



P L A N E T



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ROVOP Ready for an Exciting 2019



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DriX: One Year in Operation



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The magazine of choice for Subsea Construction and ROV Professionals

ISSUE

Q1 / 2019

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WELCOME TO



My name is Richie Enzmann, and allow me to welcome you all to the latest issue of ROV Planet!

Dear Reader,

With 2019 commencing we have a busy show season ahead of us with Subsea Expo, Underwater Intervention and Oceanology are all offering great opportunities to learn about underwater technologies and network with the industry in the hubs of the North Sea, the Gulf of Mexico, and the Pacific. We have a great selection of articles from all over the world including New Zealand with some ROV innovation happening there.

You can also read about how ROVOP are looking forward to the future after recently acquiring M2 Subsea and thus increasing their own fleet size to 51 vehicles to become a major independent ROV contractor. We look at how iXblue's new unmanned surface vehicle (USV), the DriX, has been performing in the last year. It turns out that it was a success in several sectors including the oil & gas, science, and defence industries. iXblue have done an excellent job in designing that USV.

Finally, Konrad Mech shares his experiences and tips regarding safe business travel in an engaging manner. His tips and advice are useful for all business travellers working in the oil & gas industry as the world has become a more dangerous place.

Please take a look at our updated ROV/AUV Parts and Equipment Buyer's Guide (online and in print). We have added more premium listings and general contacts of non-listed companies in each category to provide a one stop location for those that are looking for equipment and parts manufacturers.

Best regards,
Richie Enzmann

Please check out our website on:
www.ROVPlanet.com

UPCOMING EVENTS

5-7 February 2019 – Subsea Expo – Aberdeen, Scotland, UK

Europe's largest annual Subsea Exhibition and Conference organised by Subsea UK.

5-7 February 2019 – Underwater Intervention – New Orleans, LA, USA

With new features in 2019, including the 2025 Offshore Oilfield Panel Discussion hosted by BP, Underwater Intervention is expected to be the most attended in years!

25-27 February 2019 – Oceanology International Americas – San Diego, CA, USA

Oceanology International will connect you with buyers and influencers from the Americas looking for innovative solutions to improve strategies for exploring, monitoring, developing and protecting the world's oceans.

2-4 April 2019 – MCE Deepwater Development – London, England, UK

A leading deepwater technology conference for the global oil and gas industry. BP will be the lead operator sponsor of the event being held in London.

9-11 April 2019 – Ocean Business – Southampton, England, UK

The hands-on ocean technology exhibition and training forum.

6-9 May 2019 – Offshore Technology Conference (OTC) – Houston, TX, USA

The World's biggest offshore oil & gas conference and exhibition.

13-15 May 2019 – Undersea Defence Technology (UDT) – Stockholm, Sweden

The underwater defence and security community's most relevant exhibition and conference.

4-5 June 2019 – IOSTIA BlueTech Expo – Washington, DC, USA

Event organized to coincide with Capitol Hill Ocean Week (CHOW).

17-20 June 2019 – OCEANS 2019 – Marseilles, France

The OCEANS conference is the flagship event of the IEEE OES and the MTS.




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KNOWLEDGE IN DEPTH

ROVOP READY FOR AN

EXCITING 2019 AFTER A SUCCESSFUL YEAR OF GROWTH

ROVOP, the independent provider of ROV services, is well placed to expand its business this year following a highly successful 2018. During a year of growth, the company increased its fleet of ROVs to 51 in operation, expanded its workforce and introduced a new base in the Middle East. Looking forward to the rest of 2019, ROVOP is confident this growth will continue.



Steven Gray, ROVOP CEO (Courtesy of ROVOP)



David Lamont (Courtesy of ROVOP)





Michael O'Donnell and Doug Middleton (Courtesy of ROVOP)

Last year, the company acquired M2 Subsea's entire fleet of 28 ROVs. Following a technical review, 19 of the acquired systems met the ROVOP standards and were added to its fleet, with the remaining ROVs to be either decommissioned or sold. This increases the number of ROVs in operation at ROVOP to 34 hydraulic systems and 17 electric systems.

The fleet expansion enables ROVOP to better support customer operations by strengthening deployment capabilities across the world, with a particular focus on Latin America, Africa, the Middle East and Asia. The acquisition is consistent with ROVOP's long-held growth strategy of providing a focused ROV service to its customers in all markets and geographies. The fleet will be deployed in the vessel and rig markets. The addition of the latest ROV systems to the fleet enables ROVOP to better support customers with the appropriate ROVs for their requirements based on capability and greater cost efficiency.

As well as this investment in ROVs, ROVOP is also developing an enhanced digital infrastructure and platform to help support the company's growth. These digital initiatives give ROVOP's staff the ability to extract meaningful information from the data acquired in day-to-day operations – helping to create value both internally in terms of the accessibility of knowledge for staff, and also externally for its customers.

This will benefit ROVOP's new base in the Middle East, established to offer the highest quality ROV service to the region. Two senior members of staff – operations director Doug Middleton and business development manager Michael O'Donnell – are moving to the region in order to run the new operation and to lead the expansion of services to clients.



ROVOP employee mobilising ROV offshore. (Courtesy of ROVOP)

ROVOP's quality capabilities across the drill support, IRM, and construction markets within the oil and gas sector, underpinned by operational excellence and a diverse fleet of ROVs, will be managed locally. The company's unique approach combines the most advanced technology with highly skilled personnel and a first-class customer culture, which reduces risk and cost while improving efficiency.

Personnel growth in Aberdeen includes the appointment of David Lamont as a non-executive director. David has over 35 years of industry experience in the oil and gas sec-

tor and his appointment is in line with ROVOP's business and growth strategy of providing a focused ROV service to its customers in all markets and geographies.

This year, the company aims to continue on this upward trajectory – evidenced by the success of its graduate programme, which is now in its third year. This bespoke programme offers a two-year structured training and development plan. Tailored to each individual's background and aspirations, it aims to prepare graduates for a career by gaining valuable experience in areas such as operations, commercial, HSEQ, finance and offshore.

As well as the graduate programme, the company also provides the ROVOP Academy, which is a cornerstone to ROVOP's commitment to personnel and clients to ensure its people are the most skilled in the ROV industry. This is through the provision of training modules that count towards continual professional development.

Providing ROV personnel with a clear and structured program for career development and in line with personal aspirations, ROVOP's teams work towards achieving clearly defined competencies. This allows the most experienced ROV professionals to refine their skills and achieve full recognition and reward. For those less experienced, the academy helps develop new skills. Or, for personnel on their very first role piloting, the academy offers all the skills required to kick start a career in ROVs.

The structured development programme includes over 30 modules covering competencies including ROV piloting; manipulators and other peripheral tooling and sensors; scenario training on ROVOP's simulator; technical – ROV and associated systems; health and safety; environment; and coaching and mentoring.

ROVOP CEO Steven Gray said: "2019 is set to be the busiest year ever for ROVOP as we continue to grow our business providing ROVs in support of our customers worldwide.

"Our strategy of providing the best ROV service appropriate to each market is succeeding and has allowed us to become one of the leading ROV companies globally, based on customers choosing our quality of service."

ROVOP's track record of delivering the highest quality ROV service is evidenced by its commitment to provide exceptional customer service, the most skilled and competent personnel and the most advanced ROV systems. These capabilities and services include drill support, construction, IRM, surveys, cable lay support and decommissioning. With headquarters in Aberdeen and Houston, ROVOP's global scope encompasses the oil and gas, offshore wind, telecoms and power transmission industries.



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DRIX ONE YEAR IN OPERATION

In November 2017, iXblue commercially launched DriX, an 8-metre long, internationally patented and high seas going Unmanned Surface Vehicle (USV), on the civilian market.





A year on from that initial launch, we can see where iXblue's predictions have come true. They believed that the key success factors for any USV lay in its hydrodynamics, autonomy, and resilience. The track record of the energy and survey industries last year, in addition to the interest shown by defence companies and the number of similarities with new surface drones highlights that iXblue's predictions were correct.

COMPANIES, JOBS AND TRIALS

DriX started 2018 with an early adopter, Bibby HydroMap, a leading provider of hydrographic, geophysical, UXO, ROV and asset inspection surveys. Bibby was the first company to see the massive potential presented by DriX after iXblue's very own Sea Operations division. Alongside iXblue, Bibby helped communicate this potential with a number of other companies by finding applications for the DriX. One of these was their first offshore wind-farm trials, which took place in the UK.

On the fossil fuel front, iXblue performed a job in Azerbaijan for Total, a major oil and gas operator, and teamed up with a forefront contractor to help them develop a new life-of-field model. It implies properly conducting AUV tracking and more from DriX.

On the hydrographic survey side, iXblue conducted the seabed mapping of the Tonga Islands in the Pacific, and also a number of other surveys in the Mediterranean Sea and in New Zealand.

DriX operating near Conwy. (Courtesy of iXblue)



DRiX surveying the waters of the Tonga Islands. (Courtesy of iXblue)



DRiX off the coast of Baku. (Courtesy of iXblue)

iXblue has a long tradition of interacting with the academic world, and DRiX was introduced to it for the first time in 2018. The company became industrial partners of the University of New Hampshire where one DRiX is now stationed. One of the company's experts was invited to the Scripps Institution of Oceanography to deliver a speech on the added value of using DRiX in UXO and debris surveys. One of the reasons that the academic sphere is so important to iXblue is that both the software and mechanical architectures of DRiX are open for further development. The company's collaboration with the U.S. National Oceanographic and Atmospheric Agency (NOAA) and the support of The Maritime Alliance (TMA) really helped iXblue get there.

All these new collaborations generated considerable interest from the defence industry. DRiX being autonomous, silent, and enduring. At the same time it's designed to carry a submerged payload bolted to its 2m deep drop keel. The

interest was expressed so adamantly that iXblue decided to showcase a 'grey version' of DRiX during the EURONAVAL defence show in Paris. Furthermore, the USV has already been selected by a first rank NATO navy to contribute to the development of an Anti-Submarine Warfare solution.

ECONOMIC EFFICIENCY: MATURITY AND UPGRADABILITY

Overall, iXblue went from development trials to effective money-making jobs in less than a year. It integrated several sensors from different manufacturers, making DRiX a more technologically mature solution, as well as a tender winning asset.

Because R&D does not stop once the project becomes a real product, iXblue's team of engineers, sailors, and software developers provided DRiX with a number of add-ons requested by clients, such as:

- | a proper DRiX Deployment System allowing deployment of DRiX safely and efficiently from the shore or a vessel, using a davit, deck crane, or A-frame;
- | a specially fitted transport container to ship the DRiX system securely anywhere in the world;
- | several enhancements, such as a range of communication and user interfaces.

