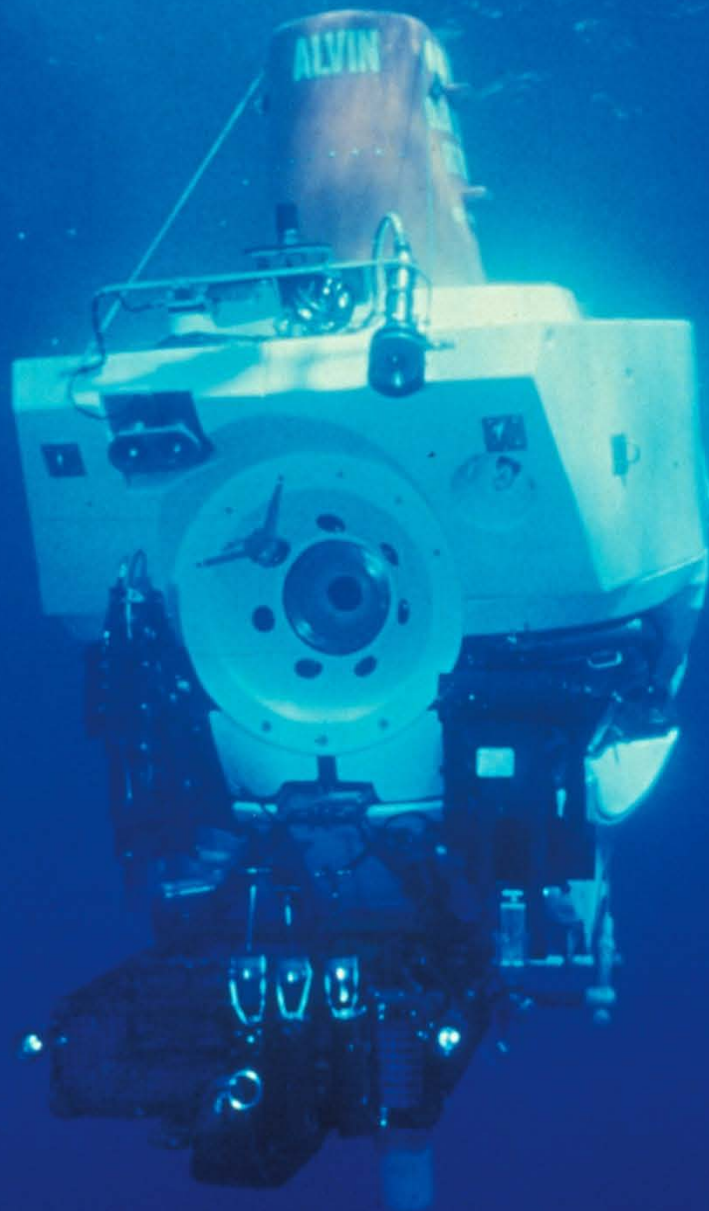


1964

2014

# DSV2 ALVIN – 50 YEARS

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MTS MUV Committee



## *Underwater Intervention Conference*

*NEW ORLEANS, USA, 11-13 FEBRUARY, 2014*

*www.underwaterintervention.com*

# 2014 MTS MUV SYMPOSIUM

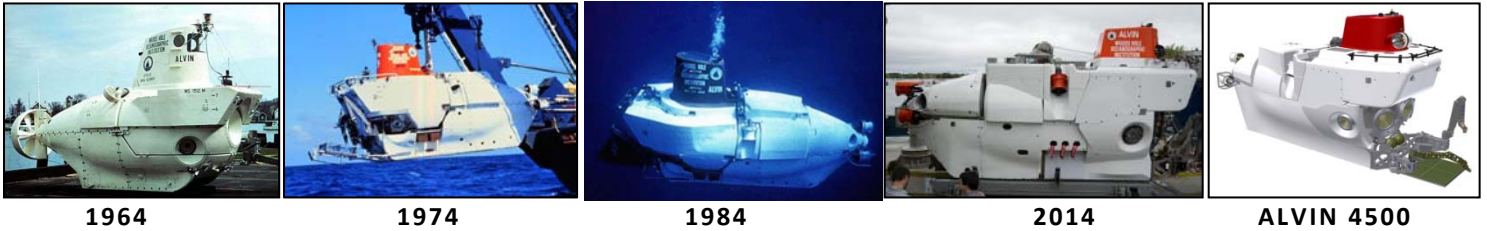
2014 MTS MUV Schedule

Adv UW Engr

ROOM	ROOM 230 DAY 1 - Feb 11, 2014	ROOM 230 DAY 2 - Feb 12, 2014	ROOM 230 DAY 3 - Feb 13, 2014	ROOM 228 DAY 2 - Feb 12, 2014
8:30 to 9:00	<b>World Overview of Manned Sub Activity in 2013</b> by: William Kohnen, Hydrospace Group MTS MUV, USA	<b>K-250 Sub for Undersea Voyager</b> By: Gregg Mikolasek Undersea Voyager, USA	<b>ABS Rule Change Proposals 2014</b> By: Roy Thomas American Bureau Shipping, USA	<b>Advanced Sonars for Subsea Hydrocarbon Detection</b> By: Peter Eriksen Norbit Group AS, USA
9:00 to 9:30	<b>Live Broadcasting from the Deep-Sea</b> By: Itaru Kawama JAMSTEC - Japan	<b>Design Fundamentals for ASME PVHO-1 Acrylic Windows</b> By: Bret Faircloth FMS Engineering, USA	<b>NUYTCO Field Operations and Activities for 2013</b> By: Jeff Heaton NUYTCO Research Ltd, Canada	<b>Hydrostatic Testing for HOV Applications</b> By: Matthew James Southwest Research Inst., USA
9:30 to 10:00	<b>Hawaii HURL Year in Review</b> By: Colin Wollerman HURL Hawaii, USA	<b>Manufacturing NEMO/Spherical Windows for PVHO</b> By: Guy Richards BLANSON Ltd., UK	<b>Overview of SEAmagine Sub Operations in 2013</b> By: Ian Sheard SEAmagine Hydrospace Corp., USA	<b>Lithium Ion Battery Consortium for HOV Applications</b> By: Bapi Surampudi Southwest Research Inst., USA
10:00 to 10:30	<b>BREAK</b>	<b>BREAK</b>	<b>BREAK</b>	<b>BREAK</b>
10:30 to 11:00	<b>Sea Trials ICTINEU3 Submersible</b> By: Carme Parareda, Pere Fores ICTINEU Submarins, Spain	<b>Impact of Culture on Behaviors and its Role in Communication</b> By: Jody Tangredi Aperian Global, USA	<b>Pressure Tolerant Subsea LH-ION Battery System</b> By: David White Southwest Electronic Energy, USA	<b>Fracture Mechanics Assessment Applied to HOV Hull Structures</b> By: Joseph Crouch Southwest Research Inst., USA
11:00 to 11:30	<b>ALVIN - 50 Years of Ocean Exploration</b> PANEL PRESENTATION  ORIGINAL DESIGN US NAVY CERTIFICATION DESSC USERS GROUP WHOI OPERATIONS NATL SCIENCE FOUNDATION	<b>Transaction Structuring in an Anti-Terrorism World</b> By: Kip Peterson Thorsborg Institute, USA	<b>Past Experience in Design, Fab and Testing of MUV power plants</b> By: Kevin Bowen San Diego CA, USA	<b>FEA of Acrylic Pressure Vessels for Human Occupancy</b> By: Stefan Delin Hydrospace Group, USA
