<table>
<thead>
<tr>
<th>No.</th>
<th>Session</th>
<th>Speaker</th>
<th>Company</th>
<th>Presentation Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8:30 to 9:15</td>
<td>William Kohnen</td>
<td>Hydrospace Group Inc</td>
<td>2018-2019 MUV Industry Overview</td>
</tr>
<tr>
<td>1</td>
<td>9:15 to 9:30</td>
<td>Susan Casey</td>
<td>Special Guest &amp; Author</td>
<td>In Praise of Descent: An Outsider's View</td>
</tr>
<tr>
<td>2</td>
<td>9:30 to 10:00</td>
<td>Francis Elder</td>
<td>WHOI</td>
<td>DSV Alvin 2018 operations summary and design progress for 6500 meter operations</td>
</tr>
<tr>
<td>3</td>
<td>10:00 to 10:30</td>
<td>Ladd Borne</td>
<td>Triton Submarines</td>
<td>Building a Classed Manned Hadal Exploration System</td>
</tr>
<tr>
<td>4</td>
<td>10:30 to 10:45</td>
<td>Masanobu Yanagitani</td>
<td>JAMSTEC</td>
<td>2018 Shinkai6500 Starting a Single pilot operation overview</td>
</tr>
<tr>
<td>5</td>
<td>11:15 to 11:45</td>
<td>Yukihito Kida</td>
<td>JAMSTEC</td>
<td>Underwater acoustic image transmission system for manned submersible Shinkai6500</td>
</tr>
<tr>
<td>6</td>
<td>11:45 to 12:15</td>
<td>Francis Elder</td>
<td>WHOI</td>
<td>A new 6500m Variable Ballast System for DSV ALVIN</td>
</tr>
</tbody>
</table>

| 7   | 12:15 to 1:30 |                                    |                          | LUNCH                                                                             |

| 8   | 1:30 to 2:00  | William (Bill) Marr            | Navy Experimental Diving Unit | Overview of the Capabilities of the U.S. Navy Experimental Diving Unit (NEDU)   |
| 8   | 2:00 to 2:30  | Jarl Strome                    | Triton Submarines          | Overview of Deep Ocean Simulation Test Facilities around the World               |
| 9   | 2:30 to 3:00  | Paul Garza                    | Southwest Research Institute | Overview of Deep Ocean Testing Capabilities in the U.S.                          |
| 10  | 3:00 to 3:30  | Roy Thomas                    | ABS                       | ABS Industry Annual Meeting - Overview of ABS Underwater Rule Change Proposals for 2019 |
| 11  | 4:30 to 5:30  |                                    |                          | MTS MUV - MUV Cocktail Reception                                                |

| 12  | 5:30 to 7:30  |                                    |                          | HILTON GARDEN INN HOTEL Reception                                                |

| 1   | 9:00 to 9:30  | Charles Westerfield            | AMETEK SCP               | Pressure Hull Penetrators - critical components for undersea mission success     |
| 2   | 9:30 to 10:00| Capt. Robert Wolf             | NAVSEA PMS391            | Submarine Escape and Rescue Recent and Future Developments                         |
| 3   | 10:00 to 10:30| Greg Cotten                   | JFD Ltd                   | Manned Submersibles for Submarine Rescue-Fly-away System Optimization             |
| 4   | 10:30 to 10:45| Scott Waters                  | Deep Sea Submarine        | Pisces VI ready for sea trials                                                    |
| 5   | 11:15 to 11:45| Jess Totten                   | ABS                      | ABS for Manned Submersibles                                                       |
| 6   | 11:45 to 12:15| Michael Klein                 | Lloyds Registry           | Classing outside the Rules: Non-prescriptive routes to submersible classification |
| 7   | 12:15 to 1:00 |                                    |                          | LUNCH                                                                             |
| 8   | 1:00 to 1:30  |                                    |                          | MTS MUV - MUV PANEL ROOM                                                          |

| 9   | 1:30 to 2:00  | Will Kohnen - Panel Chair      | MTS MUV - MTG PANEL ROOM | MUV OPERATIONS Consensus Standard                                                |
| 8   | 2:00 to 2:30  | Jarl Strome, Roy Thomas, Gard Clark, Mike Caudle, Kip Peterson, Dan Lawrence|                          | WORKSHOP & Panel Discussion                                                     |
| 9   | 2:30 to 3:00  |                                    |                          |                                                                                 |
| 10  | 3:00 to 3:30  |                                    |                          |                                                                                 |
| 11  | 3:30 to 4:00  | William Kohnen                | MTS MUV - MTG PANEL ROOM | MTS MUV ANNUAL COMMITTEE MEETING                                                 |

| 1   | 8:30 to 9:00  | Carme Parareda                | Ictineu Submarins SL     | ICTINEU New High Voltage 300VDC LiPo Battery for Underwater Systems               |
| 2   | 9:00 to 9:30  | Leon Adams                    | Southwest Electronic Energy | Novel ABS Approved Pressure Tolerant Lithium Ion Battery Modules for MUV's       |
| 3   | 9:30 to 10:00| Justin Farrelly               | Interspace Corp           | Innovation and Advances in Propulsion and Control                                 |
| 4   | 10:00 to 10:30| Will Ricci                   | Trelleborg Foam           | Syntactic foam for Dummies and New Technologies in design                        |
| 5   | 10:30 to 10:45| Bart Kemper                  | Kemper Engineering        | Joint Mechanics in Polymer Hulls and Viewports                                    |
| 6   | 11:15 to 11:45| Thomas Trudel                | Outside Innovation        | Hybrid Dome Windows -- Are they domed, flat, or both?                            |
| 7   | 11:45 to 12:15| Raja Singh                   | IoT Wizards LLC           | IoT for Underwater Assets and Data Management                                      |
| 8   | 12:15 to 1:00 |                                    |                          | LUNCH                                                                             |
Dear Members and Attendees,

Once again, we have assembled for UI 2019. Welcome to the 16th annual symposium hosted by the Marine Technology Society Committee on Manned Underwater Vehicles. Since 2003, this committee works hard to bring together an international group of manufacturers, operators and pilots, and support service providers who thrive in the intersection of engineering, technology advancements and the spirit of subsea innovation.

This year we have a program with twenty-eight speakers. Tuesday opens with an inside look at the MUV industry, followed by an assessment of the industry as viewed through an outside journalistic lens with Susan Casey. The rest of the day has a focus on deep ocean submersibles. The highlight is Triton Submarines who has engineered remarkable full ocean depth MUV, DNVGL classed for two person and engineered for multiple dives, remarkable because since the 1960’s, only the Trieste and James Cameron’s Deepsea Voyager have accessed the full deep ocean. The Triton hadal presentation is followed by updates from vanguards of deep ocean research, Woods Hole’s DSV ALVIN and JAMSTEC’s Shinkai 6500. In the afternoon, the program reviews the worldwide inventory of deep ocean simulation test facilities for manned submersibles. This should be of interest to everyone.

Be sure to set aside Tuesday evening for the MUV Cocktail Reception at the Hilton Garden Inn from 5:30 to 7:30 pm. It’s an informal way to foster networking and business development opportunities.

Special consideration on Wednesday should be given to Captain Robert Wolf, who is presenting submarine escape and rescue, past and future developments. News from NAVSEA is always a welcome addition to the symposium. The afternoon features a panel discussion/workshop on our MUV Operations Consensus Standard. This is a work in progress and everyone is encouraged to contribute.

Thursday is all about the state of technology, with a focus on components: batteries, motor drivers and syntactic foam, viewports and emerging directions of IIoT, the Industrial Internet of Things.

In between our busy program, your office responsibilities and the good eats in New Orleans, don’t forget to visit the show floor, whatever your focus: business-to-business, business-to-government or business-to-consumer, you will find solutions and innovation there.

Thank you to all our dedicated speakers for their time and efforts. Speakers are the heart of this symposium and we are grateful that they share their expertise. Special shout-out to committee members; Kip Peterson, Colleen Hahn, Veronica Hernandez, Gard Clark and Daniel Lance for making this all possible. I look forward to meeting up with everyone.

William Kohnen
Chair, Manned Underwater Vehicles

*Marine Technology Society*
CONTENTS

DAY 1: Deep Ocean Vehicles ................................................................. 5
      World Overview of Deep Ocean Test Facilities ............................ 7
      ABS Annual Industry Meeting ...................................................... 8

DAY 2: Manned Submersible Operations ........................................... 9
       WORKSHOP: MUV Operations Consensus Standard ......................... 11
       ANNUAL Meeting: MTS Manned Underwater Vehicles Committee .......... 11

DAY 3: New MUV Technology ............................................................. 12

MUV 2019 Speaker Bios ........................................................................ 15

MUV 2019 Company Directory ............................................................ 30
8:30 – 9:15  **2018-2019 MUV Industry Overview**  
By: William Kohnen, Hydrospace Group, USA

A yearly review of the state of the Manned Submersible industry in 2018/2019. The overview will look at developments in all branches, including international research, tourism activity, leisure and security developments. This will include a summary of submersibles under Classification, operating and in construction, review of the industry trends and regulatory highlights for the year.