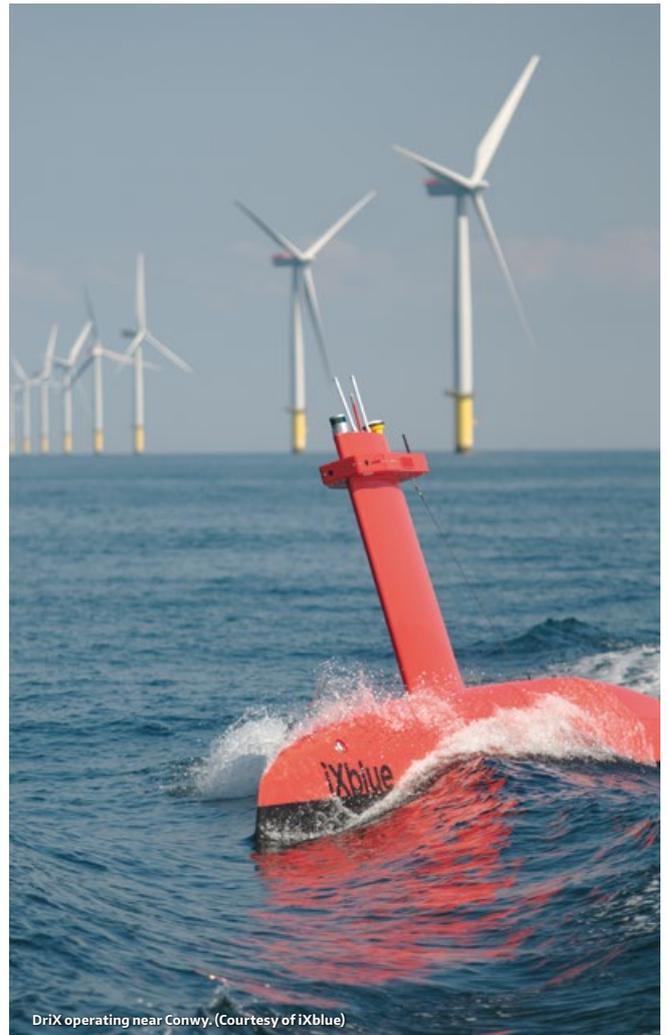
Those technical milestones were all implemented on board existing DRiXs. These are exceedingly easy to update even if this contingency is considered every time a new development is being prepared.

LESSONS LEARNED

Over 2018, DRiX performed like a workhorse. Most of the time, it operated jointly with a specialised vessel acting as support. Why a specialised one and not a vessel of oppor-



Euronaval 2018 with the French Navy chief of Staff. (Courtesy of iXblue)



DriX operating near Conwy. (Courtesy of iXblue)

tunity as DriX was designed to operate with? Well, because over the first contracts, the final clients did not fully foresee the benefits of DriX until they actually saw it operating in the water. So they used both a traditional asset and a DriX at the same time, on a 'just in case' basis. Truth be told, it turned out that DriX was able to work longer and in harsher conditions and did not face the issues one would expect on a 'manned vessel'. The downtime is not zero, but only a fraction of what it usually is on a surface vessel.

The other lesson learned is the fact that surveyors are willing to take more risks with an unmanned asset than with their own vessel. For instance, on a particular contract in uncharted waters, they used DriX to map the hazardous areas where they did not dare to venture themselves. This event showed additional added value for DriX.

ADDED VALUE

The long autonomy is also a game changer. It allows people to work for hours on end focusing on the data quality and not the asset itself.

iXblue equally realised how easy it was to include DriX in a pre-existing environment, such as an oil field or a wind farm. Even when using the now traditional image of 'plug and play'

would be stepping a bit too far, the integration to a pre-existing organization is made easy and smooth enough.

Last but not least, users realised the enormous added value of the Launch And Recovery System (called the DriX Deployment System, or DDS) as a protective device, or simply as a cradle. Although it is also possible to use DriX without it, it greatly enhances the smoothness of the entire operation, while operating in the same range of sea states as a RHIB would. The DDS plays a big part in the present assessment.

CONCLUSION

All in all, DriX has made even more financial sense than expected: it's simple, robust, and designed for offshore and coastal environments. It also brings better and faster results than a surface vessel operating at the same time. Its navigation accuracy is second to none, and it's safe.

It's also been observed that – from a human perspective – surveyors were changing the way they worked. They were not forced into developing new concepts of operations because of a new technology. On the contrary, DriX is perfectly adaptable to 'the old ways'. Instead of disrupting traditional ways, it brings them to a new level of efficiency thanks to the users themselves.

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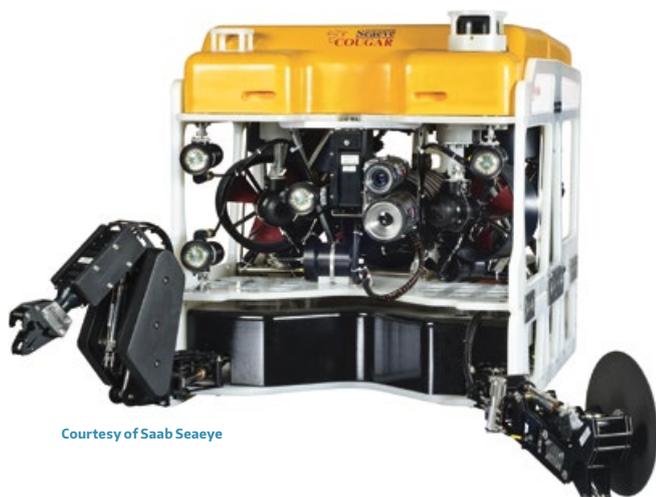
Norway-based Østensjø Rederi has chosen a Saab Seaeeye Cougar XT underwater robotic vehicle as a deployable resource aboard their multi-purpose support vessel 'Edda Fonn'.

The company is contracted to deliver the 'Edda Fonn' to the New Zealand Ministry of Defence in 2019 with an integrated ROV and dive system amongst its upgrades. The ship will subsequently be used by the Royal New Zealand Navy.

Østensjø Rederi say they chose the Cougar over robotic vehicles from other manufacturers after hearing 'very good feedback' from end users around the world. They also said the Cougar had the best overall specification and is backed by Saab Seaeeye's 30 year reputation for building reliable systems.

ROV and diving consultant at Østensjø Rederi, Arvid Bertelsen, explains that the Cougar XT has the best power, thrust and payload in its class, with the widest and most comprehensive range of quick-change tool skids.

He says it was also the most technically compliant to specifications demanded by NORSOK, the Royal New Zealand Navy and Østensjø Rederi. The Cougar is compliant with NORSOK 102 3ed. 2016 Class II B for an observation vehicle with light intervention, survey and construction capabilities.



Courtesy of Saab Seaeeye

EXCEPTIONAL LAUNCH AND RECOVERY SYSTEM

To meet the Navy's exacting operational requirements, Østensjø Rederi expanded and extended the technical specification for the complete system including the Cougar, the control room, and in particular, the Launch and Recovery System (LARS).

The ability to safely launch the Cougar in sea states specified by the Royal New Zealand Navy was of paramount importance. This set a special focus on the LARS and its position inside the vessel, with the Cougar launched from a mezzanine deck inside the vessel's ROV hangar.

When evaluating the best system, Østensjø Rederi concluded that the Cougar with a modified dipping and extending LARS with snubber, heave compensation and electric winch motors, was the best solution.

Along with the LARS, the complete system includes a standard Cougar XT with minor modification to include three cameras and sonar system, together with its tether management system and three individual tool skids with manipulators, cutters and water jetting system.

Also specified is a control room integrated into the vessel created to a design centred on operator ergonomic principles.

UNRIVALLED MANOEUVRABILITY

The 2000m rated Cougar XT's maneuverability comes from its six thrusters, each interfaced with a fast-acting control system and solid-state gyro for enhanced azimuth stability and control.

The Cougar's compact 1.5 metre size footprint makes it easy to mobilise, yet despite its small size, it has the power to handle a wide range of heavy tooling.

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GIGANTIC STEP FOR NEW ZEALAND ROBOTICS; HEADED TO ANTARCTICA

Boxfish Research, New Zealand's leading underwater robotics start-up have announced that on the 2nd of January 2019, Cofounder and experienced mechanical engineer Ben King, will begin his journey to Antarctica. Accompanying Dr Regina Eisert and a research team from the University of Canterbury, the team will be participating in the Antarctic Top Predator New Zealand programme. With the goal of studying and capturing footage of specifically the Orca and the Minke whales as they congregate through the ice channel that resupplies McMurdo research station. King will be equipped with both the Boxfish ROV and the Boxfish 360 underwater vision systems, which have been designed to handle the harshest conditions in the world.



Courtesy of Boxfish Research





Pre-shoot testing in the coldest place on earth. (Courtesy of Boxfish Research)



Courtesy of Boxfish Research

As a growing New Zealand Startup Boxfish are thrilled to have the opportunity to participate in and facilitate this massive research expedition. Through this opportunity, the Kiwi startup is able to expand their audience and prove their equipment has got what it takes.

“At Boxfish Research we develop high-end video solutions for underwater, and have been asked to join a scientific expedition to try and understand better the behaviour of these animals... our equipment is designed to be used by people in real situations and there's no better way to test that than in the coldest, driest and windiest place on earth.”

“We hope to capture 360 immersive videos with the 360 camera which will be lowered off the ice with a rope. Then we will be using the unique ultra high definition ultra-stable Boxfish ROV to capture whales from underneath and from unique angles going down some several hundred meters.”, explained Ben King.

Through the use of the Boxfish ROV, the research team will have the ability to capture uncompressed UHD video that is live streamed back to the surface on a 17" monitor. This advanced system allows the team to capture broadcast quality footage from depths and angles divers simply can't reach underneath the ice. As well as the ROV the Boxfish 360 spherical camera will also be lowered off the edge of the ice, capturing immersive VR video content on behalf of many that will never have the opportunity to visit Antarctica.



Courtesy of Boxfish Research



Courtesy of Boxfish Research



NZ tech being deployed in the extreme Antarctic temperatures. (Courtesy of Boxfish Research)

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FORUM'S NEW EROV MEANS BIG SAVINGS FOR OPERATORS

FORUM SUBSEA TECHNOLOGIES IS DRIVING COST EFFICIENCIES FOR THE SUBSEA SECTOR WITH THE ADDITION OF ITS LATEST ELECTRIC REMOTELY OPERATED VEHICLE (ROV).

The recently launched XLe Spirit is the first observation-class ROV to utilise Forum's Integrated Control Engine (ICE™) to bring greater functionality commonly only found in larger work-class vehicles. The advanced control electronics pod fitted to all Forum XLe observation class vehicles enables superior connectivity and expansion capabilities when compared with other ROV's on the market. Ethernet interfacing allows for seamless integration with other industry sensors using common IP architecture and ease of remote data transfer.

Kevin Taylor VP of Subsea commented: "As the subsea market continues to recover from a sustained downturn, cost efficiency is high on the agenda for the industry. Forum recognised the opportunity to apply our leading software to a more compact vehicle to enhance capabilities and meet the changing demands of the sector.

"By utilising the same system across all vehicles, pilots only have one interface to learn as the skills are transferable between the smallest observation vehicle and the largest trenchers. This means training can concentrate on operational tasks opposed to control systems, providing further efficiencies."

The XLe Spirit incorporates a number of features to maximise its stability for use as a sensor platform, including regulated propulsion power, optimised thruster orientation and location, accurate thruster speed control and a wide range of auto-functions for positioning and flying.

The XLe Spirit has just completed a twelve-week test programme at Forum's test tank in Kirkbymoorside, Yorkshire. It will be sent for sea trials in the first quarter of 2019.