11:30 to 12:00		<b>Life Lessons from an Acquisition Program Manager</b> By: Stephen Armstrong Mangerton LLC, USA	<b>Choosing the Right Business Model for Manned Subs</b> By: Rich Maurer AquaVenture WaterCrafts, USA	<b>Control Actuation Reliability for long duration UW Vehicle Missions</b> By: Jason Weiss Moog Defense, USA
12:00 to 1:30	<b>LUNCH</b>	<b>Panel Discussion: (12:15 to 1:15) CROSS-CULTURAL RELATIONS in International Business</b> Jody Tangredi, Aperian Global USA Robert Surma, DNV GL, GERMANY Robert Hennig, Moog Defense, USA Stephen Armstrong, Mangerton LLC	<b>LUNCH</b>	<b>LUNCH</b>
1:30 to 2:00	<b>INTERNATIONAL TRIBUTE TO ALVIN - 50 YEARS</b>  WHOI 50 YEARS - USA IFREMER, France JAMSTEC, Japan US NAVY, USA INTERNATIONAL	<b>Rebuild of the LULA 500 Submersible</b> By: Stockton Rush OceanGate Inc., USA	<b>MTS Manned Underwater Vehicle Committee</b>  1:30 to 3:00PM	<b>O2, CO2 and Endogenous Contaminants: Limits, Dependencies and Some Misconceptions</b>  By: Thomas C. Schmidt Lockheed-Martin, USA
2:00 to 2:30		<b>A New Paradigm in Manned Submersible Ownership</b> By: Jarl Stromer TRITON Submarines, USA	<b>ANNUAL MUV MEETING</b>	<b>OPEN DISCUSSION</b> Life Support System Regulations and Control Parameters for MUVs
2:30 to 3:00	<b>ALVIN 50th Anniversary CEREMONY</b> Marine Technology Society MUV	<b>New EXOSUIT ATM Dive System</b> By: Phil Nuytten NUYTCO Research Ltd, Canada		
3:00 to 3:30	<b>BREAK</b>	<b>BREAK</b>	<b>BREAK</b>	<b>BREAK</b>
3:30 to 4:00	<b>DEEPSEA Challenger – Next Steps</b> By: Anthony Tarantino WHOI, USA	<b>Modification and GL Classification of Diver Lock-Out Submersible, S301</b> By: Brett Phaneuf Submergence Group, USA		
4:00 to 4:30	<b>DEEPSEA Challenger - Mechanical Sys Review</b> By: Loral O'Hara WHOI, USA	<b>Review of Activity at DNV GL Americas</b> By: Jim Hierholzer, Harald Pauli DNV GL Americas, USA		
4:30 to 5:00	<b>DEEPSEA Challenger - Electrical Sys Review</b> By: Richard Sanger WHOI, USA	<b>2014 Overview NAVSEA Activity</b> By: Tommy Beals Naval Sea Systems Command, USA		
5:30 PM	<b>MTS Manned Submersible Reception</b> ALVIN 50th ANNIVERSARY - <b>Cocktail Party</b> MARRIOTT Hotel 2 Flr ATRIUM	<b>MTS Manned Submersible TOUR of ALVIN</b> - Visit the R/V ATLANTIS New Orleans AQUARIUM on CANAL Street		
7:30PM				

