Underwater Robotics Conference
30th November

PROGRAMME

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Underwater Robotics Conference
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09:00 **Arrival and Registration**

09:30 **Welcome from Neil Gordon**
CEO, Global Underwater Hub

09:45 **An Operators View**
Eric Primeau, bp

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30th November

Session 1: Underwater Vehicles

10:05 **Lex Veerhuis**
Fugro

10:25 **Graham Jaques**
Modus

10:45 **Alan Anderson**
Oceaneering

11:05 **Q&A and Panel Session**

11:15 **Coffee**

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Session 2: Navigation, Sensors and Electronics

11:30 **Asser Awaad**
Impact Subsea

11:50 **Sam Taylor**
Ocean Infinity

12:10 **Rory Findlay**
Nortek

12:30 **Q&A and Panel Session**

12:40 **Lunch**

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Session 3: Power and Capability

13:40 **Andrew Gibson**
maxon

14:00 **Paul Slorach**
Verlume

14:20 **Aidan Thorn**
Sonardyne

14:40 **Dr Hui Yan**
SMD Ltd

15:00 **Q&A and Panel Session**

15:15 **Closing Comments**

15:25 **Tea and Networking**

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30th November

Eric Primeau

Senior Technical Specialist

bp

An Operators View

Eric graduated Plymouth and Heriot Watt universities in Marine Civil Engineering, Hydrographic Surveying & Subsea Engineering. He spent time in field as surveyor, Offshore Manager and Consultant on site investigation, inspection & engineering projects. Onshore, Eric worked for Tier 1 contractors in Project Management & Business Development. In 2011 Eric commenced with BP as Survey, positioning and geospatial data management manager for the Caspian, then North Sea.

In 2019 Eric was appointed Senior Technology Specialist to drive technology developments within bp, with specific focus on uncrewed and remotely operated systems. Eric is a Fellow of the Chartered Institute of Civil Engineering Surveyors and a Chartered Engineer.

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30th November

Lex has worked for the last four years in Fugro on implementing new technologies for offshore asset inspections with their clients and authorities in Europe.

These technologies focus on the use of advanced robotics and remote operations. He has obtained a master's degree in Civil Engineering and specialized in the field of extreme events.

Lex Veerhuis

Development Manager – New Business

Fugro

How uncrewed operations become a reality

Today's businesses are increasingly focused on making a positive impact on society. Management teams are tasked to transform their businesses to become more sustainable, connected and socially engaged. In the maritime industry these trends translate predominantly to a focus on footprint reduction, quicker decision-making and wellbeing of (offshore) staff. Innovations involving remote control and autonomy are considered to be key enablers to achieve these ambitions and will play a vital role in supporting this transition.

Fugro decided to embrace this transition and aims to be a frontrunner in the space of commercially ready remote and autonomy solutions for its clients in the maritime industry. Their ambition is to:

- Deliver on net-zero carbon emissions by 2035, covering all direct and indirect emissions from operations. In the maritime business, a significant footprint reduction should be realized through the use of smaller (compared to conventional), hybrid powered Uncrewed Surface Vessels (USV's).
- Remove any crew from an offshore environment and facilitate operations completely from onshore based Remote Operations Centres (ROC's).
- Have clients benefit from digitized workflows by giving them near real-time asset integrity insights via cloud-based platforms.

Driving change with innovation as one of the frontrunners in the maritime industry comes with its specific challenges, mostly related to change management. As change-management can dictate the pace of implementation, this presentation will share insights in three of the key challenges that were encountered during the build-up towards the first commercial projects with the Blue Essence Uncrewed Surface Vessel (USV) in Europe.

The three key challenges are:

1. Finding a trusted launching customer
2. Focus, time and resources to implement a new way of working
3. Adoption with (local) authorities

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30th November

After graduating from the University of Liverpool with a degree in Electronic Engineering, **Graeme** immediately started working offshore on various international projects including subsea positioning, site investigations, pipeline and cable installation support and inspection using the latest ROV and AUV technologies.

