Bw>

IT'S WHAT'S ON THE INSIDE THAT COUNTS



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Ocean Sonics designs and manufactures the icListen, a compact self-contained easy to deploy digital hydrophone. As the world leader in gathering ocean sound, Ocean Sonics combines very high signal performance with innovative ease of use, to give customers the best digital hydrophone technology available. It's a compact, all-in-one instrument capable of processing data while collecting in real-time.

Creating Acoustic Arrays is now simple. Connect two or more icListen hydrophones together and they self-synchronize, operating as one. Ocean Sonics offers a wide range of geometries, including vertical, horizontal, autonomous, very small geometrical arrays, or spread out over many kilometres.

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- WiFi remote Buoy: BASDA14, Multi-sensor & Rechargeable Acoustic Buoy accessible in Real-time
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We provide advanced embedded acoustic products in the environmental research, surveying and monitoring areas. With Synchronized Multichannel Acquisition and accepting a broad range of Acoustic Transducers and Hydrophones from 3Hz to more than 1MHz, our solutions allow the user a new range of applications.

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 E-mail: sales@rowetechinc.com
 Website: www.rowetechinc.com
 Contact: Chris Arends, Global Sales Director



Rowe Technologies designs and manufactures state-of-the-art Acoustic Doppler Current Profilers (ADCPs) and Doppler Velocity Logs (DVLs), applicable to an array of current measuring and navigational deployments for world-wide use, in oceans, lakes, and rivers. Rowe Technologies 7,100 ft² facility is headquartered in San Diego California and was founded in 2009 by Dan and Steve Rowe, the sons of Fran Rowe who is the originator of the Acoustic Doppler Current Profiler (ADCP) and co-founder of Teledyne RDI. Rowe Technologies highly experienced, innovative staff has over 250+ years of Doppler system development experience and is on the preponderance of ADCP patents.

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- Provor and Arvor profiling subsurface floats (ARGO project): CTD, dissolved oxygen, BGC, deep; Argos and Iridium transmission.
- Drifting surface buoys with temperature and GPS receiver for Surface velocity project. Contact: Nathalie Le Bris, nlebris@nke.fr or Jérôme Sagot, jsagot@nke.fr

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Kongsberg Maritime is a marine technology company providing innovative solutions for all marine industry sectors including merchant, offshore, subsea, naval and fisheries. The company delivers systems that cover diverse maritime applications. Within subsea, Kongsberg Maritime's sonars, Sub-bottom profilers, multibeam and single beam echo sounders, cameras, positioning and underwater communication & monitoring systems, instruments, software and Marine Robotics are used in survey and inspection operations worldwide. Working closely with customers to develop technology that pushes the limits in subsea applications, Kongsberg Maritime is also dedicated to developing innovative environmental monitoring solutions such as the K-Lander system in addition to cutting-edge Marine Robotic platforms such as the futuristic Eelume vehicle.

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