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*ALVIN Celebrates 50 years Deep Ocean Research*



February 11, 2014

**Welcome to 2014 MTS MUV SYMPOSIUM**

Dear Colleagues,

Last year's Manned Underwater Vehicles Program celebrated a decade's worth of meetings under the umbrella of the Underwater Intervention Conference. The speakers brought a combination of technology and exploration together in such a way that it seemed it would be hard to top that program. But I was wrong. There is always something to celebrate in the manned submersible industry. 2014 represents fifty years of operation for the American research submersible ALVIN, and we have assembled delegates from all over the world to discuss the milestones of the ALVIN from its inception, deployment, participation in international ventures and its many technical upgrades. Recently certified by the US Navy and ready for public inspection, our guest of honor is the ALVIN itself, docked in New Orleans and open for tours throughout the conference and through February.

There is no other Symposium that assembles the breadth of specialized knowledge you will find gathered here. We have overviews of industry activities, new product presentations, opinions, technical insight, knowledge, information and rare networking opportunities. By attending showcase of exhibitors on the show floor, a full technical program on ROVs, AUV's and Diving Systems at this conference you will leave with up to date information about the current status of anything happening in the Underwater arena.

The Manned Underwater Vehicles Symposium has a focus on the international. Our international overview starts on Tuesday, February 11th at 8:30 including presentations and panel discussions, cumulating with a reception and cocktail party in tribute to ALVIN at 5:30PM. The following day our international focus continues with a lunch panel discussion open to all tracks about business across cultures. Whether your business interactions are international or local, business-to-business differences can arise when negotiating across international, research, military and commercial mind-sets.

Thank you to our speakers for their time and presentations. Thank you for attending and for your participation. Thank you to our generous sponsors and thank you to Underwater Intervention for making this all possible.

Welcome to Underwater Intervention 2014. Cheers to ALVIN, to international ocean exploration, and the underwater ventures represented in our 11th MTS Manned Underwater Vehicles Program.



William Kohnen

Chair, Manned Underwater Vehicles

**Marine Technology Society**

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## ALVIN's 50th Anniversary RECEPTION

**Manned Underwater Vehicles**  
*Cocktail Reception*  
*Tuesday, February 11th*  
**Marriott Hotel 2nd Floor ATRIUM**  
*5:30 - 7:30 pm*

**DNV-GL**

**MTS**  
marine technology society

**ABS**  
FOUNDED 1862

*11th ANNUAL MTS MUV Program*

# Manned UW Vehicle PROGRAM

Day 1 Room 230- Tues.11 February

RM 230: TUE 8.30 – 9.00 William Kohnen, MTS Manned Underwater Vehicles, Chair



## World Overview of Manned Sub Activity in 2013

by: William Kohnen  
Hydrospace Group, USA  
Email: wkohnen@HydrospaceGroup.com

A yearly review of the state of the Manned Submersible industry in 2013. The overview will look at developments in all branches, including international research, tourism activity, leisure and security developments. The presentation covers the world of deep research submersibles, directions and trends in different countries. Commercial vehicles and new private developments as well as major news events are presented on behalf of many organizations that cannot attend the conference personally. The review also includes a summary of submersibles under Classification, operating and in construction, review of the industry trends and regulatory highlights for the year.