Using this experience Graeme performed various roles in the following years including project manager, operations manager and country manager in countries throughout the Americas before finally spending the last 15 years working in Brazil as a business development manager.

Graeme returned to the UK in 2016 spending 5 years working with the design and manufacture of subsea remote and autonomous systems before finally joining Modus Subsea Services based in Darlington in 2021.

Graeme Jaques

Sales Manager

Modus Subsea Services

Cutting Cost and Carbon using Hybrid AUV Systems for Seabed Survey and Inspection Campaigns

With operators looking to reduce carbon emissions with the aim of a rapid transition to net zero, innovation and new technologies are needed to perform offshore works more efficiently.

Modus is the market leader in Hybrid Autonomous Underwater Vehicles (HAUV), having been the first to offer commercial HAUV operations back in 2018 and has gone on to establish the longest track record of operations with its fleet of 2 HAUV systems.

The use of these systems from 'low logistics' support vessels has brought about a reduction in personnel HSE exposure, lower costs and reduced carbon footprint whilst improving the quality of data gathered.

These systems represent the very latest in Hybrid AUV/ROV technology which can operate in a high speed ROV tethered mode or a fully autonomous AUV mode without tether and still acquire video, multibeam, sidescan sonar, sub-bottom profiler and magnetometer data for survey and inspection scopes of work. The vehicles can operate at speeds of up to 4kts and in water depths of 1m to 3,000m.

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30th November

Alan Anderson is a Product Manager at Oceaneering International. Since 2021 Alan has been responsible for the Product Management of the Freedom Hybrid AUV System.

Prior to joining Oceaneering Alan worked for Fugro and held various technical roles, most recently as Product Owner for Fugro ROV Systems. He has over 23 years of global work experience in the Subsea Robotics Industry with a broad experience of ROV and AUV systems.

Alan holds a Batchelor's degree in Electrical and Electronic Engineering from The Robert Gordons University in Aberdeen.

Alan Anderson

Product Manager - SSR

Oceaneering International Services

Development and Technology Readiness Testing of the Freedom Autonomous Underwater Robot

The Freedom AUV has been in development since 2014 with the ambition of delivering sophisticated autonomous behaviours for a variety of subsea tasks

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Technical Sales Engineer, **Asser**, works closely with Impact Subsea's customers and distributor network.

Asser holds a BSc in Electronics and an MSc in Offshore Engineering. He has a decade of previous experience in the Subsea Industry as an ROV Pilot and a Survey Engineer.

Asser Awaad

Technical Sales Engineer

Impact Subsea

New Generation of Mechanical Scanning Sonars

With the aim to further capabilities available to work-class and micro-ROVs alike, Impact Subsea are committed to providing a range of compact, high-performance sensor solutions for underwater vehicles and associated applications. The release of the ISS360 range of imaging sonars addresses this commitment by revolutionising mechanically scanning sonar market, introducing capabilities traditionally only found in much larger scanning sonars to the miniature sonar market.

Sonar image quality is usually defined in two ways: angular resolution and range resolution. Angular resolution becomes important, particularly at longer ranges. This is the ability to discriminate between two items which are next to each other but the same distance away. The smaller the angle, the higher the resolution. Range resolution refers to the ability to discriminate between two items one behind the other (at different ranges), usually more critical within shorter ranges.

Offering a 360° field of view with unrivalled technical specifications including range capabilities, resolution, scanning speed and more; the ISS360 range provides users with a robust and adaptable solution where space, weight and costs are critical considerations.

During this presentation, Asser will discuss the revolution of mechanically scanning sonar technology and the relevance this has within the underwater robotics market.

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Sam is the Business Development Manager with Ocean Infinity focussing on the development and delivery of subsea IMR activities in the offshore energy sectors.

Sam has worked in the offshore energy industry for over 13 years undertaking many roles including Project Engineering, Technical Sales, and Project Management before joining Ocean Infinity in the Business Development team.

Sam Taylor

Business Development Manager

Ocean Infinity

How Ocean Infinity's Armada Fleet will safely deploy and operate subsea payloads from uncrewed vessels

Ocean Infinity will describe and demonstrate how it will deploy and operate ROVs and other subsea payloads from a uncrewed platform through innovative and scalable launch and recovery.