9:15 – 9:30  **In Praise of Descent: An Outsider’s View**  
By: Susan Casey, Ocean Author - Hawaii, USA

Susan Casey is currently working on a book about the deep ocean and will present an outsider’s view as a modern context to the MUV industry. She is the author of three New York Times’ bestselling books: The Devil’s Teeth, The Wave, and Voices in the Ocean, the former editor-in-chief of O, The Oprah Magazine, and an award-winning journalist whose work has been featured in The Best American Science and Nature Writing, The Best American Sports Writing, and The Best American Magazine Writing anthologies; and has appeared in Esquire, Sports Illustrated, Fortune, Time, Outside, and National Geographic.

9:30 – 10:00  **DSV Alvin 2018 operations summary and design progress for 6500 meter operations**  
By: Francis Elder, Alvin Group, WHOI, USA

This presentation will detail DSV Alvin operations through early 2019, including the completion of Alvin’s 5000 dive in late November 2018. Additionally, the engineering efforts to complete remaining systems conversion for 6500 meters operations are in the final stage, with mature designs nearing completion, and procurement of new components and materials underway. The presentation will provide information on the progress of these efforts, and the Alvin program’s plans to complete integration in 2020, and initial operations to 6500 meters scheduled in early 2021.
Building a Classed Manned Hadal Exploration System
By: Ladd Borne, Triton Submarines, USA

Triton Submarines has built the world’s first manned submersible commercially certified for repeatable exploration to the deepest point in the ocean. Over 150 suppliers from 36 different countries contributed to the project; in many cases re-thinking the technologies used to develop weight-critical and precision components in compliance with stringent quality requirements. This talk will detail the building and proof testing of the submersible.

10:30 – 10:45
COFFEE BREAK

2018 Shinkai 6500 starting a single pilot operation overview
By: Masanobu Yanagitani, Japan Agency for Marine-Earth Science and Technology, JAPAN

JAMSTEC remodeled the inside of the “SHINKAI 6500” personnel sphere, and prepared guidelines for implementation of a single pilot operation. This allows the deep research submersible to carry two scientist and one pilot. For more than 25 years, the submersible was controlled by one pilot and one co-pilot. The first single pilot operations were carried out in 2018. The presentation will review the year’s activity and introduce future improvement points for single pilot operation.

Underwater acoustic image transmission system for manned submersible Shinkai6500
By: Yukihiro Kida, Japan Agency for Marine-Earth Science and Technology, JAPAN

JAMSTEC is the national deep ocean research organization in Japan operating the 6500m rated SHINKAI 6500 manned submersible. JAMSTEC continues to improve the technology for deep sea research and this presentation will demonstrate the performance of a new underwater acoustic communication system, which was developed for image transmission from a manned submersible Shinkai 6500 to the surface ship. The presentation will discuss the capabilities to capture a still image from a camera on the submersible and send the image data at the data rate of 40kbps.

A new 6500m Variable Ballast System for DSV ALVIN
By: Francis Elder, Alvin Group, WHOI, USA

Alvin’s Variable-Ballast system is one of several systems limiting dive depths to 4500m. New designs are being implemented to complete the conversion of remaining systems for operations to 6500 meters. This presentation will highlight system requirements, design rational, and new components for a 6500 meter Variable Ballast system.

12:15 – 1:30
LUNCH BREAK
**DEEP OCEAN SIMULATION TEST FACILITIES**

**PART 1:**
**Overview of the Capabilities of the U.S. Navy Experimental Diving Unit (NEDU)**
By: William (Bill) Marr, Navy Experimental Diving Unit, USA

The Navy Experimental Diving Unit, located in Panama City Florida, is a multi-faceted National Asset. Primary facilities include the manned Ocean Simulation Facility (OSF), an Unmanned Test Facility, the Saturation Fly Away Diving System (SATFADS), the Test Pool, and the Fluctuating Altitude Simulation Technology (FAST) System. The capabilities and parameters of the major NEDU assets will be presented.

**PART 2:**
**Overview of Deep Ocean Simulation Test Facilities around the World**
By: Jarl Stromer, Triton Submarines, USA

The manned submersible industry has experienced significant growth over the past decade thanks to the increasing acceptance and popularity of privately owned yacht-based submersibles. Common among all new manned submersibles is the requirement to conduct external hydrostatic testing on submersible pressure hulls as well as all pressure resistant equipment and housings installed on the submersible. These tests may be conducted by dropping the un-manned submersible to a depth corresponding with the test pressure, or they can be pressure tested in large chambers specifically designed and built for such a purpose. These large chambers can simulate the pressures and temperatures in the deep ocean in a controlled environment. This paper discusses the procedures and requirements for external hydrostatic testing of submersible hulls and equipment it also presents an overview of deep ocean simulation chambers and test facilities around the world.

**PART 3:**
**Overview of Deep Ocean Testing Capabilities in the U.S.**
By: Paul Garza, Southwest Research Institute, USA

Southwest Research Institute (SwRI) in San Antonio, Texas provides testing and engineering services in a variety of fields from deep sea to deep space. The Ocean Simulation Laboratory at SwRI maintains and operates dozens of pressure chambers used to simulate deep ocean environments for submersible vehicle and component validation testing. SwRI has also collaborated with other test labs around the U.S. that provide similar services. Laboratories like these are vital to the future of research and development into subsea technologies. These facilities and their importance to the industry will be presented.

**COFFEE BREAK**
ABS Industry Annual Meeting -
Overview of ABS Underwater Rule Change Proposals for 2019
By: Roy Thomas, American Bureau of Shipping, USA

The American Bureau of Shipping (ABS) Rules for Building and Classing Underwater Vehicles, Systems and Hyperbaric Facilities, commonly known as the “Underwater Rules”, are the primary ABS Rules for classification of underwater units. These underwater units include manned submersibles, lock-out submersibles, diving systems, atmospheric diving suits, remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and so forth that are used for commercial, scientific, and government applications. This session commences with an overview of the ABS Underwater Rule change proposals for 2019 and provides the rationale and basis for each proposed Rule change. Thereafter, this session includes a question-answer session and facilitates an open dialogue with the industry on current technical issues that work well or may be problematic. All active designers, fabricators, owners and operators are invited to attend and provide feedback.

Please Join us for the
MTS MUV Cocktail Reception
HILTON GARDEN INN – 5:50 to 7:30

JOIN US – Everyone are invited to the HILTON GARDEN INN Courtyard for Cocktails, Refreshments and catching up with the MUV colleagues and friends. All are invited. The Hotel is just across the street from the Convention Center, 1 block up.

HILTON GARDEN INN COURTYARD - RECEPTION
9:00 – 9:30  **Pressure Hull Penetrators - critical components for undersea mission success**  
By: Charles Westerfield, AMETEK SCP, USA  

Pressure Hull Penetrators are critical components for undersea mission success for any manned, unmanned, or fixed infrastructure system. Penetrators maintain pressure boundaries between the inside and the hostile outside environment. Penetrators protect humans as well as sensitive electronics. A failure may cause a mission failure or have life-threatening effects.

9:30 – 10:00  **Submarine Escape and Rescue Recent and Future Developments**  
By: Capt. Robert A. Wolf, US Navy, NAVSEA PMS391, USA  

This presentation will serve to update government and industry partners on the status of our capabilities, current acquisitions and procurements, lessons learned from the ARA SAN JUAN incident, highlights from recent Operation Gray Lady and CHILEMAR 2018 exercises and to share perspective on future technology objectives.

10:00 – 10:30  **Manned Submersibles for Submarine Rescue-Fly-away System Optimization**  
By: Gregory Cotten, JFD Ltd, UK  

JFD, Ltd., who designs build, maintains and operates globally three generations of manned submersibles for submarine rescue, intends to discuss the many challenges associated with designing and operating a deep diving (600m+) manned submersible which needs to be optimized for fly-away and quick mobilization on a vessel of opportunity.

10:30 – 10:45  **COFFEE BREAK**

10:45 – 11:15  **Pisces VI ready for sea trials**  
By: Scott Waters, Deep Sea Submarine, USA  

This is an update on Pisces VI and speech about getting ready for sea trials and about the Pisces VI capabilities.
11:15 – 11:45  **ABS for Manned Submersibles**  
By: Jess G. Totten, American Bureau of Shipping, USA

Presentation includes background on ABS and the origins and purpose of class societies. Describes the process of classing a vessel or platform with ABS. Finally, discusses pros and cons of classing manned submersibles as well as alternatives and special considerations.