RM 230: TUE 9.00 – 9.30 Itaru Kawama, JAMSTEC, JAPAN

## Live Broadcasting from the Deep Sea

By: Itaru Kawama  
JAMSTEC (Japan Agency for Marine-Earth Science and Technology), Japan  
Email: itaru@jamstec.go.jp

DSV "Shinkai 6500" is conducting an Around-the-World research cruise with R/V "Yokosuka" from January to December in 2013. This big cruise was named "Quelle 2013" and has a variety of ocean target areas such as Indian Ocean, South Atlantic Ocean, and the Cayman Trench. On the way in this cruise, JAMSTEC organized an internet live broadcast from "Shinkai 6500" using a fiber-optic transmission system and a maritime communications satellite service. In this effort images from SHINKAI's TV cameras as well as from the cockpit were successfully transmitted. The broadcast was executed in real time, generating great interest from Japanese and international viewers, and achieving a positive public outreach demonstrating the forefront of deep-sea research. This presentation will introduce the overall logistics and technologies used in achieving this live broadcasting project.



RM 230: TUE 9.30 – 10.00 Colin Wollerman, Hawai'i Undersea Research Lab, USA



### Hawaii Undersea Research Lab Year in Review

By: Colin Wollerman  
HURL - Hawai'i Undersea Research Center, USA  
Email: wollerma@hawaii.edu

In an ever-more challenging budget environment HURL is embracing diversification and creativity to keep our submersible program alive. By reactivating the LRT 30 (Launch Recovery Transport) HURL has enabled an option for continued operation independent of our support ship, the KOK. Using this system we completed an impressive series of dives detailed in this presentation. HURL subs continue to operate on the Research Vessel KOK. Ambitions for an exciting 2014 operations plan will be outlined. At the Makai Range Testing Test Facility steps have been taken to make the submersible support facility at Makai Pier available for equipment testing and scientific studies. Some of these projects will be outlined along with a facility overview and future ambitions. The School Ocean Earth Science and Technology (SOEST) at University of Hawaii recently purchased an ROV system from DOER. HURL sub ops has committed to assist in the building of an ROV operations program that will complement the science carried out by Pisces IV and Pisces V. Overview of system and program integration.

10.00 – 10.30

## COFFEE BREAK

RM 230: TUE 10.30 – 11.00 Carme Parareda, ICTINEU Submarins SL, SPAIN



### Sea Trials and Testing of 1200M rated ICTINEU 3 Research Submersible

By: Carme Parareda, Pere-Forès  
ICTINEU Submarins SL, Spain  
Email: cparareda@ictineu.net

Ictineu Submarins SL was founded in 2007 to develop and built the ICTINEU 3: a scientific manned submersible, a work class vehicle with high capabilities for work, observation and intervention, also suitable for filming and leisure. It is designed for 1200 meters depth, and a crew of three: one pilot and two observers (passengers). Certified and classified by Germanischer Lloyd, the submersible completed final assembly in 2013 and began its initial water trials in Barcelona. The presentation will review the technical process it took to achieve the final integration of the pressure tolerant lithium battery system, propulsion system, and the near foam-less ballasting configuration to meet the requirements of GL Classification. An overview of the initial sea trials of the submersible cover the technical aspects of the dive testing as well as the administrative challenges encountered to obtain government permissions to perform manned submersible dives near the coastal waters of the Mediterranean, near Barcelona.

RM 230: TUE 11.00 – 12.00 US ALVIN Program – 50 Years of Ocean Exploration



**PANEL PRESENTATION 50 Years of  
Deep Ocean Research in USA**

**Part 1 - 1960s  
How ALVIN came to be**

Don Walsh International Maritime Inc. Email: imiwalsh@mac.com  
Jerry Henkener Southwest Research Institute Email: Jerry.henkener@swri.org



In the wake of the 1960 success of TRIESTE and valuable operations experience, the NAVY team in San Diego (Dr. Andy Rechnitzer, Larry Shumaker, Don Walsh and Bud Froelig from General Mill) sketched an unsolicited proposal for a small, more mobile submersible that would fit on a ship for easier long range transport. The long and arduous towing exercises of TRIESTE had made this benefit very clear. The delegation went to Office of Naval Research (ONR) in Washington to present the idea and found the timing was most auspicious. Since 1960, Charles Momsen, head of ONR, had encouraged scientists to lease a submersible with ONR funds. As negotiations were becoming difficult at Woods Holes working with Reynolds and ALUMINAUT, ONR saw an opportunity. The submersible concept was called Sea Pup, it could be purchased instead of leased and this started a whole new line of thinking. In 1962 Woods Hole and Al Vyne issued an official bid which General Mills won for \$472,517. This made ONR very happy, everyone had a new objective, Al Vyne championed the project through and ALVIN came into being. The presentation will start with a look at the early days.