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Rory Findlay holds a Masters degree in Coastal Engineering from the University of Southampton. Upon graduating in 2017 he joined Nortek in a technical sales and support role, primarily focusing on oceanographic sensing onboard autonomous and uncrewed platforms.

Since 2021 he has operated as Nortek's Business Development Manager for navigation products, working on integration of acoustic Doppler sensors into subsea and surface vehicles.

Rory Findlay
Business Development Manager
Nortek

Validating Combined Navigational Sensor Packages for Small Vehicle Platforms

Introduction of new sensor packages for marine autonomous applications is invariably a learning process for both the developer and the user. As the field of marine autonomy continues to accelerate into new technical realms, sensor manufacturers need to ensure that products are fit for contemporary and future applications. Technical capability is only part of the solution. The proliferation of advanced autonomous control and navigation is accompanied by a drive to provide such capabilities across a wider range of price and payload brackets – in other words, democratising autonomous control and navigation in addition to advancing it. In order to balance technical capability with commercial needs, Nortek have combined acoustic and inertial sensor capabilities in a compact navigation package designed exclusively to extend the capabilities of smaller vehicles. Following two years of internal development and external collaborative testing, Nortek present use cases that demonstrate technical improvements resulting from an iterative process of user informed development. This presentation will focus on case studies covering multiple vehicle domains, and addresses the specific technical requirements associated with various vehicle applications.

Use cases include:

- Fully autonomous navigation and combined oceanographic data collection from Micro-AUVs
- Intelligent control and pilot aiding onboard inspection class ROVs
- Simplifying underwater navigation for divers using a combined inertial and acoustic navigation package

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30th November

Andrew Gibson has 30 years' experience in the engineering environment. He completed a mechanical engineering apprenticeship at Reliance Precision and achieved the BTEC HNC and continued his studies achieving an MSc in Manufacturing, Management and Technology.

Andrew has 15 years' experience in a sales environment dealing with a wide range of markets and specialises in subsea and aerospace.

Andrew Gibson

Subsea Sales Engineer

maxon

Lightweight robotic arms and grippers for harsh environments

When Reach Robotics of Sydney Australia were developing their Reach Alpha 5 robotic manipulator and gripper, they looked to maxon to provide the drives they required. The Reach Alpha 5 is the world's smallest ROV manipulator, when curled up it's only 230x150x40mm. At the same time the arm can lift 2Kg at its farthest reach of 580mm. The grippers have a closing force of 600N. To pack this power into such a small package Reach Robotics needed a very power dense motor. They also had very tight development timescales, so needed product on site as soon as possible. They turned to the maxon DCX16 brushed DC motor with integrated GPX16 planetary gearheads.

The maxon DCX motors are configured online allowing the customer to select the motor, gearbox, sensors as well as modifications to shafts, flanges, leads and encoder resolution. On top of this level of customer flexibility the product is supplied in a 11 working day manufacturing time. This level of customisation with a short lead time proved essential for Reach Robotics.

Underwater Robotics Conference
30th November

Paul Slorach is one of Verlume's founding team members and has been integral to the company's growth. Passionate about subsea technology and the energy transition, Paul has a background as a mechanical engineer, with over 15 years' experience in subsea engineering in the oil & gas and offshore renewables sectors, mainly in design and delivery of subsea production systems, intervention equipment, power generation and energy storage technologies.

At Verlume, Paul previously worked as lead engineer for the development of the Powerhub, a tidal energy conversion system developed by Verlume, as well as lead engineer for number of other client projects and R&D work scopes including the early stages of what became the Halo battery storage development programme.

Paul Slorach

Chief Technology Officer

Verlume

Continuous availability for remote subsea operations and offshore infrastructure

Recognising the challenge of renewable energy intermittency and energy security needs for offshore operations, Verlume has developed a suite of products to deliver a reliable, uninterrupted power supply for a range of applications.
As a battery systems provider for harsh environments, Verlume has created an intelligent energy management system which autonomously maximises available battery capacity in real time. The company has also developed a full energy storage system, and compact energy storage in the form of subsea battery packs.