Courtesy of Forum Energy Technologies



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Crew of the Pescadero Vent Diving expedition recover the mapping AUV. This Autonomous Underwater Vehicle is equipped with four mapping sonars that operate simultaneously during a mission: a swath multibeam sonar, two sidescan sonars, and a sub-bottom profiler. The multibeam sonar produces high-resolution bathymetry (analogous to topography on land), the sidescan sonars produce imagery based on the intensity of the sound energy's reflections, and the sub-bottom profiler penetrates sediments on the seafloor, allowing the detection of layers within the sediments, faults, and depth to the basement rock. All components are rated to 6,000 meters depth. The vehicles are launched on programmed missions and run on their own battery power until they return to the surface as programmed for recovery. (Photo: Monika Naranjo Gonzalez / Courtesy of Schmidt Ocean Institute)



NEW UNDERSEA MAPS LEAD TO HYDROTHERMAL VENT AND SPECIES DISCOVERIES

Autonomous and interactive robotic seafloor mapping systems were used on an expedition aboard research vessel Falkor in the southern Gulf of California, leading scientists to a new hydrothermal vent field and enabling the discovery of new deep-sea organisms.

SOUTHERN PESCADERO BASIN, GULF OF CALIFORNIA – A spectacular new hydrothermal vent field, named JaichMatt, has been discovered during an expedition aboard Schmidt Ocean Institute's R/V Falkor. The vents were identified using Monterey Bay Aquarium Research Institution's (MBARI) Dorado autonomous underwater vehicle to conduct exploratory seafloor surveys with one meter lateral resolution. Simultaneously, MBARI's new Low Altitude Survey System was used from Schmidt Ocean Institute's remotely operated vehicle SuBastian to map the previously discovered Auka Vent field at centimeter scale resolution using co-located multibeam sonar, scanning laser Lidar, and stereo photography. The biological communities and the geological and geochemical characteristics of these vent fields were then explored and sampled using ROV SuBastian.





Courtesy of Schmidt Ocean Institute



A microbial mat (a multi-layered sheet of microorganisms, mainly bacteria and archaea) consisting of mysterious blue microbes on the Auka hydrothermal vent dubbed "The Matterhorn." (Courtesy of Schmidt Ocean Institute)



Researchers, including Dr. Ronald Spelz Madero, aim to characterize the kinematics and past rupture history of several important fault systems in northern Baja California. (Photo: Monika Naranjo Gonzalez / Courtesy of Schmidt Ocean Institute)

Principal Investigators Drs. Robert Zierenberg from University of California Davis, Victoria Orphan from California Institute of Technology, and David Caress from MBARI, along with scientists from Oregon State University, the Universidad Autónoma de Baja California, the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), and the Scripps Institution of Oceanography, demonstrated the multi-disciplinary use of submarine robotics while investigating an area of unique geologic activity where submarine volcanism in heavily sedimented basins results in high temperature venting with unusual chemistry and geology. The nested-scale mapping approach allowed the team to efficiently progress from large scale exploratory seafloor coverage to precision targeted sampling on and around the vents. The detailed maps also allow for quantification of various microbial and animal communities in precise relation to geologic features and areas of focused and diffuse hydrothermal fluid flow. "By using submarine robotics for seafloor mapping in combination with remotely operated vehicles, the science team has been able to interactively explore and sample animals, microbes, rocks, and sediment" said Dr. Caress.

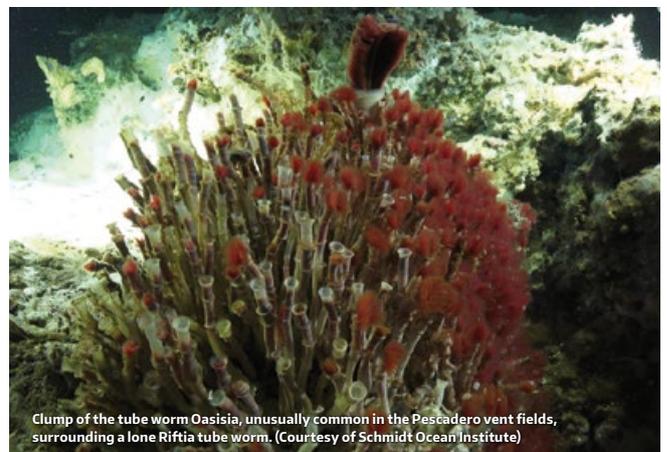
The new vent field name, JaichMaat, translates to liquid metal in an ancient language of the indigenous people of Mexico surrounding the region, in reference to the reflective hydrothermal fluid and seawater interface that was found ponded along the roof of a large cavern in the hydrothermal mound. The new vent field consists of multiple hydrothermal calcite mounds up to 25 meters high that were venting fluids at temperatures as high as 287° C. Groups of animals common in non-hydrothermal settings, including anemones, were also observed for the first time in dense accumulations at the base of the mounds, and many previously unknown species were identified.

This expedition successfully showcased new approaches to multi-scale seafloor mapping allowing oceanographers to more efficiently explore the deep ocean. In addition to identifying sites of hydrothermal venting, the combined mapping and ROV exploration also sampled the first volcanic rocks collected in both the North and South Pescadero Basins, confirming that in these basins the continental rifting that has formed the Gulf of California has transitioned to seafloor spreading and the volcanic formation of new oceanic crust. The Pescadero Basin is a unique site for studying microbial extremophiles involved in



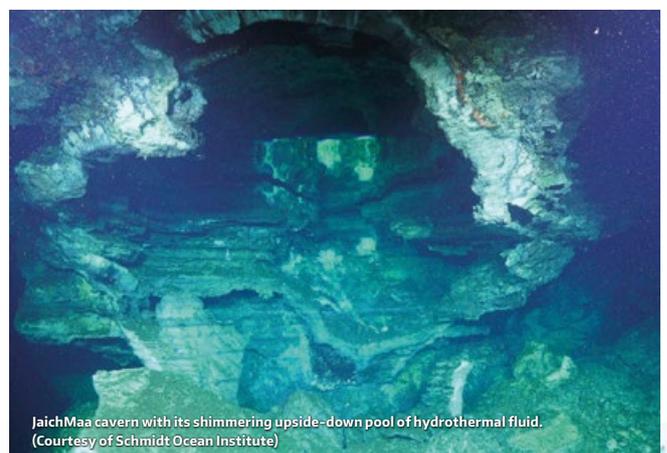
Researchers and ship crew inspect both the Autonomous and Remotely Operated vehicles after testing them near the start of the expedition. (Photo: Monika Naranjo Gonzalez / Courtesy of Schmidt Ocean Institute)

methane and hydrocarbon metabolism and an important location to try to understand how vent fauna colonize similar sites around the globe. The detailed mapping will further allow investigation of the geological and geochemical controls on habitat suitability for different animal and microbial communities. The Pescadero Basin vents harbor unique biology and geology compared to other nearby hydrothermal vent sites. This system was discovered in 2015 on a MBARI research cruise, and has been visited by scientists only a few times. Research Specialist Jennifer Paduan observed that this exquisite system is different due to the interaction of hydrothermal fluids with sediment, "The hydrothermal structures here are beautiful. The animals and the bacteria that are supported by the vents are different because the chemistry of the fluids is different than the usual sulfide type chimneys."



Clump of the tube worm Oasisia, unusually common in the Pescadero vent fields, surrounding a lone Riftia tube worm. (Courtesy of Schmidt Ocean Institute)

Hydrothermal vents are an expression of submarine volcanism that is a globally important process and play a vital part in shaping the surface of our planet. "The deep ocean is still one of the least explored frontiers in the solar system," said Principal Investigator Robert Zierenberg. "Maps of our planet are not as detailed as those of Mercury, Venus, Mars or the moon, because it is hard to map underwater. This is the frontier." The vents at the Southern Pescadero Basin offer a unique opportunity to compare microbial and animal community compositions between vents with different chemistries and mineral deposits. Microbes at these vents form the basis of the food web here, and gaining insight into the vent communities helps us understand the whole ecological system.



JaichMaa cavern with its shimmering upside-down pool of hydrothermal fluid. (Courtesy of Schmidt Ocean Institute)



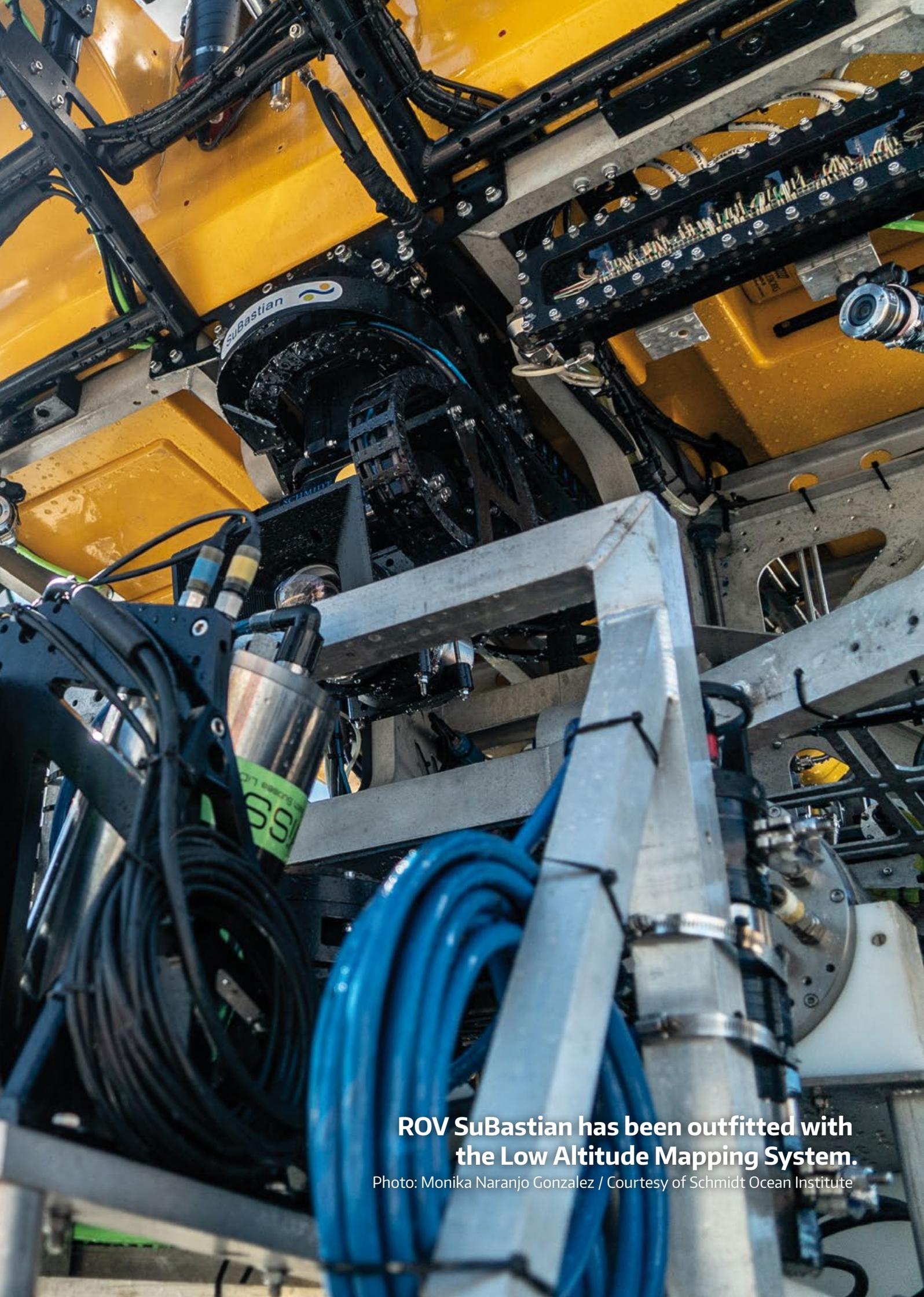
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**ROV SuBastian has been outfitted with
the Low Altitude Mapping System.**

Photo: Monika Naranjo Gonzalez / Courtesy of Schmidt Ocean Institute

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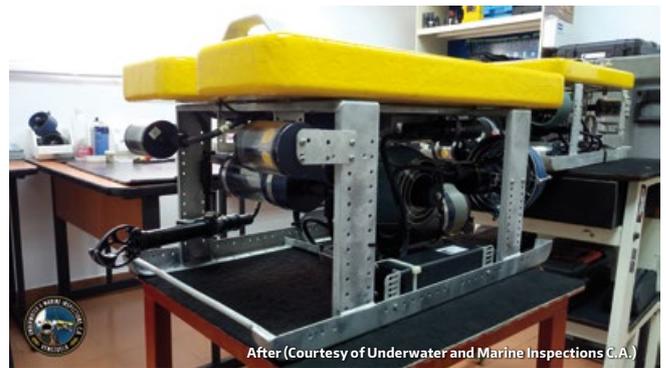
ROV RESTORATION IN VENEZUELA

BY UNDERWATER & MARINE INSPECTIONS C.A.