11:45 – 12:15  **Classing outside the Rules: Non-prescriptive routes to submersible classification**  
By: Michael Klein, Lloyd’s Register North America, Inc., USA

Given the unique nature of submersible designs as well as rapid advancements in material and power technologies, a prescriptive Rules-based approach to classification may not be adequate. By considering the fundamental purpose of classification, this talk outlines alternative routes to classification and clarifies such questions as:
- How does classification reduce risk and cost to submersible owners, operators, and insurers?
- How does Class accept vessel designs that fall outside the scope of the prescriptive Class Rules?
- What are the right questions when considering Class for a new or existing submersible?

This talk will incorporate case studies involving LR-classed manned submersibles as well as similar approaches to classification in other segments of the maritime industry.

12:15 – 1:30  **LUNCH**

### MUV Operations Consensus Standard CATEGORY OUTLINE

<table>
<thead>
<tr>
<th>No</th>
<th>Operating Category</th>
<th>Current US Coast Guard Designation</th>
<th>APPLICABILITY</th>
</tr>
</thead>
</table>
| 1  | **Tourism Submersibles** | USCG Subchapter T Small Passenger Inspected Vessels | Submersibles built for commercial tourism  
- Carrying Tourists from General Public  
- Inspected Vessel COI (FLAG STATE)  
- Classed Vessels (IACS) |
| 2  | **Un-Inspected Classed Submersibles** | USCG Subchapter C Uninspected Vessels | Commercial, Private & Research MUVs  
- Classed Vessels (IACS)  
- 6 or less Participant Allowance  
- Can Operate commercially |
| 3  | **Un-Inspected Unclassed Submersibles** | USCG Subchapter C Uninspected Vessels | Private & Commercially built MUVs  
- Unclassed Vessels  
- No third party documentation  
- Definition of Commercial Operation |
| 4  | **Personal Submersibles** | Recreational Submersibles | Home built, self-operated personal subs  
- Unclassed Vessels  
- Not Valid for commercial operation |
| 5  | **Submarines** | Submarines | Classed Submarines / Work / Passengers  
- Inspected Vessels COI (FLAG STATE)  
- Classed Vessels (IACS) |
MUV WORKSHOP and PANEL DISCUSSION

1:30 – 3:00  **MUV Operations Consensus Standard Working Session**  
By: Will Kohnen, MTS MUV, Chair

The MUV industry continues its work on the development of an Industry Best Practices based consensus standard for the operation of manned underwater vehicles. This does not address the issues related to design standards but does consider the level of third party review and certification of a specific vessel. This first level work consists of defining the different Categories of MUV operations.

(1:45 - 1:50)  **Category 1 – Tourism Submersibles**  
By: Roy Thomas, American Bureau Shipping, USA

(1:50 – 1:55)  **Category 2 – Uninspected Classed Submersibles**  
By: Jarl Stromer, Triton Submarines, USA

(1:55 – 2:00)  **Category 3 – Uninspected UN-Classed Submersibles**  
By: Gard Clark, Captain, USN (Ret.), USA

(2:00 – 2:05)  **Category 4 – Personal Submersibles**  
By: Mike Caudle, Tank Doctor, CANADA

(2:05 – 2:10)  **Category 5 – Submarines**  
By: Kip Peterson, Capt. USMM, Thorsborg LLC, USA

(2:10 – 2:20)  **Manned Submersible Regulations in US Waters**  
By: James D. Lawrence, US Coast Guard Head Quarters, USA

(2:25 – 3:00)  **PANEL DISCUSSION**

Discussion of term definitions, category structures and scope of each definition. Open comment session and industry member input.

3:15 – 3:30  **COFFEE BREAK**

3:30 – 4:30  **MTS MUV ANNUAL COMMITTEE MEETING**  
By: Will Kohnen, Chair, Manned Underwater Vehicles, MTS, USA

ALL MTS MUV Members and Industry delegates are invited to attend, participate and join in the planning for the committee work for 2019.
ICTINEU New High Voltage 300VDC LiPo Battery for Underwater Systems
By: Carme Parareda, and Pere Fores, ICTINEU, Spain

ICTINEU Submarins, the Barcelona based builders of deep sea manned submersibles, continue the pioneering work of deep ocean Lithium battery modules for operation up to full ocean depth. Ictineu’s latest battery is a high voltage pressure-compensated Lithium-polymer battery module producing 296V DC and delivering 9,18 kWh, a further progress in the line-up of ICTINEU’s existing 6,000m and 11,500m rated 148 VDC batteries. This new development, the 4th generation batteries, is the result of more than 10 years of research, development and engineering for the production and certification of lithium batteries with extensive heritage of operation and supported by proprietary specifications and closely guarded proprietary rights. This new generation is designed taking in account the evolution of the rules from maritime classification societies for lithium batteries in the last years, which have incorporated withstanding new requirements. The unit will undergo ICTINEU Submarins extensive validation and test program which aims to ensure the maximum safety and reliability of the products delivered. The presentation will focus on the new features and design specifications as they apply to larger manned or unmanned underwater vehicles and systems.

Novel ABS Approved Pressure Tolerant Lithium Ion Battery Modules for MUVs
By: Leon Adams, Southwest Electronic Energy Group, USA

Regarding powering Manned Submersibles, Safety is paramount. Reliability is critical. Efficiency is important. Ease of use is valuable. How do you assure that innovations designed to provide power to manned submersibles address such Safety and Reliability? One such way is to rely on credible Industry Standard testing and certification organizations, such as the American Bureau of Shipping (ABS) to “vet” the innovations…. put them through their paces of spec reviews and tests to get their seal of approval.

ABS has completed a Certification for the SWE SeaSafe II and SeaSafe Direct subsea battery modules for product design assessment applied in 4 different marine and subsea vessel classes, and the ABS Lithium Battery Guide. This rigorous review and testing includes the class and use case covering Manned Submersible Vehicles. With the SeaSafe Battery Modules, this ABS Certification process, tests completed, and successful results will be discussed and highlighted, including a critical new IEC safety test and video of successful results.

It will become clear how Safety and Reliability are additionally validated with these ABS certification and IEC reviews and tests. Efficiency and Ease of Use will also be summarized to show how SeaSafe II and SeaSafe Direct subsea battery modules are technically and operationally changing the playing field of powering manned submersibles.
9:30 – 10:00  **Innovation and Advances in Propulsion and Control**  
By: Justin Farrelly, Innerspace Corporation, USA

In recent times thruster manufacturers and system designers have been developing new approaches to the implementation of electric propulsion. All aspects - electrical, electronic, mechanical and system software/firmware have come under scrutiny as used on ROV and manned submersibles. The presentation looks at recent system level developments and discusses factors driving design, and the resulting products now entering the market. We consider the influence of new technology and methods used to streamline implementation, maintenance, reliability and safety.

10:00 – 10:30  **Syntactic foam for Dummies and New Technologies in design**  
By: Will Ricci, Trelleborg Applied Technologies, USA

Buoyancy material is a crucial component of subsea vehicle design. The composite "syntactic" foam material maintains the positive buoyancy at depth for vessel vehicle designs which can't rely entirely on pressure vessels. Although the first use of syntactic foams in subsea buoyancy applications began in the 1950's, the first mention of a syntactic foam in scientific publication was not until 1965 which was for non-subsea applications by the U.S. Air Force. To this day, many frequent operators of syntactic foam bearing vehicles are unfamiliar with the most basic technological drivers of this critical material.

Syntactic foams are a unique type of composite material and as with all composites they have constituent components whose individual characteristics and interplay drive their macroscale material performance. This presentation will delve into those constituent materials and discuss how they impact end material performance and help dictate end-user demanded specifications.

Building from the understanding of the background material science we will discuss the current state of buoyancy foams including types, capabilities, and applications and end with future technology. Drivers of next generation technology include the raw materials for super high strength to weight ratio materials which utilize highly functionalized micro particles, as well as, thermoplastic syntactic components as both structurally integral metal/plastic replacements and lightweight fairings.

10:45 – 11:15  **Joint Mechanics in Polymer Hulls and Viewports**  
By: Bart Kemper and Krista Kemper, Kemper Engineering Services, LLC, USA

Very large acrylic spheres are used as both a “hull” and a “viewport” in many modern submersibles. The aspect ratio of wall thickness-to-curvature violates the “thin wall pressure vessel” assumption used for metallic hulls. This presentation provides the analytical basis for proposed changes to ASME PVHO-1 and related codes.
**Hybrid Dome Windows – Are they domed, flat, or both?**

By: Thomas Trudel, Outside Innovation, USA

This paper provides an overview of the current state of “hybrid dome” windows in the deep sea submersible industry. A “hybrid dome” window is a one that has a conical seat, flat low pressure face, and semi-spherical high pressure face. The intended advantage of these windows is that they provide the structural advantages of semi-spherical windows while maintaining flat optics. These windows have become increasingly popular in recent years (Oceangate, Triton, Deepsea Challenger) despite the ambiguity surrounding how to properly design and certify the windows. The primary source of contention is the debate over whether the window design should adhere to ASME guidelines for semi-spherical or conical frustum windows. The design criteria for semi-spherical windows allows for larger internal diameters and is attractive to designers, but early analysis indicates that the strain distributions within the windows have a mix of semi-spherical and flat characteristics. Analysis results are presented and compared to ASME code as well as legacy work by Stachiw. Analytical and industry level discussion follows. Context on the current views of the ASME-PVHO subcommittee on viewports is also provided.