**Part 2 – US Navy Deep Submergence Design and Certification**

Program Office  
Naval Sea Systems Command, USA  
Email: roger.schaffer@navy.mil



The US Navy and Office of Naval Research have worked since the very early days on the development of new deep submergence designs but also on the development of rules for certification. ALVIN is considered DSV2 and was originally designed to a maximum depth of 6000ft. Continued development produced the US Navy submersibles Turtle and Sea Cliff. The experience from these submersibles enabled the certification of ALVIN in 1976 to 13,124ft and then again in 1994 to 14,764ft (4500m) but the US Navy data and experience played a central part in the design and certification of the new ALVIN personnel sphere upgrade to 6500m in 2013. The commitment of the US Navy and ONR to maintain design and certification expertise active over 50 years and many generations of engineers represents a significant contribution to the continued success of ALVIN as well as the US national capability.



**Part 3 – Perspective from the US Research Community and Users**

Peter R. Girguis  
Deep Submergence Science Committee (DESSC), USA  
Email: pgirguis@oeb.harvard.edu

The capabilities of ALVIN were well matched by the imagination of a vast community of deep ocean researchers. They implemented a wide range of research expeditions

that have led to several discoveries over the fifty years of ALVIN. The presentation reviews the importance of research orchestration and user coordination to produce a cohesive scientific base that is effective, and sustainable. The US model has shown to be extremely versatile and resilient in the face of many agency changes.

## **Part 4 – The Technology of ALVIN and the Art of DSV Operations**

Patrick Hickey

Woods Hole Oceanographic Institution, USA

Email: [jhickey@whoi.edu](mailto:jhickey@whoi.edu)



The presentation will review the operational capabilities and significant developments at Woods Holes over the 50 years as ALVIN morphed from a 6000ft rated submersible to its present pressure hull rating of 6500m. The upgrades include installation of a new, larger personnel sphere with improved interior ergonomics; five viewports (instead of the previous three) to provide overlapping fields of view; new lighting and high-definition imaging systems; new syntactic foam for buoyancy and an improved command-and-control system. The impact of the operations team, training, maintenance and repair facilities in the success of deep ocean research is presented.



## **Part 5 – ALVIN’s New Future for US Deep Ocean Research**

Brian Midson

National Science Foundation, USA

Email: [bmidson@nsf.gov](mailto:bmidson@nsf.gov)

The future of US Deep ocean research and human exploration is driven by and has benefitted from the vision of a broad community of visionary scientists guiding national policy and directives. The success of ALVIN is not in small part a result of careful and disciplined planning many years ahead. The presentation gives an overview of the National directives that helped ALVIN over the years and a look over the horizon to the new challenges and directives that will guide the deep research for the next generation.

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12.00 – 1.30

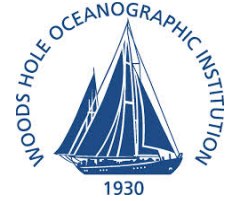
LUNCH BREAK

RM 230: TUE 1.30 – 2.30 PANEL PRESENTATION - International Tribute to ALVIN



**WOODS HOLE OCEANOGRAPHIC INST  
– 50 Years of ALVIN**

By: William Strickrott  
Woods Hole Oceanographic Institution, USA  
Email: strickrott@whoi.edu



The ALVIN program at Woods Hole covers a rich history of scientific accomplishments and oceanographic discoveries. It also captures 50 years of exploration, historic events and opportunities to work with international organizations all aiming to learn more about the deep oceans and its many mysteries. From the early challenges to the discoveries of black smokers, discovery of the RMS Titanic and the numerous joint expeditions, Woods Hole is proud of its public and international outreach. The new endeavors with the New ALVIN continue in that tradition and will surely enable a new generation to push the limits of knowledge into the future.



**FRANCE: IFREMER and WHOI  
– 50 Years of ALVIN, 30 Years of NAUTILE**

By: Viorel Ciasu  
IFREMER (Institut Français pour l'Exploitation de la Mer)  
Email: Viorel.Ciasu@ifremer.fr



France has a long history in manned submersibles, paralleling TRIESTE, J.Y. Cousteau and his Diving Saucer and many more early developments. DSV NAUTILE was launched in December 1984, engaged in 137 campaigns and 1850 dives. The long standing relationship between IFREMER and WHOI has transcended multiple science generations. ALVIN clearly changed the paradigm of deep diving and the success of the concept was clearly evident in the performance of NAUTILE, designed in its origin to a depth of 6000m. ALVIN led the way and in one form or another, influenced the entire world.