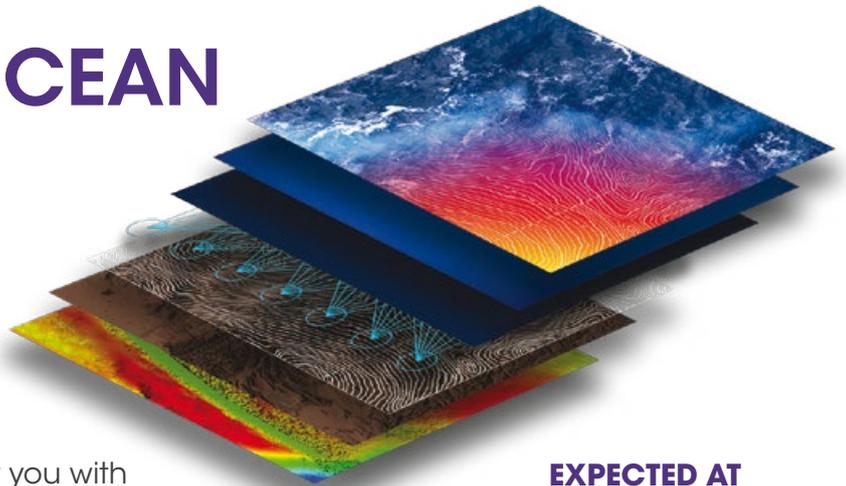
The general restoration of Outland ROV models 1000 & 2000 were completed by Underwater & Marine Inspections C.A. for the company Offshore Technology Solutions LTD (OTSL) in Venezuela. Total frame repair, buoyancy block and general maintenance were done. These two ROVs were offshore on the drilling of Cardon IV, in the Gulf of Venezuela, with the trinitarian company OTSL. Then they went to the headquarters of Underwater & Marine Inspections, C.A. in the port of Guanta, Puerto La Cruz, Venezuela, to be restored to the immaculate state that both companies can work together on the next contract.

Underwater & Marine Inspections, C.A. was founded in 2017 by José Antonio Núñez, the technical director of the Oriente Marine Group C.A. (O.M.G.C.A.), and his son Antonio Núñez, who is an ROV pilot graduated from the QSTAR ROV Training Center. José Antonio Núñez was the first Latin American registered member of the ADCI and a founding member of the Latin American and Caribbean chapter of the same association, which he presided over during the period 2004-2006. The company specializes in marine and underwater work, UWILD ABS Class Inspections, NDT Underwater Inspections, Real Time CCTV Monitoring and CCTV in-water survey inspections using ROVs and industrial diving.

The two Outland 1000 and 2000 models with LARS and control room are 100% operational and now on standby waiting for their next job.



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PHOENIX SUBMARINE RESCUE TEAM

COMPLETES RESCUE OPERATIONS OFF THE COAST OF ALASKA

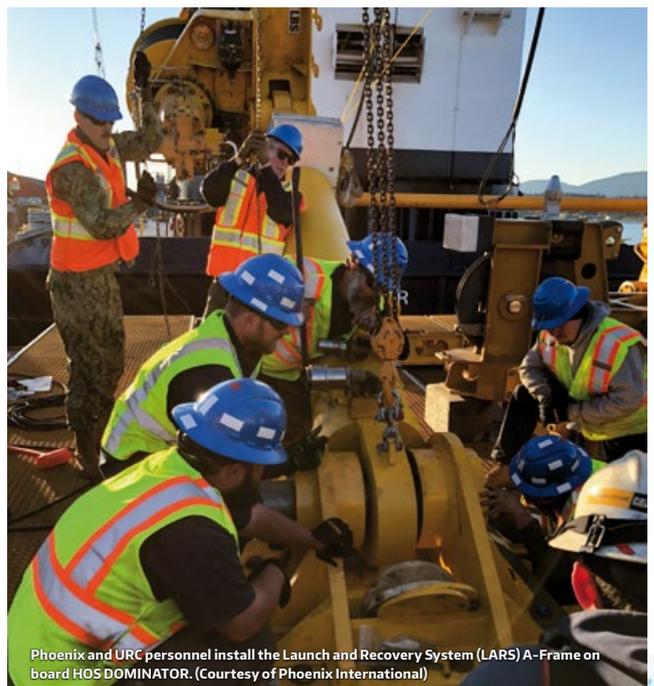
SRDRS (in the SRS-TUP configuration) loaded on board HOS DOMINATOR near Ketchikan, Alaska preparing to conduct mating operations with U.S. fast-attack submarine USS TEXAS. (Courtesy of Phoenix International)

The Phoenix Submarine Rescue Team mobilized the Submarine Rescue Diving and Recompression System (SRDRS) on board the M/V HOS DOMINATOR 10 October – 6 November and completed eight days of submarine rescue operations with the U.S. Navy's Undersea Rescue Command (URC) off the coast of Ketchikan, Alaska, culminating in the mating of the Pressurized Rescue Module (PRM) with a U.S. submarine.

The system was transported via commercial trucking from the URC compound in San Diego to Anacortes, WA, where it was loaded onto the HOS DOMINATOR at a commercial pier, validating the U.S. Navy's Pacific Northwest submarine rescue seaport capability. The HOS DOMINATOR then proceeded north via the Inside Passage to Ketchikan, Alaska for participation in a submarine rescue exercise. The Phoenix team operated the tethered PRM submersible and achieved a mate with Virginia-class fast-attack submarine, USS TEXAS (SSN 775), at the U.S. Navy's Southeast Alaska Acoustic Measurement Facility (SEAFAC) Static Site.

Phoenix personnel were instrumental in the successful completion of the SSN 775 rescue exercise, rapidly mobilizing SRDRS in its largest configuration at a remote seaport, and adapting operations to meet environmental challenges (shifting currents, low temperatures, rain and wind) while operating the rescue system safely in a constrained submerged envelope.

Phoenix has held the US submarine rescue contract since the SRDRS system was adopted as the U.S. submarine res-



Phoenix and URC personnel install the Launch and Recovery System (LARS) A-Frame on board HOS DOMINATOR. (Courtesy of Phoenix International)

cue capability in 2006-2007, and has developed broad and deep knowledge of the system and its capabilities. This knowledge is critical (as was demonstrated during the 2017 submarine rescue response off Argentina) to maintaining all U.S. rescue, intervention, and mobilization capabilities and to responding under challenging conditions. Rescue and intervention equipment for which Phoenix is responsible includes SRDRS for deep rescue, two Submarine Rescue Chambers (SRC) for shallow rescue, and the Sibitzky ROV for intervention.

SUBMARINE RESCUE CHAMBER (SRC)

The SRC is a McCann rescue chamber designed during World War II and is still used today. The SRC is operated by two crewmembers and is lowered using a tethered cable to the submarine. Once the chamber reaches the submarine, it seals over the submarine's hatch, allowing sailors to be safely transfer to the rescue chamber.

The SRC can rescue up to six persons at a time and reach a bottomed submarine at depths of 850 feet. SRC is the main component of the Submarine Rescue Chamber Flyaway System (SRCFS), which is capable of worldwide submarine rescue missions. Once launched, the SRCFS is able to operate around the clock.

The SRC consists of an upper and lower compartment. The upper is maintained at atmospheric pressure and contains operators, passengers and controls. The lower is flooded at ambient sea pressure and blown dry after mating to transfer personnel. It contains a downhaul drum and spooling device. The ballast tanks are normally dry but flooded during the mating process to provide additional weight.

PRESSURIZED RESCUE MODULE (PRM-1) FALCON

The PRM-1 Falcon is a tethered, remotely operated submarine rescue vehicle. It is capable of diving to depths up to 2,000 feet and mating with a disabled submarine trapped on the sea floor at up to a 45-degree angle in both pitch and roll. Two crewmembers operate the PRM, which can rescue 16 personnel at a time. The PRM is the main component of the Submarine Rescue Diving and Recompression System (SRDRS), which is capable of being flown anywhere in the world to rescue either U.S. or partner nation submariners in distress.

SRDRS is designed for quick worldwide deployment in the event of a submarine accident and is transportable by truck, aircraft, or ship.

The SRDRS replaced the vessels Mystic and Avalon, two previous rescue submarines, as the primary deep sea rescue asset for submariners.

ROV SIBITZKY

The Sibitzky ROV system consists of a 13.5-foot operations van, a 6.5-foot spares van, a winch with 3,000 feet of soft umbilical, a launch and recovery system, and the Sibitzky



Nick Grassilli, Edison Henry II, Mike Subarich, Dan Koenig, Cody Brown and Justin Lashlee (counter-clockwise from left rear) repositioning the Pressurized Rescue Module (PRM) during loadout of the SRS-TUP system on board HOS DOMINATOR in Anacortes, WA. (Courtesy of Phoenix International)

vehicle. The ROV is named after BM2 Martin C. Sibitzky, who received a Navy Cross for his valiant actions during the May 23, 1939 USS Squalus rescue and salvage operations.

The Sibitzky ROV weighs 2,000 pounds, is variably buoyant and has a maximum depth of 2,000 feet. It consists of six thrusters for maneuvering, five high-definition cameras for intervention and salvage, two robust manipulators capable of lifting 100 pounds each, a front-looking sonar system and an advanced navigation system that allows station keeping so the pilot can focus on work at hand.

The ROV is the main component of the Assessment/Underwater Work System (AUWS), which also includes Launch and Recovery System (LARS), a flyaway sonar and associated support equipment. This is the first system mobilized in the event that a submarine becomes disabled. The system will help confirm and mark the disabled submarine, assess surrounding conditions, clear debris from a submarine's hatch and even provide emergency life support stores (ELSS) replenishment.