---

**IOT for Underwater Assets and Data Management**

By: Raja D. Singh, IoT Wizards LLC, USA

IOT is a buzz word that is used everywhere, yet few can put their fingers on exactly what it is. Part of the issue is that when it works well, it becomes completely transparent to the user. Sharing data has become easy. Sharing vast amounts of data is harder and doing it large scale through the “Cloud” is the modern challenge. Data safety is at the centre of this technology. The technology is rooted in encryption technology, artificial intelligence, big data computing maintained by very large organizations (such as google) to support a powerful array of services with state-of-the-art security infrastructure. IoT can aggregate the dispersed device data into a single global system and use the IoT data stream for advanced analytics, visualizations, machine learning. It can improve operational efficiency, anticipate problems, and build rich models that better describe and optimize your business. At the core of the technology is the security infrastructure that allows you to securely connect a few or millions of devices to ensure smooth data ingestion under any condition. The presentation will discuss how IoT is a technology that brings device data into your everyday business through a secure, intelligent, and responsive IoT data pipeline.

---

**Become MTS MUV Member**

www.mtsociety.org/membership
**2019 MUV SPEAKER BIOS**

**LEON ADAMS**  
Southwest Electronic Energy Group  
P.O. Box 31340  
Houston, TX 77231  
Tel: 281-240-4000  
Direct: 281.240.3670  
Email: ladams@swe.com  
www.swe.com

Leon Adams is a Vice President at Southwest Electronic Energy. He has 7+ years’ experience in Lithium and Lithium Ion battery applications, product definition, and technical customer support and sales. Prior, Leon had 28 years experience at Texas Instruments as a Systems Engineer, and managed applications, marketing, and business in DSP and embedded processing. Leon has authored/presented technical papers and articles on Lithium Ion subsea battery technology and applications, DSP and embedded processing solutions, DSP power management, and software development tools. Leon is a member of MTS, SUT, AADE, and IEEE. Leon has an MBA and a BS in Engineering Physics.

**LADD BORNE**  
Triton Submarines, LLC  
10055 102nd Terrace  
Sebastian, FL 32958  
Tel: (772) 494-5722  
Mobile: (772) 285-8308  
Email: ladd@tritonsubs.com  
www.tritonsubs.com

Ladd Borne is a project manager / mechanical engineer for Triton submarines and has 25+ years of manned submersible engineering and ocean industry experience. Formerly he worked as an ocean engineer, project manager and director for Harbor Branch Oceanographic and as president and editor of Ocean News & Technology Magazine. Ladd holds a B.S. in Aerospace Engineering from Embry-Riddle Aeronautical University and is a registered professional engineer in the state of Florida.
**SUSAN CASEY**  
Ocean Author  
17 Malie Place  
Paia, Hawaii 96779 USA  
Tel: 808.280.1417  
Email: susancasey@mac.com  
www.susancasey.com

**Susan Casey** is the author of three *New York Times*’ bestselling books: *The Devil’s Teeth*, *The Wave*, and *Voices in the Ocean*. Casey is the former editor-in-chief of *O, The Oprah Magazine*, and an award-winning journalist whose work has been featured in *The Best American Science and Nature Writing*, *The Best American Sports Writing*, and *The Best American Magazine Writing* anthologies; and has appeared in *Esquire, Sports Illustrated, Fortune, Time, Outside*, and *National Geographic*. She is currently working on a book about the deep ocean.

---

**MIKE CAUDLE**  
Tank Doctor  
Aerotech Dr  
Goffs, NS B2T 1K3, Canada  
Tel: 902 873-3939  
Email: tankdoctor@msn.com

**Mike Caudle** has owned and operated Tank Doctor Aquatic Systems Inc since 1986. Manufacturing live holding systems, specializing in titanium heat exchangers for customers around the world.

He has been Scuba diving for over 40 years and involved with building and operating Submarines for over 30 years.
Captain Clark is a career submariner whose undersea experience includes 31 years in the United States Navy culminating with command of the USS DALLAS (SSN-700), a fast attack nuclear powered submarine specially equipped to carry the Seal Delivery Vehicle (SDV). The SDV is a deployable MUV housed in a Dry Deck Shelter on the deck of the larger submarine and is a "wet submersible" where operators wear scuba gear and are exposed to the ocean environment. While in command, Captain Clark conducted operations with special forces using the SDV during two six-month deployments to the Middle East and Indian Ocean. Following command at sea Captain Clark served as the Major Program Manager for Naval Sea Systems Command (NAVSEA) PMS-399—Special Operations Forces Undersea Mobility Program Office. There he was responsible for sustainment and development of Dry Navy Submersibles as well as Dry Deck Shelters and other submarine Deep Submergence Systems including maintaining Scope of Certification for manned operations. Following retirement from the Navy in 2012, he joined Teledyne Brown Engineering, Inc. where he currently serves as Vice President leading the Energy and Environment Business Unit. Teledyne Brown Engineering is the designer and manufacturer of the US Navy Shallow Water Combat Submersible which is the follow-on vehicle to the SDV. Captain Clark is a member of the Marine Technology Society’s Manned Underwater Vehicle Committee.

Dr. Greg Cotten graduated from the United States Naval Academy in 1987 with a B.S. in Systems Engineering. He completed 5 strategic deterrent patrols on USS JAMES MADISON (SSBN-627), ultimately as Strategic Weapons Officer. Transferring to the Naval Reserve in 1993 he completed his M.E. and Ph.D. in Chemical Engineering from the University of Idaho in 2000.
FRANCIS ELDER
Woods Hole Oceanographic Institution
DSV Alvin Group Submersible Engineering and Operations
266 Woods Hole Road
Woods Hole, MA 02543-1050 USA
Tel: (508) 548-1400
Email: felder@whoi.edu
www.whoi.edu

Francis Elder has been working as a mechanical engineer at the Woods Hole Oceanographic Institution since 2009, working on a variety of projects including instruments and deep submergence vehicles. He has been working in the Alvin group since 2012 and has been the Lead Mechanical Engineer since 2016.

JUSTIN FARRELLY
Innerspace Corporation
1138 East Edna Street
Covina CA 91724
Tel: (626) 331-0921
Mobile: +1 832 462 5041
Email: jfarrelly@vercet.com
www.innerspacethrusters.com

Technology Research Lead for the research and development company Vercét LLC in the United States, Justin has enjoyed a long career in electronics, mechanical and system design. Raised and educated in New Zealand, Justin has travelled the world working in a variety of technical and management roles, both for Vercét and representing others. Recent years have seen Justin as an active designer in sub-sea sensing and data acquisition systems, and in the development of pressure tolerant electronic control systems. Vercét and Justin have been instrumental in the development of a variety of innovative new technology now actively used by companies in the oil, gas, medical, sub-sea and alternative energy sectors. Living in Dallas since 2004, Justin and wife Catherine spend time trying to keep track of an active daughter, Grace, and when time permits enjoys sailing, a lifelong interest.
Paul Garza is a test engineer and project manager at Southwest Research Institute. He received his B.S. in Aerospace Engineering from Florida Institute of Technology in 2007, and completed his M.S. in Mechanical Engineering from the University of Texas at San Antonio in 2016. Paul joined Southwest Research Institute in 2009 after briefly working for Northrop Grumman Shipbuilding in the Composites Engineering group. At SwRI, he initially worked in the Marine Structures and Engineering group where he provided design and analysis support for numerous projects. One of his first assignments was to provide testing support for the DSV Alvin replacement personnel sphere. Shortly afterward, he moved to the Ocean Simulation Laboratory where he has been managing validation testing of submersible vehicles, oil and gas equipment, and other related components.