Verlume's flagship Halo battery energy storage product has been specifically designed for the harsh underwater environment, reducing operational emissions and facilitating the use of renewables.
Halo is part of a collaborative project which was developed by partners in the UKCS to combine a wave energy converter (WEC) and a subsea battery storage system, to deliver low carbon power and communication with subsea infrastructure such as subsea production control systems and residential ROVs and AUVs.

The Renewables for Subsea Power (RSP) project also includes engagement from an operator and an Oil & Gas services company. The assembly and onshore commissioning of the RSP system is scheduled to be completed by November, where a Transmark AUV will be powered by the Halo device. The final phase of the project will include offshore deployment and underwater demonstration.

Underwater Robotics Conference
30th November

Aidan Thorn joined Sonardyne in August 2021 as Business Development Manager – Marine Robotics. Through this role Aidan is responsible for achieving sustainable growth for Sonardyne across multiple markets in Marine Autonomous Systems and Vehicles. Prior to joining Sonardyne Aidan spent 21 years working for the National Oceanography Centre in a variety of industry facing roles, including as Marine Robotics Innovation Centre Business Manager.

Aidan has also served on various industry groups, boards and committees including; the Society for Maritime Industries Maritime Autonomous Systems Group Council and the Ocean Business Technical Committee.

Aidan Thorn

Business Development Manager – Marine Robotic Systems

Sonardyne

Delivering a reliable persistent presence for offshore wind

Marine Robotic systems, such as UUV's and USV's will have a huge role to play in the provision of offshore wind. It is projected that 30% of operations and maintenance (O&M) tasks on wind farms will be automated. Having persistent marine robotics gathering information about wind farm environment and infrastructure in collaborative fleets will enable understanding of problems in a timely way so that interactions can be delivered when needed, rather than when spotted by periodical survey.

This presentation will focus on how Sonardyne's navigation, positioning, tracking, comms, command and control technologies can enable marine robotic platforms of all types to support the information needs of offshore wind operators in their O&M operations.

Sonardyne technologies can enable a USV to dynamically position itself using our SPRINT Nav hybrid navigation solutions. We can provide positioning and tracking solutions from a USV to a UUV that is surveying subsea cables. Using our acoustic and/or optical comms technologies to transfer data about a cable or scour inspection by a UUV to the operator. This presentation will also present a future vision for continuous presence of marine robotics within a wind farm, enabled through Sonardyne. This future vision that looks not just at the marine robots themselves, but the infrastructure required to support their use. This will include subsea launch, recovery, docking, charging and data transfer from resident subsea garages and/or from existing wind farm infrastructure – e.g. Crew Transfer Vessels.

Underwater Robotics Conference
30th November

Dr Hui Yan is a Senior Development Engineer working within SMD's Innovation R&D team. She has a PhD in Naval Architecture and Ocean Structures and specialises in ROV/AUV design, propeller design, navigation algorithms and 6 DOF motion simulations and control.

Hui joined SMD in 2015 and has used her knowledge to progress and proof the performance of SMD's advanced range of products.

Dr Hui Yan

Senior Development Manager

SMD Ltd

The science behind ROVs for high current operations in Offshore Wind

Efficient installation of offshore wind infrastructure relies on having equipment that can cope with the demanding conditions. One such condition is high currents which can be problematic for current generation ROVs. SMD has been working on a new range of high current ROVs to address this issue and open the operating window of vessels so productivity can be increased.

In this presentation SMD will introduce the design principle of ROVs and step through the factors it has considered and implemented in the design of its new EV range of high current ROVs. It will look at the importance of fluid dynamics, how umbilical/tether affects ROV operations, how propulsion systems behave under varying work conditions and above all how stability and control is maintained so quality of operation is not compromised.

SMD will explain how it has considered each factor carefully with simulations and tests which include ROV speed, ROV power, umbilical/tether tension, and how it predicts ROV performance to de-risk ROV operations in the Wind sector.