Phoenix recognizes the outstanding work of URC personnel during this highly successful operational period, and appreciates the professionalism of both the SEAFAC personnel and crew of the USS TEXAS in facilitating this demonstration of U.S. submarine rescue capability.



Phoenix personnel securing the PRM umbilical after reeving through the cursor during installation of the SRS-TUP system. (Courtesy of Phoenix International)

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AN OARDACIOUS EXPEDITION

Four submariners will be rowing across the Atlantic Ocean for charity at the end of this year. The Royal Navy team – HMS Oardacious – will be racing in the Talisker Whisky Atlantic Challenge aiming to raise £100,000 for the Royal Navy and Royal Marines Charity.

The team of serving crew members on Vanguard and Astute class submarines is led by Lieutenant Hugo Mitchell-Heggs, with Lt Callum Fraser, Petty Officer Dylan Woods and Engineering Technician Matthew Harvey.



Courtesy of AJP Media

Lt Mitchell-Heggs said: “Since April 1969, and the fifth patrol of HMS Resolution, there has always been a Royal Navy Ballistic Missile Submarine at sea, providing a Continuous At Sea Deterrent (CASD), and ensuring that the UK remains safe.

In December 2019 the submariners will row unsupported across the Atlantic Ocean, departing from the Canary Islands to reach Nelson’s Dockyard Antigua a month later – their aim is to be the first team to cross the finish line, as well as raising money for charity.

HMS Oardacious are canvassing support and sponsorship for what is ultimately going to be a fantastic collaboration between the Royal Navy Submarine service, its enterprise, affiliates and the wider community that supports service-personnel.

Sponsorship is not just about advertising; it is an alignment of values and a way to engage with the Armed Forces in an environment they are passionate about.

To find out about the HMS Oardacious crew, the expedition and the partnership opportunities please visit www.hmsoardacious.com

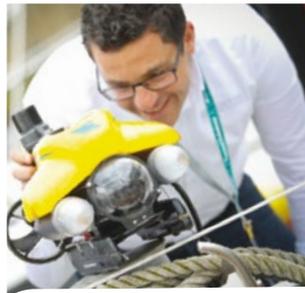


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I WAS ABDUCTED. I GOT AWAY.

TIPS ON SAFE INTERNATIONAL BUSINESS TRAVEL.

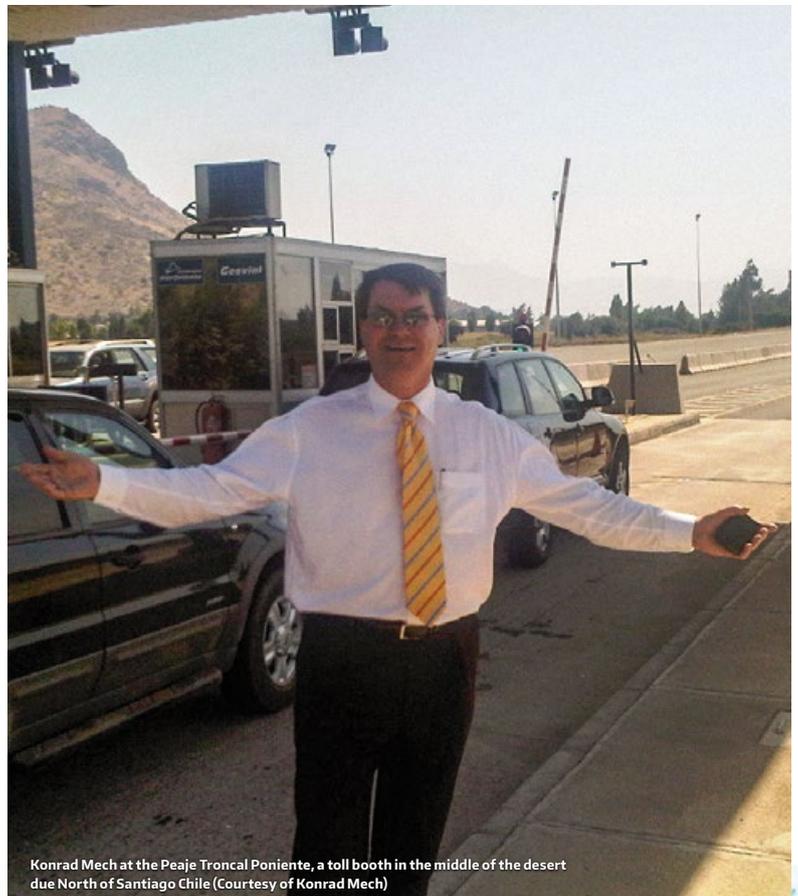
Konrad Mech, working for a large Norwegian maritime concern

Kidnap - to steal, carry off, or abduct by force or fraud, especially for use as a hostage or to extract ransom.
Abduct - to carry off or lead away (a person) illegally and in secret or by force, especially to kidnap.

I have been abducted. I emphatically do not recommend being abducted. Nobody needs the instantaneous recognition that things are suddenly very, very bad as your endocrinal system dumps vats of adrenaline into your bloodstream. I was lucky. My colleague and I got away because our abductor made a mistake. Back in 2011, my colleague and I got ourselves into trouble in Santiago, Chile. But we realized it fast, made our plan, waited for our opportunity, and when that opportunity presented itself, we got away. The full story is below.

I travel extensively on business. This year alone, I have been in Dubai, Spain, Israel, Mainland China, Korea, Japan, England, France, Chile, Argentina, and Norway. I travel on business in Mexico, Colombia, Ecuador, Peru and Brazil in Latin America. I also lived for 3 months in Port Elizabeth, South Africa. Some places are extremely safe. Other places are very sketchy, including Canada and the USA if you get into the wrong situation.

Is the world really that dangerous? It depends. Factors include where you are going, the state of the economy and predisposition to violence at your destination, your own cognitive biases



Konrad Mech at the Peaje Troncal Poniente, a toll booth in the middle of the desert due North of Santiago Chile (Courtesy of Konrad Mech)

TRAVEL CHECK-LIST

Trip Date: _____ Trip Location: _____

ACTION REQUIRED	REQUIRED?	DONE?	NOTES
TRAVEL LOGISTICS			
Trip Approval obtained?			
Hotel booking(s)			
Flight booking(s)			
Itinerary to Traveltracker			
Rental Car booking(s)			
Passport			
Entry Visa			
DFAIT contact in country			
Insurance Coverage			
Special medical inspection or inoculations (e.g. malaria, yellow fever)			
Personal Protective Equipment			
Local Currency			
Advise Credit Card Companies and HSBC			
SALES AGENDA			
Agent / Sales Affiliate Contact info			
Appointment Schedule with Details (Who, What, When, Where, Why?)			
First rendezvous confirmed?			
Cultural / legal briefing, if first visit to country			
SALES TOOLS			
Demo Equipment			
Presentations			
Literature			
Samples			
Promotional items			
Business Cards			
Trade Show Badge			
TECHNOLOGY			
Laptop and country-specific plug adapters			
Cell Phone with charger and country-specific plug adapters			
USB with presentations on it			
LAN cable			
Roaming / Data Package			
Voice Mail Extended Absence Greeting			
Email extended absence notice			

and how they affect your decision making, and where you sit on the savvy-naïve scale. I have rented motorcycles solo in South Africa and in Ecuador with no problems. I have gone for long solo walks everywhere in the world and enjoyed them. Yet it was a simple taxi ride that went wrong for me. The world is also less secure today than it was ten years ago. One thing I do know: active planning and preparation moves the odds in your favour, and following some simple rules makes business travel safer.

After my 2011 Santiago experience, I began to realize that I was not alone. My current agent in Santiago showed me his kill switch to disable his vehicle if it is car-jacked. My agent in Buenos Aires told me he drives a reasonable car to avoid being targeted. His friends who have nice cars carry \$4,000 US to buy off car jackers – cash is way easier than fencing a BMW 7-series. A potential business partner in Mexico City had me picked up by an armed driver, wearing a ballistic vest under his suit, in an armoured Yukon. One of my colleagues from Spain was kidnapped in Venezuela and held for ransom for weeks in a remote village. One of my former employees was shot in the buttocks with a hand-gun during a stick-up in his hotel room. (Hint: don't invite hookers to your room). A consulting engineer I worked with told me about being tied naked to a chair in his own apartment in Rio de Janeiro while every single piece of furniture was moved out into a truck by robbers. Another sales manager recounted how he went into a Buenos Aires gentleman's club, was drugged, and regained consciousness 5 days later, naked, in a greasy hotel with no money, no passport, no credit cards (including his corporate cards) empty bank accounts, and no clothes. And as a bonus, no job when he got home and was dismissed. One of my acquaintances in Vancouver shared management responsibilities at a gold mine in Zimbabwe with a colleague, doing 30 days in, 30 days out. His colleague was stopped a roadblock en-route to the mine site for his roto and was shot dead. Some of my business colleagues in the US have CCW permits – permits to carry concealed weapons. A female lawyer from Rio told me she was held up at gunpoint so many times that after the third time she stopped even flinching and just handed over her stuff. These are not stories I heard third- or fourth-hand, or stories about a friend-of-a-friend. These are about events that happened directly to that individual. Which leads me to Tautology Number 1: Everything is fine, until it's not.

One challenge we face as business travellers is that we are more attractive targets than tourists. Bad guys know that business travellers carry money, have credit cards, and have an organization behind them that has cash for ransoms. Another challenge is the effect of our inherent cognitive biases on our own judgement. Confirmation Bias, Ostrich Effect, Outcome Bias, Overconfidence, Selective Perception, Survivorship Bias and Zero-Risk Bias are all examples that we should be aware of and incorporate into our own risk assessment processes.

I am sharing some thoughts and experience I have gained on how to stay safe during business travel. Keep in mind that I am not ex-Special Forces, nor am I trained as a secu-

PRE-TRIP

1. Everything is fine until it's not. Hope for the best but plan for the worst.
2. Time is never wasted on recce (reconnaissance). And a map recce helps a lot. This is an old army saying. You should know where you are going. Take the time to plot a map from the airport to your hotel, and from your hotel to your appointments. Technology fails! Google Maps may not be available – your mobile may not work. Print the map and carry this with you. It is very helpful for taxi drivers. Even better if the information is in local language.
3. Invest in advance research. The government is actually your friend. When travelling to a country for the first time, I use the Canadian Department of Foreign Affairs website. This lists the embassy and consulates. This provides travel advisories. This lists any visa requirements and advice. Another great source of information is the US Central Intelligence Agency's World Factbook. This has detailed reports on every nation in the world, including Military and Security, Terrorism, and Transnational Issues.
4. Being even a little prepared is better than being completely unprepared.
5. If possible, plan with a local. Gain as much local knowledge as you can. See if your country has a chamber of commerce. Check your alumni network to see who lives locally. Network like crazy. It pays off.
6. If your company has a security program, don't ignore it, respect it. My company uses a service called International SOS and an internal Travel Tracker system. Make a note on your checklist to register. These services send out pre-travel notifications including risks you can face. If your destination is really sketchy, hire the appropriate protection. There are protective driving services, and armed guard services.
7. Get some martial arts training, and go to a gun range at least once. Ladies, this includes you.
8. Use a check list.

rity expert. I'm just a business person with experience that I think is worthwhile passing along.