Bart Kemper, P.E. is the principal engineer of Kemper Engineering Services. He is also a member of the ASME Codes & Standards for PVHOs and Chair of the Viewports Subcommittee as well as part of the Emerging Technologies Task Force for the National Society of Professional Engineers. Krista Kemper is president of Kemper Engineering and a contributing member of PVHO and its various subcommittees. Both have been working in the diving and subsea industry for many years, ranging from 3rd party review of systems to engineering support for dive operations to new equipment development.
YUKIHIRO KIDA
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
2-15 Natsushima-cho
Yokosuka 237-0061, Japan
Tel: +81 46 867 9936
Email: kiday@jamstec.go.jp
www.jamstec.go.jp

Yukihiro Kida received B.E. degree and M.E. degree in civil and earth resource engineering from Kyoto University, Kyoto, Japan in 2011 and 2013, respectively. He is currently working at acoustics and telecommunication Group of Japan Agency for Marine-Earth Science and Technology (JAMSTEC). His research interests include underwater acoustic navigations/communications, underwater acoustic transducers, acoustical simulations, geophysical signal processing, non-linear inversion problems.

MICHAEL KLEIN
Lloyd’s Register North America, Inc.,
1621 114th Avenue SE, Suite 118,
Bellevue, Seattle, WA 98004 USA
Tel: +1 425 440 0323
Mobile: +1 832 462 5041
Email: michael.klein-urena@lr.org
www.lr.org

Michael Klein-Ureña heads marine and offshore business development for western North America at Lloyd’s Register and has worked with local submersible builders, diving system manufacturers, and component fabricators in the US and Canada. Prior to his current role, Michael headed business development for SanSailTEC LLC, focusing on projects involving LNG, hydrogen, and battery power technologies. Though not a submariner, Michael quickly came to appreciate the world of submersibles starting with his childhood fascination with the Titanic. He holds a degree in naval architecture and marine engineering from Webb Institute.
William Kohnen is President of Hydrospace Group, specializing in submarines, submersibles and other high reliability underwater vehicles, integrated solutions for manned submersibles and human occupied systems for diving, medical and aerospace applications. He has 30 years of engineering experience in aerospace and submersible vehicle design and development which include propulsion systems for manned and unmanned vehicle, pressure vessels for human occupancy, high reliability electric motors and actuators as well as optical lenses and acrylic windows for subsea and hyperbaric systems. With technical expertise in both electrical and mechanical engineering, this enables the development of ever evolving turn key solutions for customers. Mr. Kohnen was CEO and co-founder of Seamagine Hydrospace Corp. that led the design, production and certification of ten commercial, ABS classed submersibles since 1995. Mr. Kohnen is a Marine Technology Society (MTS) fellow and chair of the MTS Manned Underwater Vehicles Committee since 2003. Mr. Kohnen has given many presentations around the world and published multiple articles on State of Technology of Manned Submersible technology. He has over 20 years’ experience working with the US Coast Guard and American Bureau of Shipping (ABS) rules as a member of the ABS Special Committee for Underwater Systems and Vehicles. He is also a Standards Committee member of the ASME Pressure Vessel for Human Occupancy Committee and industry technical contributor to DNVGL regarding new rules and regulations for underwater systems.

James (Dan) Lawrence
Coast Guard Headquarters
Coast Guard Offshore Engineer CG-OES-2
Vessel & Facility Operating Stds
Tel: 202-372-1382
Email: james.d.lawrence@uscg.mil
www.uscg.mil

Dan joined the U. S. Coast Guard in 1974. He completed 29 years of active duty service. His first 16 years serving in various engineering and surface operations billets, and then his final 13 years serving in marine safety and occupational health, including a tour, as the senior inspector, at the Coast Guard Inspection and Investigations School. Upon retirement from active duty Dan joined the civilian staff, at the Coast Guard Headquarters Office of Design and Engineering Standards, serving as the small vessel, environmental, submersible and special projects engineer. He currently serves as the Coast Guard Offshore Engineer and leads the Offshore Branch of the Coast Guard Headquarters Vessel and Facility Operating Standards Division. He is a member of several professional engineering associations including ASME PVHO and ASTM. He also serves on the ABS Special Committees for Mobile Offshore Units and Underwater Systems and Vehicles.
WILLIAM J. MARR Ph.D
Supervisory General Engineer (NEDU 04)
Navy Experimental Diving Unit
321 Bullfinch Road
Panama City, Florida 32407
Work: 850.230.3189
Email: william.marr@navy.mil

W.J. Marr, Ph.D., P.E. completed a career as a U.S. Navy officer with extensive experience as a Navy diver and Explosive Ordnance Disposal Technician. He taught Ocean Engineering at the U.S. Naval Academy for more than a decade and also served as the Associate Chairman of the Naval Architecture, Ocean, and Marine Engineering Department. Following his retirement from USNA as a Permanent Military Professor, he continued his academic contributions as a part-time Lecturer for the Whiting School of Engineering at The Johns Hopkins University. His various civilian commercial pursuits have been focused on the maritime environment, including inspections of coastal and harbor structures for the U.S. Coast Guard, underwater inspections of highway bridges (by NBIS standards), ship engineering support for the Military Sealift Command, and investigation of barge/levee interactions for the U.S. Army Corps of Engineers. He was a certified commercial diver qualified through the Association of Diving Contractors International (ADCI). Dr. Marr earned his doctorate in Mechanical Engineering from the U.S. Naval Postgraduate School in Monterey, California and is a Registered Professional Engineer in California and Maryland. He is currently the Supervisory General Engineer at the Navy Experimental Diving Unit in Panama City, Florida.
Captain Robert Wolf of Fort Worth, Texas, graduated from the U.S. Naval Academy in 1995 with a Bachelor of Science degree in Systems Engineering. He also holds a Master of Science in Engineering Management from Catholic University of America and Naval Engineer and Master of Science in Systems Engineering degrees from the Massachusetts Institute of Technology.

Upon commissioning, Wolf completed nuclear power training and submarine school and reported to USS KEY WEST (SSN 722) where he qualified in submarines and served as a division officer in engineering and weapons departments deploying twice to the Western Pacific. Wolf then served as an action officer for the Director, Submarine Warfare Division (OPNAV N87) for submarine escape & rescue and Arctic programs. He transferred into the Engineering Duty Officer (EDO) community and completed his EDO qualifications at Norfolk Naval Shipyard where he was the deputy project superintendent for the USS CHARLOTTE (SSN 766) depot modernization period. Subsequently, Wolf served at Program Executive Officer (PEO) Carriers, as the assistant program manager for testing and technical issues for USS GEORGE H. W. BUSH (CVN 77); at PEO Submarines as the executive assistant to the PEO and as the assistant program manager for Post-Delivery VIRGINIA Class submarines; at Supervisor of Shipbuilding, Conversion & Repair in Newport News, Virginia as the Submarine Project Officer and VIRGINIA Class Submarine Program Manager’s Representative where he work on 12 new construction submarines, delivering two as well as completing two major submarine repair availabilities; and at Director, Submarine Warfare (OPNAV N97) as the branch head for VIRGINIA Class new construction and in-service submarine hull, mechanical & electrical maintenance and modernization.

Wolf currently serves as the Program Manager for Submarine Escape and Rescue (PMS 391) where he is responsible for advanced development initiatives, acquisition, test and evaluation, in-service support, international engagement, foreign military sales and certification for all undersea escape, rescue and survivability systems for the US Navy.

Wolf has received various personal and campaign awards, including the Meritorious Service Medal with two gold stars and Navy Commendation Medal with three gold stars.
Carme Parareda. Co-founder, administrator and COO of ICTINEU Submarins SL. As a Surveying Engineer she worked in the service of the Cartographic Institute of Catalonia (Government agency) for 15 years, since 1992, in the field of geodesy, high accuracy positioning and GPS navigation techniques. In 2004 she re-oriented her career to ocean observation and underwater technology, co-founding in 2004 the Ictineu Institute, Catalan Submarine Research Centre, and in 2007 ICTINEU Submarins SL where she develops her main professional activity as chief operations manager, sales, certification procedures and DNVGL certified pilot. In parallel from 2007 to 2009 she coordinated the Argo Maris Foundation activities (sea exploration and outreach) and from 2009 to 2016 she was a board member of the Catalan Maritime Cluster. Member of the Marine Technology Society since 2009. A traveller who loves adventure sports and mountaineering, after crossing Mongolia by bike, she sailed across the Atlantic twice. She co-wrote a book, l’Atlàntic a quatre mans (The Atlantic four hands).

Kip Peterson
Thorsborg Institute, LLC
P.O. Box 2017
Brunswick, Georgia 31521 USA
Tel: 1 770 518-0704
Email: KEP@Thorsborg.com
www.thorsborginstitute.com

As founder and CEO of Thorsborg Institute, LLC, Captain Peterson has conducted business in 99 countries since 1979 directing this global strategic intelligence/research/analytical institution for: government resource options, hydrospace development/research/training and intelligence research for global threat analysis. Captain Peterson is an accomplished: global maritime intelligence professional; degreed marine biologist; sea captain; underwater archeologist; underwater photographer; advanced scuba instructor; research/scientific diver instructor and dive safety officer who has sailed world’s oceans on commercial and research vessels for the past 47 years. He is a member of the Marine Technology Society’s Manned Underwater Committee, member of American Academy of Underwater Society and serves as an Area Commodore in the Southern Region of the Sea Scouts.
WILL RICCI
Business Development Manager
Trelleborg Applied Technologies
58 Teed Drive
Randolph MA 02368
Tel. +1 774 444 5160
Email: will.ricci@trelleborg.com
www. trelleborg.com

Will has worked in the field of syntactic foams since his undergraduate work at the NYU- Composite material laboratory. Shortly after joining Trelleborg in 2006 he finished his graduate degree in Materials engineering with his thesis topic centering on functional microparticles.