**JAPAN: JAMSTEC and WHOI  
– 24 Years of SHINKAI Research**

By: Shozo Tashiro, JAMSTEC  
Japan Agency for Marine-Earth Science and Technology  
Email: Tashiro@jamstec.go.jp



Japan has a long history of manned underwater vehicle research, dating back to the early 1960's and the Kuroshiho. JAMSTEC continues a long tradition of deep ocean research that led from Shinkai 2000 to Shinkai 6500, for many years the deepest submersible in the world. Over its 50 years of Ocean Research, JAMSTEC and WHOI have benefitted from a long cooperative relationship. JAMSTEC continues to forge with its national deep ocean directives and sees a full ocean depth capable vehicle in the future.

**Recognition and Tributes from International Partners:**



**RUSSIA: P.P Shirshov Institute Oceanology**

By: Anatoly Sagalevich, Director  
MIR-1 & MIR-2 Submersibles



**CHINA: National Deep Sea Center**

By: Liu Feng, Director  
JIAOLONG Submersible



**GERMANY: GEOMAR Institute**

By: Karen Hissmann, Director  
JAGO Submersible



**GREECE: Hellenic Center for Marine Res.**

By: D. Sakellariou, Dir. Underwater Activities  
THETIS Submersible



**BULGARIA: Institute of Oceanology, BAS**

By: Iliya Shtirkov, Director  
PC8B Submersible



**USCG: United States Coast Guard**

By: Kenneth A. Smith  
Assistant Division Chief, USCG



**NOAA: National Oceanic & Atm. Adm.**

By: Craig McLean  
Deputy Assistant Administrator for Research

**DEEPSEA Challenger Team**

By: James Cameron  
DEEPSEA Challenger Submersible



**USA: Southwest Research Institute**

By: Joseph E Crouch  
ALVIN RHOV Hull Program



**USA: Lockheed-Martin Corp.**

By: Dan McLeod  
Director, Defense & Space

**RM 230: TUE 2.30 – 3.00 MARINE TECHNOLOGY SOCIETY – ALVIN Recognition**

**ALVIN 50th ANNIVERSARY CELEBRATION PRESENTATION**

By: Drew Michel, MTS President  
William Kohnen, MUV Committee Chair

To: Susan Avery, Director  
Woods Hole Oceanographic Inst., USA

The Marine Technology Society and the Manned Underwater Vehicles committee will present, on behalf of all its members and international delegations at the Symposium, a commemorative plaque in recognition of the unique achievement of the ALVIN program and the success of the US Deep Ocean Research program.

ALVIN  
**50th**  
Anniversary



3.00 – 3.30

COFFEE BREAK

RM 230: TUE 3.30 – 4.00

Anthony Tarantino, Woods Hole Oceanographic Inst., USA

**DeepSea Challenger – Next Steps for Jim Cameron’s Extreme Vehicle**

By: Anthony Tarantino, Program Mgr.  
Woods Hole Oceanographic Inst., USA  
Email: atarantino@whoi.edu



The Woods Hole Oceanographic Institution (WHOI) is teaming up with James Cameron and his DEEPSEA Challenger (DSC) team to identify and document the lessons learned from the historic project. The teams hope to identify innovations and techniques that can benefit the scientific and technical community at large, and be applied to current and future projects. WHOI has assembled a team of engineers that have designed, built and operated vehicles such as Sentry, Nereus and Alvin to work with the Cameron team to study the vehicle and harvest its technology. This presentation will discuss the structure of the project, update its progress and discuss how the information was/will be made accessible to the community.

RM 230: TUE 4.00 – 4.30

Loral O’Hara, Woods Hole Oceanographic Inst., USA

**DeepSea Challenger II– Enabling Technologies in Mechanical Systems**

By: Loral O’Hara, Mech. Engr  
Woods Hole Oceanographic Inst., USA  
Email: Lohara@whoi.edu



The Woods Hole Oceanographic Institution (WHOI) recently received ownership of James Cameron’s DeepSea Challenger (DSC), the submersible he piloted in 2012 to the deepest known point on our planet. WHOI is reviewing the vehicle system and associated documentation to identify and publish information outlining key innovative technologies. This talk will discuss the technical challenges the DSC team overcame in regards to the vehicle configuration and mechanical systems. Notably, the DeepSea Challenger’s unique vertical configuration, and the development of structural syntactic foam (Isofloat®) by Ron Allum Deepsea Systems. Potential future applications will be also discussed.