My personal guidelines are broken down into pre-trip, during-trip, and post-trip tips.

Back to Santiago Chile. The photo shows me with a huge smile at the Peaje Troncal Poniente, a toll booth in the middle of the desert due North of Santiago Chile. This is 28 km from our requested destination near the International Airport, due West of Santiago. My business colleague and I had arrived on a Monday. We made our first call to the Canadian Embassy in Santiago where we met with the Trade Commissioner. This included a security overview. We had interviews with a few potential business agents over the week. We had dinner with someone who was working with us on a project for the Chilean Army. People advised us not to take taxis off the street, especially because most drivers were Peruvian. (Chileans have a thing about Peruvians). Our advisors told us to go to a hotel for a cab, or to call a radio taxi. But by Thursday, we both thought that Santiago was cool, safe, and secure. We had finished a business lunch and we had another appointment close to the International Airport. We left the restaurant and we grabbed a cab off the street. My travel companion, a retired Lieutenant-Colonel from the Canadian Army, did not speak Spanish, and I speak functional Spanish. I gave the taxi driver directions. We were dressed in business suits and we had brief cases with us. The cab driver started in the direction of the airport. Then after five minutes, he claimed not to know where our destination was, and that he would call his son who would give him directions off his home computer. My colleague had his iPhone with Google maps, so he showed the driver where our destination was. The driver nodded his head as if to acknowledge the directions. But then he came to an off-ramp to

DURING TRIP

9. There is safety in numbers. Try to go out in groups.
10. Don't put a huge target on your back. Leave the MAGA hat at home – and flashy watch, and company logo clothing.
11. When someone with local knowledge says "don't do that", then don't do that.
12. When people say "It happened so fast!" it happened even faster.
13. Pay attention to your gut and the hairs on the back of your neck.
14. The best martial art is "Run-foo".
15. Men are inherently way more risk-prone than women. When travelling with women, let them set the risk tolerance.
16. If you want to be a frat boy, do it at home.
17. If someone wants your stuff, give them your stuff. It's only stuff.
18. The world is not all a horrible place. If you have taken precautions, then enjoy your trip and the experience.

another highway, and turned north. This was away from the airport. We protested to the driver that he was heading in the wrong direction. He said "Si, Si", but kept driving, even past U-turn points. He was also driving at 60 km per hour with two wheels on the shoulder, but the highway speed was posted as 100 km per hour. This is when my colleague and I did the math: 1 – wrong direction, plus 2 – ignoring our instructions, plus 3 – going significantly slower than the posted speed limit, plus 4 – on the cell phone several times = this was a heist,

and we were the goods. "Dave, we're being kidnapped. This won't end well." "I know" he replied. "Dave, we're going to have to jump." "I know" he replied. By this time the cab driver had turned east, north of the city. We were well out of inhabited areas. The driver was taking us out into the desert. It was clear he was organizing a gang to greet us. But he also made a mistake. "Dave, there's a toll booth. We have to jump out – get your stuff ready." We jumped out of the car while it was still rolling. The taxi meter showed over 150,000 Chilean pesos, approximately \$150 USD at the time – and the driver just drove away. Nobody in Chile who is legit drives away from the average monthly wage. The ladies in the toll booth said "What are you doing? Get back in the taxi". No way, we said. We made our way back to our appointment courtesy of an American employee who worked for a mining company, who called us a radio taxi.

To recap: We were told "Don't do that." We did it, and we got ourselves in trouble. But we quickly realized we were being abducted and transported to a shake down site. We then made our plan – jump, waited for our opportunity – the toll booth, and when that opportunity presented itself, we acted immediately. We got away. And that explains the

POST-TRIP

19. Make notes. Evaluate what went right and what went wrong. Keep a log and a file for each country. It's worth it.

huge smile in the middle of the Chilean desert. But how many other people would have waited in that taxi, hoping for the best, hoping that the driver was really talking to his son and was just about to turn around and go to the actual destination, despite all the clues otherwise? How many people would have frozen up, instead of acting and taking control of their future? Ostrich Bias is a very bad bias. You have to be prepared to act.

I am a certified Project Management Professional (PMP), and as a PMP I am trained in planning and execution. If you approach your international business travel as a project, you will benefit in spades. You will not only maximize the scope, schedule and budget for your company, but you will also assess any risks, engage stakeholders, hire specialists – all the key elements you need to maximize your probability for a very successful trip.

Wherever your team are travelling, can you track them in real time? It could be critical.

With the steady rise in oil prices reigniting investment in oil and gas exploration, corporate travellers can be at risk in these challenging destinations. However, these days all travel has potential hazards, whether you are in London, Luanda or Las Vegas and companies are legally bound to practice duty of care. Energy specialist travel and logistics provider, Wings Travel Management, helps companies to manage the risk.

Paul East, Chief Operating Officer, UK/Europe & Americas, Wings Travel Management, commented, "Any organisation that is operating in countries where travel cannot be undertaken smoothly, should be looking for a travel management company with a central database, as this allows reporting and traveller tracking in real time," explains Paul East. "At any given

time, we know where our clients' travellers are and because of our access to this on-demand, reliable data, emergency situations can be managed quickly."

London-headquartered Wings Travel Management is the only independent travel management company (TMC) to own and manage all its operations around the globe. Established in 1992, Wings' global reach spans North America, South America, UK/Europe, Africa, Asia Pacific and the Middle East, with wholly-owned operations in locations such as Aberdeen, Cape Town, Dammam, Dubai, Houston, Johannesburg, Lagos, Luanda, London, Maputo, Stavanger, and Rio de Janeiro. This means every Wings office operates off the same travel booking technology platform and centralised global database.



Wings Travel Management has published a White Paper 'Travel Risk Management in a Changing World'.

To request your copy or to find out more, visit: www.wings.travel

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OSEA2018:

DIGITAL INNOVATION AND INVESTMENT IN GAS ARE KEY NEAR-TERM FOCUS FOR ASIA'S OIL & GAS INDUSTRY

Held from 27 – 29 November, at Marina Bay Sands, Singapore, OSEA the biennial event brought together around 15,000 attendees and close to 1,000 exhibitors from more than 40 countries and regions to create the largest industry platform for business trade, networking, discussion and debate on the latest trends affecting the oil and gas sector. The event highlighted the growing demand for gas and its outlook in Asia as well as the importance for businesses in the sector to embrace digitalisation and adopt new innovations, to drive business performance and move the oil and gas industry forward in this digital age.



With the sector under one roof, industry players also took this opportunity to make key announcements on exclusive partnerships, product launches and new business strategies for the Asian oil and gas market.

EMBRACING INNOVATION AND DIGITAL STRATEGIES

Speaking at the OSEA2018 Conference on how oil and gas companies can achieve digital transformation with Alibaba Cloud's AI and Big Data platform, Yang Kan, Regional Manager of Data Intelligence Business, Alibaba Cloud says, "We are committed to leveraging our knowledge and experience to build a strong ecosystem for our partners in the oil and gas industry to help them create more effective business models for the digital era."

The conference also featured a session by Sanjay Bakshi, Head of Digital Transformation & Ventures, Shell, on building a digital strategy for maximum ROI and how technologies and innovations in IoT, automation and AI can be leveraged to achieve cost and operational efficiencies for sustainable business. In addition, a panel discussion on cyber safety in oil and gas discussing practical and actionable considerations to safeguard critical IT and OT assets, and a masterclass on building a roadmap for the digital oilfield followed.

On the showfloor, ST Engineering was showcasing innovative solutions that drive Smart Autonomous Vessels, Cybersecurity, Scrubber Retrofit, and LNG-powered vessels that could help operators meet stricter IMO regulations. These solutions could improve operational efficiency, ship performance, navigation safety, and drive out operating costs. Its in-house developed NERVA ship management and sense-making system (SMS2) is a class-certified integrated alarm, monitoring and control system that provides ship operators with intelligent hull, mechanical and electrical (HMSE) management and control of the ship systems. This can be



done through real-time, centralised control and monitoring of platform sensors and systems including intelligent health monitoring and predictive diagnostics on platform machinery. Solutions for its Autonomous Underwater Vehicle (AUV), the NEPTUNE AUV, was showcased. The AUV is used to conduct a myriad of subsea operations such as seabed mapping, underwater pipeline and cable inspections, debris field inspections as well as search and salvage.

"It's exciting for us to witness how solutions designed and developed by ST Engineering have created endless possibilities and led the way forward for the industry. The impetus for all these innovations has stemmed from a fundamental need to optimise resources and improve overall safety, reliability and cost for ship owners and operators. We are proud to be an industry-transforming force," said Chew Men Leong, Chief Marketing Officer, ST Engineering and Deputy President & President (Defence Business), Marine.

PARTNERSHIPS INKED AT OSEA2018

Following Gaylin Holdings Limited's recent acquisition of AMOS International Holdings Pte. Ltd, the combined entity launched its new name – AMOS Group Limited, at OSEA2018. Short for "All Marine Offshore Solutions", AMOS captures the Group's vision of becoming a leading international provider of diversified products, services and solutions to customers in the marine and offshore sectors.

Commenting on the launch of the new name, Perry Kennedy, CEO of the Group, said, "The merger of Gaylin and AMOS has created a strong combined entity, AMOS Group Limited, and we were delighted to launch this at OSEA2018. The event offered us a fantastic platform to showcase AMOS' new identity and our combined capabilities to a large group of customers and suppliers. Our stand attracted an encouraging high volume of foot traffic from the outset. We will now play out the value of a capable and unified team, our collective value



propositions, and a single streamlined network. I'm confident that our business partners will benefit from increased efficiencies and valuable economies of scale."

At an official signing on Day 2, Franklin Offshore Holdings and Lankhorst Ropes inked an exclusive partnership to name Franklin Offshore Holdings as official authorised stockist and distributor in Singapore and Southeast Asia for Lankhorst's specialised Dyneema slings. These slings are used in the offshore oil, gas and wind energy construction and subsea installation industries.



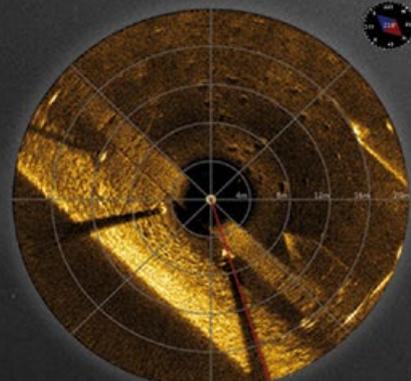
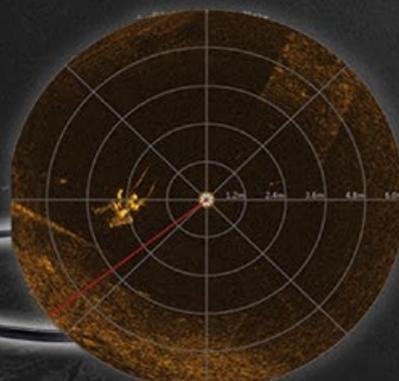
"The Dyneema slings use a synthetic fabric and are lighter than traditional wire rope slings," explained David Glennie, General Manager of Franklin Offshore Holdings. "The industry is changing, and it's all driven by safety. Today, people are looking at using synthetic slings that reduce weight, so they can lift heavier items with the cranes they have. Technology is moving ahead and our companies, Lankhorst and Franklin, also have to move ahead in the industry," he said.