Will has worked at Trelleborg in engineering, sales, and business development roles and is the company technical expert on hollow glass microspheres which are manufactured in-house, and is the critical material used in deep sea buoyancy, as well as many non-structural aerospace composites. He took a brief break from Trelleborg during which he worked for Gurit Composite Materials on lightweight core and long fiber structural composites for the wind power, marine and automotive industries. Today, Will is the head commercial member of Trelleborg Boston's team and has a unique vantage on the subsea industry due to his role servicing myriad subsea vehicle and equipment builders utilizing deep sea buoyancy materials.

RAJA SINGH
IoT Wizards LLC
9559 Center Avenue, Ste O
Rancho Cucamonga, CA 91730 USA
Tel: 909.896.5520
Email: rdsingh@iotwizards.com
www.iotwizards.com

Raja Singh is founder and CTO of IoT Wizards LLC, an advanced engineering design house in the world of systems controls, electronics and software. For more than 25 years, Mr. Singh has been responsible for innovative new product development efforts with high growth technology companies that are spanned across the globe. Mr. Singh has lead international teams of engineers in developing Intellectual Property (IP) for solving demanding problems within semiconductor, automotive and process control industries. This experience and expertise established IoT Wizards to support companies with effective and reliable new product development efforts. Mr. Singh is a Senior Member of IEEE and served as chapter co-chairman of IEEE computer society in southern California (Inland Empire) for more than 10 years and has given many presentations on advanced IoT technologies. IoT Wizards is at the forefront of the IoT movement specializing in Cloud IoT technology and provisioning services for IoT installations. Mr Singh is a specialist in new product development methodologies (NPI), Statistical Process control and Six sigma and active in every aspects of Product Life Cycle (PLC) starting from conception to end of life. At the core of the company is the expertise in custom electronic and control hardware using Microcontrollers, FPGAs, CPLDs and Single board computers and Embedded Linux. Mr. Singh has a bachelor’s degree in Electronic & communication Engineering from Institution of Engineers, Calcutta, India. Mr. Singh is US citizen, married and lives in Southern California with his two children.
Jarl Stromer is Manager of Class and Regulatory Compliance at Triton Submarines where he is responsible for conducting hydrostatic tests on manned submersible pressure hulls and equipment. His duties include the development of test procedures, the evaluation and selection of testing facilities, the execution of the hydrostatic tests, and the evaluation of test results. Mr. Stromer serves on the PVHO Standards Committee and the ABS Special Committee on Underwater Vehicles, Systems, and Hyperbaric Facilities. He graduated from Rutgers University College of Engineering and specializes in pressure vessel technology, codes, and standards. Mr. Stromer has earned numerous professional certifications and accreditations during his 32 years in the submersible and pressure vessel industry, including: National Board Authorized Inspector and AWS Certified Welding Inspector. He’s published several papers and delivered numerous lectures on the subject of manned submersibles for industry, academia, and MENSA.

Roy Thomas has worked with the American Bureau of Shipping (ABS) for the past 16 years and serves as a Senior Principal Engineer with ABS Global Engineering. He has formerly served as the Manager of the ABS Corporate Chief Engineer’s Office and Managing Principal of the ABS Underwater Systems and Lifting Appliances Group.

Mr. Thomas is actively involved with various industry committees and currently serves as the Chair of the ASME PVHO - Subcommittee on Diving Systems, as well as the Subcommittee on Submersibles. He also currently serves as the representative of the International Association of Classification Societies (IACS) on the IMO Working Group for Lifting Appliances and Anchor Handling Winches.

Mr. Thomas has extensive experience with the certification of underwater vehicles, systems and hyperbaric facilities for commercial and military applications. He has served as the lead design review engineer at ABS on numerous projects involving underwater vehicles, systems and hyperbaric facilities of every possible form and design. Over the years, he has played an active role in updating the ABS Rules for Underwater Vehicles, Systems and Hyperbaric Facilities and has authored new sections on Underwater Habitats, Diving Systems, Lock-Out Submersibles, Ambient-Pressure Submersibles, Atmospheric Diving Suits, AUVs, ROVs, Lithium Batteries, etc. Mr. Thomas holds a master’s degree in Ocean and Naval Architectural Engineering from Memorial University of Newfoundland, Canada.
JESS TOTTEN
ABS
Managing Principal Engineer
Engineering Services Department (ESD)
16855 Northchase Drive
Houston, TX 77060
Tel: +1-281-877-6075
Mob: +1-346-262-4141
Email: jtotten@eagle.org
www.eagle.org

Jess G. Totten is a Managing Principal Engineer with the American Bureau of Shipping. Jess has worked for ABS for 10 years and is a subject matter expert on underwater vehicles and systems. Jess graduated from UT Austin with a BS in Mechanical Engineering in 2004. Before coming to ABS he worked a variety of jobs in Houston, ranging from reverse osmosis to pipeline intervention to pizza delivery. Jess was born in Panama City, Panama, is married, and is the father of two children, ages 6 and zero.

THOMAS TRUDEL
Aerospace Engineer
Outside Innovation
Half Moon Bay, Honduras
Tel: 011-504-3359-2887
Email: outside.innovation@gmail.com

Thomas Trudel is the Head of R&D at Outside Innovation, a contract engineering company that focuses on projects related to human exploration of the sea and space. He has previously served as the Head Engineer and Pilot at the Roatán Institute of Deepsea Exploration (RIDE) and has collaborated on a variety of projects with several other manned submersible groups. During his 8 years at RIDE, Thomas was responsible for numerous safety and mission critical improvements to Idabel (RIDE’s flagship submersible). In 2017, he designed and built custom scientific equipment used to collect biological samples for the Smithsonian Tropical Research Institute and University of Washington. To date, this streamlined system has enabled the scientists from STRI and UW to capture over 40 fish samples, 7 of which are new species, at a significantly lower cost than competitive systems. Thomas also leads several research efforts at Outside Innovation focused on improving the fundamental performance of deep sea submersibles.
Scott Waters is the president of the deep sea submarine Pisces VI. He has been involved with human occupied submersibles since 2008 and specializes in business and law. He also works in human space flight helping other countries start space programs. Scott’s main goal is to make submarines more available and more affordable to the general public.

Mr. Westerfield is the Director of Business Development for the AMETEK Subsea Connector Products (SCP) division.

He is responsible for securing new programs and introducing new products to undersea markets. He has secured new programs-of-record for missions such as mine hunting, counter measures, decoys, and towed arrays.

He served on a Congressional Advisory Committee for the 15th Congressional District and was an appointee to Economic Development Commission of East Central Florida. He currently serves as a Board member for the Bethune Cookman University Industry Advisory Committee for Engineering. He has a engineering degree from Auburn University.
MASANOBU YANAGITANI
Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)
2-15 Natsushima-cho
Yokosuka City, Kanagawa,
Japan 237-0061
Tel : +81-46-867-9914
Fax : +81-867-9215
E-mail : yanagitani@jamstec.go.jp
www.jamstec.go.jp

Mr. Masanobu Yanagitani is Senior Engineer of Marine Technology and Engineering Center in Japan Agency for Marine-
Earth Science and Technology (JAMSTEC). He is currently in charge of underwater vehicle engineering and operations for
JAMSTEC’s underwater vehicles in Marine technology Dept., and he had joined SHINKAI operations team as a pilot and
mechanic, so he has an experience 11 years in a field of a deep-sea research.
## 2019 MUV Company Directory

**ABS**  
American Bureau of Shipping  
Roy Thomas, Engineering Manager  
ABS Plaza, 16855 Northchase Drive  
Houston, Texas 77060 USA  
Tel: 1-281-877-5800  
Email: rthomas@eagle.org  
www.eagle.org

**Atlantis Submarines Int’l Inc.**  
John Witney, VP Engineering  
West 6th Avenue  
Vancouver, BC V5Y 1K8 Canada  
jwitney@atlantissubmarines.com  
www.atlantissubmarines.com

**ALS Marine**  
Spyridon Volonakis,  
Managing Director  
85 Vouliagmenis Ave Glyfada  
Athens, GR 16674, Greece  
Tel: +30 210 960 7077  
Email: svol@alsmarine.gr  
www.alsmarine.gr