RM 230: TUE 4.30 – 5.00    Richard Sanger, Woods Hole Oceanographic Inst., USA

**DEEPSEA Challenger III - Electrical System Architecture**

by: Richard Sanger  
 Woods Hole Oceanographic Inst., USA  
 Email: Rsanger@whoi.edu



The DeepSea Challenger (DSC) design team developed techniques and technologies in their electrical and control system that enabled them to reach the deepest trenches in the ocean without having to rely heavily on 1 atmosphere pressure housings. These are often expensive, heavy, and bulky, and carry with them the added risk of implosion. The team instead opted to design much of their electrical systems to be pressure tolerant, in oil compensated volumes, of pressures up to 20,000 psi (or 12,000m). This includes the vehicle's lithium ion battery packs. A vehicle control network (VCN) is used to monitor and control battery banks, and controls lights, thrusters and hydraulic functions on the vehicle. Presented will be findings on these systems resulting from our review of documentation, and a controlled disassembly and reassembly of DeepSea Challenger.

**5:30 – 7:00                      MTS Manned Submersible RECEPTION**

**COME and JOIN US – Complimentary Beer & Wine**

**ALVIN's 50<sup>th</sup> ANNIVERSARY CELEBRATION**

**WHERE: MARRIOTT HOTEL 2<sup>nd</sup> FLOOR ATRIUM**  
**WHEN: 5:30-7:30PM**

*Sponsored by:*



# Manned UW Vehicle PROGRAM

Day 2 Room 230- Wed.12 February

RM 230: WED 8.30 – 9.00 Gregg Mikolasek, Undersea Voyager Project, USA



## A K-250 Like No Other: Re-purposing of a Discarded P-sub into the Iconic Research Tool of the Undersea Voyager Project

by: Gregg Mikolasek

Undersea Voyager Project, USA

Email: [gregg@underseavoyagerproject.org](mailto:gregg@underseavoyagerproject.org)

The evolution of “The Great White,” from rusting orange hulk on a trailer, to a 400ft capable 2 person research platform, has been an eight year process accomplished almost exclusively with personal donations of time, money and engineering expertise. Virtually all parts aside from the original pressure hull were fabricated on a homebuilt CNC machine. The Great White could serve as the submersible poster child of what can be accomplished on a limited budget with the appropriate addition of perseverance, dedication and a few wonderful sponsors. This talk will focus on the re-engineering of this K-250, missions accomplished in 2013 and plans for the coming year, including planned upgrades. The Undersea Voyager Project is a CA based 501(c)3 organization whose mission is to advance scientific knowledge and understanding of the Oceans current condition, mankind's influence upon it and communicate our findings to a global audience.

RM 230: WED 9.00 – 9.30 Bret Faircloth, FMS Engineering, USA

## Design Fundamentals for ASME PVHO-1

### Acrylic Viewport Windows

by: Bret Faircloth

FMS Engineering LLC, USA

Email: [bfaircloth@fmsengineering.com](mailto:bfaircloth@fmsengineering.com)

For those individuals who are not familiar with the design of acrylic viewport windows or for those who would like a review, this presentation will cover the basic design principles for acrylic viewport windows in accordance with the ASME PVHO-1 Safety Standard for Pressure Vessels for Human Occupancy. Items to be covered include: standard window geometry, design limitations, tolerances, clearance criteria and example calculations. The presentation includes an explanation of all different certification documents needed to certify a window in accordance with ASME PVHO-1 rules, which includes the Design Certification, Fabrication Certificates, Material Certificates, Material Testing Certification and the Hydrostatic Testing certification. A brief review of the ASME PVHO rules for the service of windows in operation will also be touched on, to explain the rules as it applies to the repair and inspection of existing windows.



RM 230: WED 9.30 – 10.00 Guy Richards, Blanson Ltd, UK



**The Challenge of Manufacturing, Maintaining and Inspecting Acrylic NEMO/Spherical Windows and Satisfying PVHO, the Customer and Classification Society.**

by: Guy Richards  
Blanson Ltd., UK

Email: [guy.richards@blanson.com](mailto:guy.richards@blanson.com)

The manufacture of large, custom acrylic windows for submersibles is a classic niche market, requiring a significant depth of understanding of polymer chemistry, acrylic properties, Standards, casting, machining, polishing, bonding, QA and annealing; all of which are required to produce a window of quality that meets the needs and expectations of customers and classification societies. In addition detailed guidance

is provided to assist the customer in the daily and more detailed window inspection and maintenance requirements over its lifetime in use.