Summing up OSEA2018, Paul Wan, Managing Director, of organiser UBM Singapore said, "OSEA2018 comes at a time where the oil and gas landscape in Asia is changing, with a greater focus on LNG and a wave of digital disruptions transforming industry. It is trusted hallmark where industry professionals gather to network and share their insights on latest market trends, opportunities and challenges."



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WHY THE OIL AND GAS INDUSTRY NEEDS TO EMBRACE ARTIFICIAL INTELLIGENCE

Gopalan Rajagopalan, Country Head, Tata Consultancy Services Scotland

With digital technologies responsible for transforming the business processes of almost every industry, oil and gas must adapt or fall behind. In particular, artificial intelligence (AI) is giving companies the tools to increase their productivity and efficiency, and is lowering costs. According to Tata Consultancy Services' (TCS) Global Trend Study on AI, more than 90% of companies in five industries already use AI in their day-to-day operations.

The uptake of digital transformation in the oil and gas industry has been slow, however. In an era of lower oil prices, where we are unlikely to see prices reach the heady heights of a few years ago any time soon, these efficiencies will do much to boost the industry's fortunes.

POCKETS OF INNOVATION

That said, there exist pockets of innovation within oil and gas, particularly around enhancing productivity and efficiency. The study revealed that, in the world of oil drilling, AI has the potential to address efficiency problems. How we work together to utilise the vast amounts of data collectively available is key in maximising the opportunities available to us.

As examples, NVIDIA and Baker Hughes, a GE company (BHGE), are using AI to dramatically reduce the cost of finding, extracting, processing, and delivering oil. The two companies have partnered on a project to use AI and GPU-accelerated computing to help the oil and gas industry distil the reams of data they collect every second – production and sensor data such as pump pressures, flow rates and temperatures – in real time. "Using deep learning and machine learning algorithms, oil and gas companies can determine the best way to optimize their operations as conditions change," says the company.

Oil drilling supplier National Oilwell Varco uses artificial intelligence to automate the drilling process. Digital sensors collect well conditions in real time, and the firm's software adjusts drilling techniques accordingly – 40% faster than oil field engineers could do it.

Along more analytical lines, Woodside Petroleum (the largest operator of oil and gas production in Australia) is using AI to analyse 30 years of engineering data, aiming to improve decision making, business processes, and operational performance.

Of the 23 companies surveyed in the study (in oil and gas production, energy distribution, and energy retailing), the most cited functional area for AI projects was IT (mentioned by 74%), followed by distribution and logistics (39%).

SUBSEA ROBOTICS

The use of robotics within oil and gas is increasing thanks to a drive to enhance productivity as well as to reduce off-shore manning. In a recent Oil and Gas Industry Roundtable event hosted by TCS, the opportunities offered by tetherless remotely operated underwater vehicles (ROVs) were debated during a discussion about the technology available in the industry today.

While subsea systems, or ocean robotics, have been in operation for over 40 years, the limitations of underwater communication meant that they had very little functionality. But after years of development work, new models are emerging such as Subsea 7's autonomous inspection vehicle (AIV).

The AIV has been performing untethered subsea inspections for Shell in the North Sea. It can submerge up to 3,000m, venture on 40km excursions and has a 24-hour dive time, depending on the mission. The technology behind the AIV will continue as more research and development funding is poured into this area. For instance, a new research centre focused on offshore robotics and led by the University of Edinburgh launched this year with nearly £14.3 million in funding from the UK Industrial Strategy Challenge Fund (ISCF).

The Offshore Robotics for Certification of Assets (ORCA) Hub will develop robotics and AI technologies for use in extreme and unpredictable environments. The hub will work to develop robot-assisted asset inspection and maintenance technologies, which can make autonomous and semi-autonomous decisions and interventions across aerial, topside and marine domains.

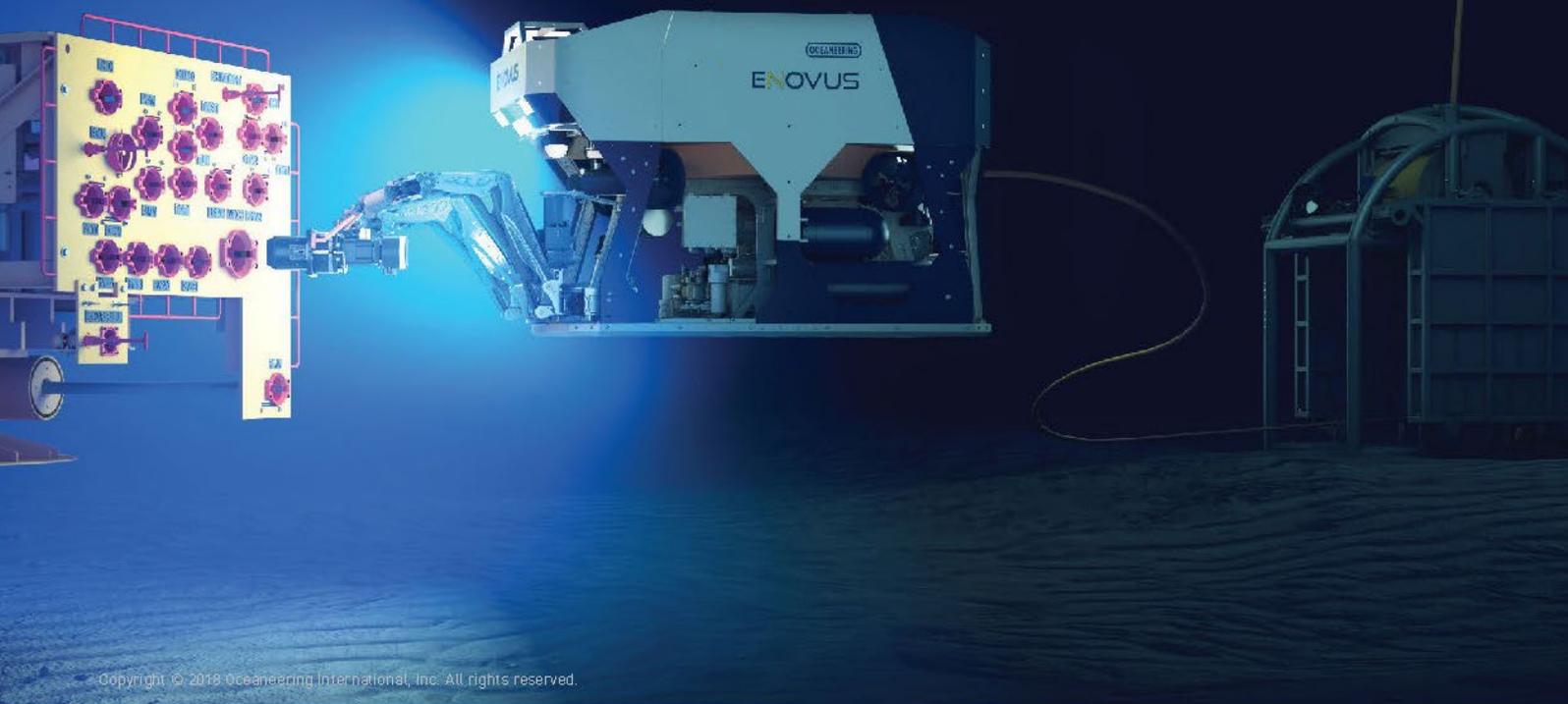
LOOKING TO THE FUTURE

When it comes to executing AI projects successfully, the key elements to getting it right include employees learning and adopting new processes and systems, while ensuring strong security and trust in the new cognitive systems. The technology has the capacity to support safer and more efficient methods of work through a deeper understanding of gathered data. As other industries increasingly harness the opportunities provided by AI, it is vital that the oil & gas sector acts now and takes the step to fully embrace tools available as part of Business 4.0. With safer operations and cost savings on the line, in addition to increased productivity, the industry can no longer afford to shy away from the digital future.



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IOSTIA MEETING REPORT

USCG BLUE TECHNOLOGY FOCUS DAY

Richard Lawson, CEO, IOSTIA

On November 28th, the International Ocean Science and Technology Industry Association (IOSTIA) conducted a highly-focused blue technology exhibition for the United States Coast Guard at their headquarters in D.C. At the request of the Coast Guard, a delegation of IOSTIA members came to D.C. to demonstrate the breadth and capabilities of cutting-edge ocean technologies and engage in a mutually beneficial two-way dialog called the CG Blue Technology Focus Day.

The opportunity to work in partnership with the Coast Guard to create this event was well-timed. The Coast Guard is challenged by limited R&D budgets and restrictive acquisition regulations that impede their ability to procure, test, and understand the applications for the latest blue technologies that could positively impact mission effectiveness. Additionally, with the recent passage of the Save Our Seas Act the Coast Guard is now charged with standing up a Blue Technology Center of Expertise (COE). The process of developing and launching this COE could certainly benefit from the kind of robust, interactive, and on-going dialog with industry that was on display at the event.

The inaugural Blue Tech Focus Day featured opening remarks from Rear Admiral Michael Haycock, Assistant Commandant for Acquisition & Chief Acquisition Officer, who commented on the value of bringing industry to the Coast Guard and challenged the attendees to think outside-the-

box as they learn about the latest blue technology. The Coast Guard Dive Team also made a highly informative presentation on their program and capabilities.

The ability to utilize technology to gather data, map, assess the environment, and use analytics to develop a mission strategy before human intervention is required, was a key theme. Assisting the Coast Guard in the process of understanding the capabilities of the latest technologies is an important first step in adopting the right blue tech solutions and applying new protocols the Guard's operations.

IOSTIA will be running similar programs with other federal agencies throughout the year that are reflective of IOSTIA's goal to create and enhance opportunities within government for its members. Through creative programs like this Coast Guard event, IOSTIA overcomes the challenges of travel budgets and other restrictions that often prohibit government employees from benefiting from traditional conferences. This customer-centric approach enables a wide range of federal contractors, end-users, executive and senior government employees and military flag officers to conveniently attend events and benefit from the wealth of information presented by IOSTIA members.



INTRODUCING XRT EXTENDED RANGE TRACKING

LONGER-RANGE BOTTOM TRACKING FOR SUBMERGED VEHICLES

Across their wide-ranging activities, submerged vehicles need reliable navigation. It underpins optimized operations, expanded capabilities, and greater cost-effectiveness. With flourishing use of DVL-based navigation on submerged vehicles, there is a push to operate at greater ranges from the seabed.

XRT TECHNOLOGY

XRT technology adds 60% more bottom-tracking range for Doppler Velocity Logs (DVL). And it still provides reliable, low-noise velocity measurements at high update rates. Moreover, XRT operates at the same frequency and power consumption. This impressive gain stems from new signal processing to boost the signal-to-noise ratio (SNR) seen by the DVL.

Developed by Teledyne RDI, XRT is a hybrid technology that merges new ideas in both transmit and receive stages of the DVL. The DVL transmits a new style of coded signal. The use of a coded transmit signal, similar to the signals used in broadband DVL transmission, makes the XRT mode largely immune to the signal fading effects that cause intermittent drop-outs in narrowband DVL instruments. This method continues a Teledyne RDI tradition, first patented almost three decades ago.