**Batelle**  
Tim Rennick, P.E., Manager,  
Maritime Systems  
505 King Avenue  
Columbus, Ohio 43201, USA  
Tel: +1 614 424 5865  
Email: rennickt@battelle.org  
www.battelle.org

**M/V Alucia**  
Mark (Buck) Taylor  
Beta Maritime Ltd, 1 Glendinning Pl  
Westport, Connecticut 06880 USA  
Tel: +1 510 940 3416  
Email: subteam@mvalucia.com  
www.mvalucia.com

**Blanson Ltd.**  
Andy Turner, Managing Director  
Unit B, Coventry Road Narborough  
Leicester LE19 2GG UK  
Tel: +44 (0) 0116 286 7007  
Email: andy.turner@blanson.com  
www.blanson.com

**AMETEK Subsea Connector Products (SCP)**  
Charles Westerfield  
Director of Business Development  
52 Airport Road, Westerly, RI 02891  
Tel: 321-266-6658  
charles.westerfield@ametek.com  
www.ametek-ecp.com/about-us/scp

**Blue Marble Exploration LLC**  
Guillermo Sohnlein,  
Co-Founder & CEO  
310 Westbury Lane  
Alpharetta, GA 30005  
Tel: +1 (703) 346 3041  
guillermo@bluemapleexploration.com  
www.bluemapleexploration.com

**Aquatica Submarines Int’l Inc.**  
Harvey Flemming, President  
418, 1489 Marine Drive  
West Vancouver, B.C.,  
Canada, V7T 1B8  
Tel: 587 333 0620  
harvey@aquaticasubmarines.com  
www.aquaticasubmarines.com

**Blue Turtle Engineering**  
Lee Frey, President & Chief Engineer  
6430 Floridana Avenue  
Melbourne Beach, FL 32951 USA  
Tel: +1 321 917 1624  
lee@blueturtleengineering.com  
www.blueturtleengineering.com
Brownies Global Logistics
Robert Carmichael,
Director of Global Logistics
3005 NW 25th Avenue
Pompano Beach, FL 33069 USA
Tel: +1 954 299 8181
Email: robert@globalsubdive.com
www.globalsubdive.com

DNV - GL
Harald Pauli, Department for Pressure Vessels & Underwater Technology
Brooktorkai 18
20457 Hamburg, Germany
Tel: +46 40 36149 8925
Email: harald.pauli@dnvgl.com
www.dnvgl.com

Bulgarian Academy of Sciences
Institute of Oceanology
Iliya Shitirkov, Head of Research Submersible Department
PO Box 152 Varna 9000 Bulgaria
Tel: +359 52 370 483
Email: ilkoshtok@yahoo.com
www.io-bas.bg

DOER Marine
Lis Taylor, President
1827 Clement Ave.
Building 19, Alameda CA 94501 USA
Tel: +1 510 530 9388
Email: liz@doermarine.com
www.doermarine.com

Cayman Islands Shipping Registry
John Aune, Deputy Director
Global Operations and Services
133 Elgin Avenue, P.O. Box 2256
Grand Cayman KY1-1107
Cayman Islands
Tel: +1 345 949 8831
Email: john.aune@cishipping.com
www.cishipping.com

Evonik Cryo LLC
Britt Nordby, Strategic Markets Manager
299 Jefferson Road
Parsippany, NJ 07054 USA
Tel: +1 973 929 8200
Email: britt.nordby@evonik.com
www.evonik.com

China National Deep Sea Center
Feng Liu
# 6 Xianxialing Road
Qingdao P.R. China
Email: liufeng@comra.org
www.ndsc.org.cn

EYOS Expeditions Ltd.
Rob McCallum, Founding Partner
Kissack Court, 29 Parliament St.
Ramsey, Isle of Man, IM8 1AT,
Tel: +1 801 390 7025
Email: rob@eyos-expeditions.com
www.eyos-expeditions.com

China Ship Scientific Research Center
Ye Cong, Director Engineering
222 East Shanshui Road, Binhu District
Wuxi, Jiangsu 214082 P.R. China
Email: yec@vip.163.com
www.cssrc.com.cn

FAU Harbor Branch Oceanographic Institute
5600 US 1 North
Fort Pierce, FL 34946 USA
Tel: 772 466 9876
www.fau.edu/hboi

Deep Sub/Pentarius LLC
Chris Welsh, Sub Owner
PO Box 12723
Newport Beach, CA 92658, USA
Tel: +1 949 278 2012
Email: chris@deepsubllc.com
www.deepsubllc.com

FMS Engineering
Bret Faircloth, P.E.
2509 Commercial Park Drive
Mobile, AL 36606 USA
Tel: 251 450 2377
Email: bfaircloth@fmsengineering.com
www.fmsengineering.com
General Dynamics Electric Boat
Dan Gietzen
75 Eastern Point Road
Groton, CT 03640 USA
Tel: 860 433 3000
Email: dgeticnz@gdeb.com
www.gdeb.com

GOEMAR Helmholtz
Karen Hissmann,
Tauchboot-JAGO-Team
Zentrum fuer Ozeanforschung Kiel
Wischhofstr. 1-3, Geb.8D/134
24148 Kiel, Germany
Tel: +46 431 600 2253
Email: khissmann@geomar.de
www.geomar.de

Gryphon Media Strategies
Colleen Hahn, President & CEO
P.O. Box 1252
Middleburg, VA 20118 USA
Tel: 703 851 6944
Email: cmhahn@gryphonmediastrategies.com
www.gryphonmediastrategies.com

GSE Trieste
Giunio Santi
Piazza Bergamo, 18
24040 Ciserano BG, Italy
Tel : +39 035 882629
Email: info@gsetrieste.it
www.gsetrieste.it

Glenair Connectors
Lutz Mueller, Product Manager
1211 Air Way
Glendale, CA 91201-2497 USA
Tel: 818 247 6000
Email: lmueller@glenair.com
www.glenair.com

GSE Trieste
Giunio Santi
Piazza Bergamo, 18
24040 Ciserano BG, Italy
Tel : +39 035 882629
Email: info@gsetrieste.it
www.gsetrieste.it

Global Dynamix
Peter J. Fitzgerald, CEO
7 Sycamore Way, Unit 1
Branford, CT 06405 USA
Tel : 860 434 5997
Email : pfitzgerarld@gdynx.com
www.gdynx.com

Hawaii Undersea Research Laboratory (HURL)
Terry Kerby, Chief Pilot, Director of Submarine Operations
1000 Pope Road
Marine Science Building (MSB) 303
Honolulu, HI 96822 USA
Tel : 808 956 6335
Email : tkerby@hawaii.edu
www.soest.hawaii.edu

Hawx Open Ocean
Graham Hawkes
1122 Brickyard Cove Road #202
Point Richmond, CA 94801 USA
Tel: 415 497 4193
Email: graham@hawxopenocean.com
www.hawxopenocean.com

Global Ocean Design
Kevin Hardy
7955 Silverton Ave. Ste. 1208
San Diego, CA 92126 USA
Tel: 858 560 1799
Email: kevin@globaloceandesign.com
www.globaloceandesign.com

Hickey Underwater Vehicle Consulting LLC
Patrick Hickey
1061 Cobb Hill Road
Waterbury, Vermont 05676 USA
Tel: +1 802 272 7530
Email: jpatrickhickey@gmail.com
Heinz Fritz Kunststoffverarbeitung
Heinz Fritz
Gewerbestraße 11
DE-89542 Herbrechtingen, Germany
Tel:+ 49 7324 988 0
Email: info@heinz-fritz.de
www.heinz-fritz.de

Hellenic Center for Marine Research
Dimitris Sakellariou, Research Director
Geologist, Coordinator of Underwater Operations Department
19013 Anavyssos, Greece
Email: sakell@ath.hcmr.gr
www.hcmr.gr

Hoffman Marine
Pete Hoffman
2585 SE 12th Street
Pompano Beach, FL 33062 USA
Tel: (954) 943 2417
Email: pete@subdive.com
www.subdive.com

Hydrospace Group Inc.
William Kohnen, President/CEO
9559 Center Avenue, Ste.P
Rancho Cucamonga, CA 91730 USA
Tel : +1 909 989 7773
Email : wkohnen@hydrospacegroup.com
www.hydrospacegroup.com

ICTINEU Submarins SL
Carme Parareda, COO
Industria 12, 08980
St. Feliu de Llobregat, Spain
Tel: + 34 933 094 274
Email: cparareda@ictineu.net
www.ictineu.net

IFREMER. Underwater Systems
Viorel Ciausu, Director of Nautile Operations
Zone Portuaire de Brégaillon
83507 La Seyne sur Mer, France
Tel : +33 (0) 49430 4966
Email: viorel.ciausu@ifremer.fr
www.ifremer.fr

Innerspace Corporation
Omar Rafieh, Engineering Manager
1138 East Edna Place
Covina, CA 91724 USA
Tel: (626) 331 0921
Email: omar@innerspacethrusters.com
www.innerspacethrusters.com

International Maritime Inc.
Don Walsh
Myrtle Point, Oregon USA
Tel: +1 (541) 572 2313
Email: imiwalsh@mac.com

International Ocean Science & Technology Industry Association
Richard Lawson, Chief Executive Officer
712 H Street NE, Suite 1061
Washington, DC 20002
Tel : 202 389 9009
Email : rich.lawson@iostia.org
www.iostia.com

iXBlue
Oliver Cervantes, Vice President
34, rue de la Croix d’Eau
78100 Saint Germain in Laye France
Tel: +33 1 30 08 8888
Email: oliver.cervantes@ixblue.com
www.ixblue.com

James Fisher Defence
Ben Sharples, Technical Director
Cartside Avenue
Inchinnan Business Park
PA4 9RW, United Kingdom
Tel: +44 (0) 141 812 8700
Email: b.sharples@jfdefence.com
www.jfdefence.com

James Fisher Defence Sweden
Carl Hagman, Technical Director
Rindö Västra
185 41 Vaxholm, Sweden
Tel: +46 8 541 318 80
Email: carl.hagman@theseal.se
www.theseal.se
National Institute of Ocean Technology
Dr. M.A. Atmanand, Project Director
Velachery – Tambaram Road, Pallikaranai
Chennai 600, 100 India
Tel: +91 44 6678 3303
Email: atma@niot.res.in
www.niot.res.in

Nekton
Oliver Steeds, Mission Director
Tel: +44 7984 677509
Email: oliver@nektonmission.org
www.nektonmission.org

NOAA Office of Ocean Exploration and Research
Karen Kohanowich, Acting Director of the National Undersea Research Program.
1315 East West Highway, SSMC III, 10th Floor, Silver Spring, Maryland 20910 USA
Tel: (301) 734 1010
Email: karen.kohanowich@noaa.gov
www.explore.noaa.gov

Nuytco Research Ltd.
Phil Nuytten
216 East Esplanade,
North Vancouver, B.C. V7L 1A3, Canada
Tel: +1 (604) 980 6262
Email: nrl@nuytco.com
www.nuytco.com

Oceaneering Advanced Technologies
David Reid, Deputy Program Manager of Submarine Rescue Systems
7001 Dorsey Road
Hanover, Maryland 21076 USA
Tel : (443) 459 3700
Email : dreid@oceaneering.com
www.oceaneering.com

OceanGate Inc.
Stockton Rush, CEO
Craftsman Way, Suite 112
Everett, WA 98201 USA
Tel: +1 (425) 939 8409
Email: stockton@oceangate.com
www.oceangate.com

Pacific Subsea Saipan, Inc.
John F. (Jack) McClure, Vice President/COO
Lowerbase, Mangrove Place, Seaplane Ramp. PPP-672, PO Box 10000, Sapain, MP 96950 USA
Tel: 670 322 7734
Email: jack@saipansubmarine.com
www.saipansubmarine.com

Patriot Engineering Co.
Fred Jensen, Co-Founder
16937 Munn Road
Chagrin Falls, Ohio 44023
Tel: 1 440 543 3100
Email: jensen@patriotengineeringco.com
www.patriotengineeringco.com

Phoenix International Holdings
Wally Jones, SRDRS Maintenance Manager / PRM Pilot
P.O. Box 181110
Coronado, CA 92178 USA
Tel: (619) 545 6901
Email: wjones@phnx-international.com
www.phnx-international.com

PSUBS
Jon Wallace, Co-Founder
P.O. Box 53 Weare, NH .3281 USA
Tel: (603) 232 9157
Email: jon@psubs.org
www.psubs.org

Rainbowfish Ocean Technologies
Xin Wu, CEO
Rm. 1901-1905, No. 777 Hong Qiao Road,
Shanghai 200031, PR CHINA
Tel: 86 021 64 73 5205
Email: xin.wu@rainbowfish11000.com
www.rainbowfish11000.com
### State Marine Technical University, St. Petersburg
Kryll V. Rozhdestvensky, International Science & Education 3, Lotsmanskaya, Saint Petersburg, 190008 Russia  
Tel: +7 812 714 2923  
Email: kvrxmas@yahoo.com  
www.smtu.ru

### Teledyne Brown Engineering
Earl Presson, Director  
300 Sparkman Drive NW  
Huntsville, AL 35805 USA  
Tel: 256 726 1000  
Email: earl.presson@tbe.com  
www.tbe.com

### Sub Aviator Systems
Jay Wade  
336 36th Street, Suite #379  
Bellingham, WA 98225 USA  
Tel: +1 888 809 7948  
Email: info@subaviators.com  
www.subaviators.com

### Trelleborg Applied Technologies
Will Ricci, Business Development Manager  
58 Teed Drive  
Randolph MA 02368  
Tel: +1 774 444 5160  
Email: will.ricci@trelleborg.com

### Sub Mare Technologies
Fredrik Gerhardsson  
Sweden  
Tel: +46 491 760 217  
Email: cjf@submaretechnologies.com  
www.submaretechnologies.com

### Triton Submarines
Patrick Lahey, President  
9015 17th Place  
Vero Beach, Florida 32966 USA  
Tel: +1 772 770 1995  
Email: patrick@tritonsubs.com  
www.tritonsubs.com

### Submergence Group
Brett Phaneuf, President  
4 Water Street  
Chester, CT 06412 USA  
Tel: +860 526-4911  
brett@submergencegroup.com  
www.submergencegroup.com

### U – Boat Worx B.V.
Erik Hasselman  
Sales & Marketing Manager  
Oosterhoutseweg 77  
4816 KC Breda, The Netherlands  
Tel: +31 (0) 76 571 3096  
Email: e.hasselman@uboatworx.com  
www.uboatworx.com

### Tank Doctor Aquatic Systems
Mike Caudle, President  
209 Aerotech Drive, Unit #8  
B2T 1J4 Canada.  
Tel: (902) 873 3939  
Email: tankdoctor@msn.com

### Navy Experimental Diving Unit
William J. Marr, PhD  
321 Bullfinch Road  
Panama City, Florida 32407  
Tel: 850.230.3189  
Email: william.marr@navy.mil

### Thorsborg Institute, LLC
Captain Kip Peterson (USMM) CEO  
P.O. Box 2017  
Brunswick, Georgia 31521 USA  
Tel: 770 518 0704  
Email: KEP@thorsborg.com  
www.thorsborg.com

### Coast Guard Headquarters
James (Dan) Lawrence, Coast Guard Offshore Engineer CG-OES-2  
Vessel & Facility Operating Stds  
Tel: 202-372-1382
Undersea Hunter Group
Shmulik Blum
#SJO 314
P.O. Box 025331
Miami, FL 33102-5331 USA
shmulikbl@underseahunter.com
www.underseahunter.com

Vulcan Inc.
Robert Kraft, Director Subsea Operations
505 Fifth Ave S., Suite 900
Seattle, WA 98104
Tel: (206) 342 2000
Email: robk@vulcan.com
www.vulcan.com

Woods Hole Oceanographic Institution
Bruce Strickrott, Manager and Senior Submersible Pilot, DSV Alvin
266 Woods Hole Road,
Woods Hole, MA 02543-1050 USA
Tel: 508 289 2252
Email: strickrott@whoi.edu
www.whoi.edu

XPrize
Jyotika Virmani
Senior Director in Prize Operations
800 Corporate Pointe, Suite 350
Culver City, CA 90230 USA
Tel: +1 424 228 1945
Email: jyotika.virmani@xprize.org
www.xprize.org
Please Join us for the

**MTS MUV Cocktail Reception**

HILTON GARDEN INN – 5:50 to 7:30

5:30 – 7:30

JOIN US – Everyone are invited to the HILTON GARDEN INN Courtyard for Cocktails, Refreshments and catching up with the MUV colleagues and friends. All are invited. The Hotel is just across the street from the Convention Center, 1 block up.

**HILTON GARDEN INN COURTYARD - RECEPTION**
MARINE TECHNOLOGY SOCIETY

MANNED UNDERWATER VEHICLES COMMITTEE

Chair
William Kohnen
Hydrospace Group Inc
Tel: (951) 323-5377
wkohnen@hydrospacegroup.com

Treasurer
Kip Peterson
Thorsborg Institute, LLC
Tel: (770) 518-0704
KEP@Thorsborg.com

Secretary
Daniel Lance
Lance Industries
Tel: (609) 805-1644
lanceind@gmail.com

Committee Web Site: www.mtsmuv.org

MTS Website: www.mtsociety.org

SPONSORED BY:

www.mtsmuv.org