Every system has a SNR threshold that sets the bottom-tracking range of the DVL. The noise can have a couple of flavours: environmental and electronics. Here we address the latter.

BOOSTING SNR

For setting the SNR level, the signal power is prescribed by the strength of the returning signals. Sending louder signals has limited advantage for increasing range. Much of the extra energy is lost to acoustic shock waves.

In contrast, the noise power is set by the bandwidth over which the received signals are processed. Filtering across narrower bandwidths allows the cut-off for processing to be pushed to weaker signals. Smarter processing allows



Pioneer and Pathfinder DVLs. Available at various frequencies and depth ratings, these products can serve many applications. (Courtesy of Teledyne Marine)

the DVL to take advantage of seabed echoes from farther ranges. Since pure narrowband signals can experience signal drop-outs due to fading effects, XRT uses a coded signal to provide more robust and reliable signal detection.

Of course, there is no free lunch: using narrowband filters requires careful implementation. More complex, adaptive algorithms are needed to avoid any bias in the processed output.



Teledyne RDI Pioneer 600 kHz DVL fitted with iXblue PHINS 6000 inertial navigation system. (Courtesy of Teledyne Marine)

FIELD TESTING

XRT performance was validated in trials at two sites: in the Mediterranean Sea off La Ciotat, France and in the Southern California Bight off San Diego. We focus here on the European trials in June 2018 where testing was conducted in varying water depths that increased beyond 180 m.

Testing in the Med was performed with iXblue, who integrated Teledyne RDI's Pioneer 600 kHz DVL with an iXblue PHINS 6000 system. The Pioneer is a compact phased array design with specified bottom-tracking range of 100 m.

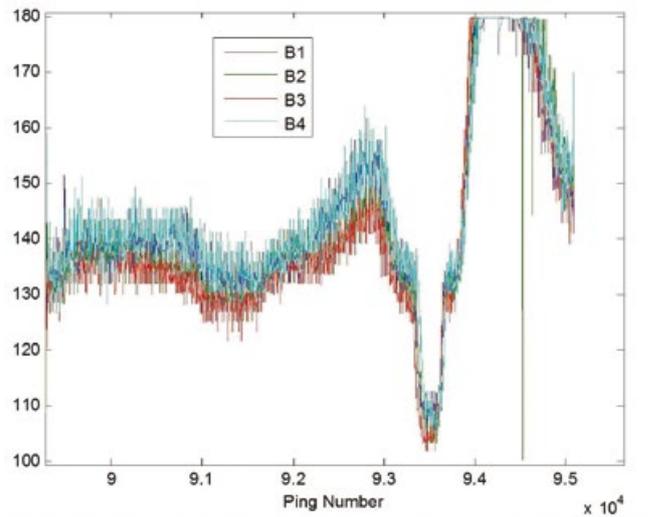
XRT ALTITUDE RESULTS

Comparing new results calls for a baseline. Teledyne RDI's standard bottom tracking mode was operated in shallower depths. The data dropout rate was 2 per 1000 pings.

XRT testing targeted deeper water. In fact, XRT was tracking reliably in 180 m depths, which was deeper than previous testing. In the deeper water, XRT's data dropout rate was 1 per 1000 pings—even over steep terrain. This rate beat the baseline threshold set in shallower depths.

Several factors contributed to XRT's 15% farther reach in the Med than off San Diego, especially bottom type. Coarse sand off La Ciotat has a higher scattering strength than the muddy bottom off San Diego.

Phased array technology allows submerged vehicles to carry compact, low-frequency DVLs to reach longer ranges. Teledyne RDI's new XRT multiplies this advantage by extending the DVL's operating range an additional 60%. Meanwhile, the DVL still provides reliable, low-noise velocity measurements at high update rates.



Ranges for four beams of Pioneer DVL using XRT. Results are for 600 kHz operation on a deep and steep seabed. Rolling motion of boat contributes much of the 3-m r.m.s. spread. (Courtesy of Teledyne Marine)

ROV SUPPORT CHALLENGES ON LAND AND IN THE DEEP!

Freddy Christensen, ROV-Support A/S

In our small offshore company in Kolding-Denmark, we have the happy announcement that 2019 will be a surprising challenge. We are selected to participate in Scale Up Denmark and Next Step Challenge. It will be a 6-month concentrated boost program, where we have affiliated with some of Denmark's top executives from the Offshore industry and other top executives from affiliated Industries. It will be tough strategic training and will boost the company over the next 5 years. For us as a small company, it is a needle eye that we have entered, and it is with great gratitude and curiosity that we enter this journey.

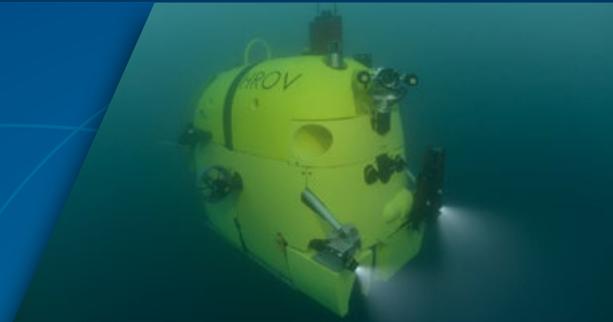
The year also brings another journey for us. We will attend Nekton Mission 2 in the Indian Ocean. We will collect wildlife and other exciting objects from the deep, down to 500 m. In the same project we will document Triton submarines during operation and live stream the operation via satellite. Since we are a small company in the southern town of Kolding-Denmark, we are clearly very proud of the two fantastic trips we are going to start the year with.



Courtesy of ©Nekton 2018

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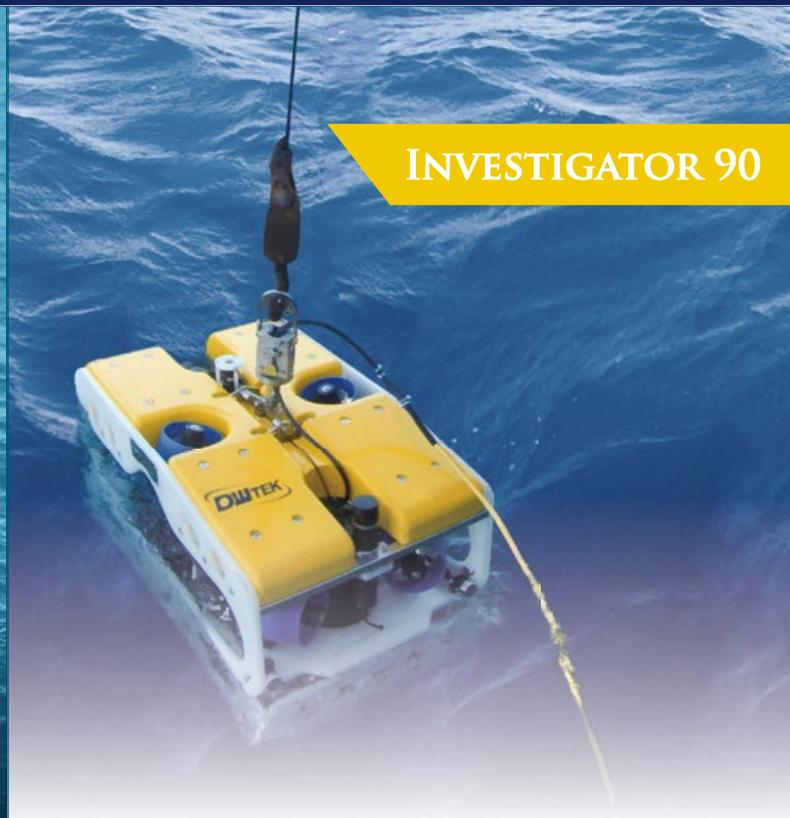
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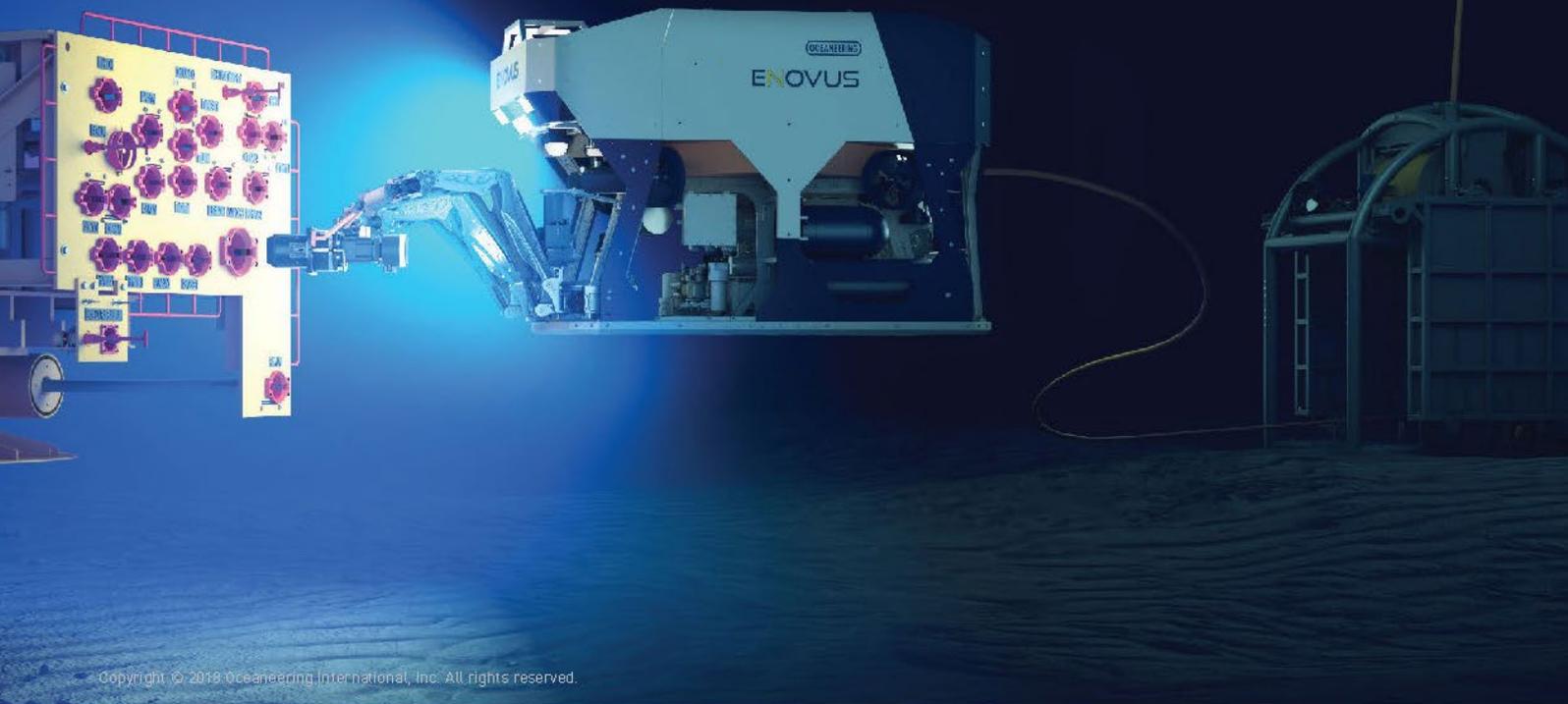
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