10.00 – 10.30

COFFEE BREAK

RM 230: WED 10.30 – 11.00 Jody Tangredi, Cross Cultural Consulting, USA

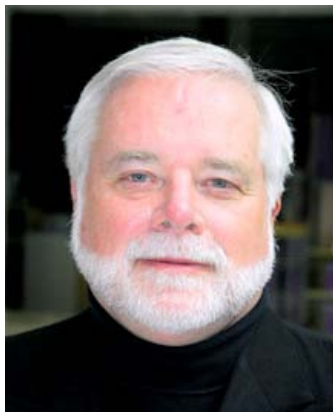
**Impact of Culture on Behaviors and Awareness of its Role in Communication and Negotiation**

by: Jody Tangredi, Project Manager  
Global Learning & Development, Aperian Global, USA  
Email: [jtangredi@aperianglobal.com](mailto:jtangredi@aperianglobal.com)

“People are all the same.” “Culture doesn’t matter, business is business.” These are commonplace sayings or thoughts as one prepares to do business with international counterparts. However, as business dealings on a global scale increase, so does the volume of lost business opportunity due to a lack of awareness about the impact of culture. In the past two decades, the study of cross-cultural working relationships and management styles has flourished in response to an increase in lost contracts, failed joint ventures, and unsuccessful mergers and acquisitions as global business interactions rise. Being aware of the impact of culture on our behaviors, and particularly on the interpretation of those behaviors, is key to negotiating effectively across cultures and borders. Research shows that investing time into raising awareness of the role that culture plays in communicating and negotiating improves outcomes. Ignoring, not seeing, or minimizing the impact of culture in business can lead to underperformance, a sudden end to a business relationship, or poorly managed projects. This presentation will review and highlight some of the more common sources of cultural differences that impact the ability to communicate and negotiate effectively.



**RM 230: WED 11.00—11.30 Kip Peterson, Thorsborg Institute, USA**



**International Business – Transaction Structuring  
in an Anti-Terrorism World**

by: Kip Peterson  
Thorsborg Institute, USA  
Email: [kep@thorsborg.com](mailto:kep@thorsborg.com)

Global transactions have always been risky...many plans have been devised to minimize the risk, but most have resulted in a false of security for the participants. Problems that were unheard in prior times now have the opportunity to influence not only financial concerns, but could include personal criminal indictments because of political actions that may not be publically known, yet are very real and enforced. The MUV community is by its nature international business people who are used to governmental scrutiny and oversight, but continued cultural/legal/financial scrutiny needs to be expanded as operations and purchases of components may run afoul of many new obscure laws. As WikiLeaks has so publically shown, the whole world is watching and listening, so “skimming along the edges of legality” could be considerably more risky. This is a discussion of creating a compliance process that while not 100% foolproof could be a useful management tool in changing environments.

**RM 230: WED 11.30—12.00 Stephen Armstrong, Mangerton LLC, USA**

**Military Culture - Life Lessons from an Acquisition Program Manger**

by: Stephen Armstrong  
Mangerton LLC, USA  
Email: [mangertonllc@gmail.com](mailto:mangertonllc@gmail.com)

The U. S. Department of Defense’s (DoD’s) system of developing, producing and fielding new systems has been called the “World’s Most Complicated Technical Process”. However, the principals that underpin the system can be very simple and surprisingly obvious. While some principals are codified in complex written doctrine, many are unwritten and can only be learned through years of hard work, kind of like Zen. This paper lays out these program manager life lessons gathered over 30 years of maritime systems development and operation in industry and DoD.



12.15 – 1.15

**LUNCH AND PANEL DISCUSSION**  
**Cross Cultural Relations in International Business**  
**MARKET SHOWCASE – UI MAIN FLOOR**

## UI MAIN FLOOR – MARKET SHOWCASE

WED 12.15 – 1.15

### -Cross Cultural Relations - Panel Discussion

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#### **Impact of Culture on Behaviors and Awareness of its Role in Communication and Negotiation**

by: Jody Tangredi, Project Manager  
Global Learning & Development, Aperian Global, USA  
Email: jtangredi@aperianglobal.com

Jody C. Tangredi is an independent consultant, trainer, and coach specializing in the development of global mobility and talent, intercultural competence and communication skills. She currently consults with one of the top US-based global talent development and cross-cultural training firms, delivering services to clients globally. Her experience includes work with multinational corporations, US and Canadian universities, relocation support services for the US Navy, diplomatic personnel and NATO. She worked for several years in Japan in an executive international human resource capacity, managing a global workforce supplying language and cultural skills training for Fortune 500 Japanese multinational clients.

#### **Cultural Considerations in Worldwide Classification and Certification Activities**

By: Robert Surma, Vice President, Materials & Products  
Germanischer Lloyd SE, GERMANY  
Email: robert.surma@dnvgl.com

Dr. Robert Surma is Vice President of Germanischer Lloyd Materials and Products group. Worldwide classification and certification activities require a high degree of understanding for different cultures. At DNV GL more or less 10 different Country Clusters from Confucian Asia to Latin America are served. Having in mind that customers act in a specific way related to their own culture allows behaving in a respectful and appropriate manner. As an example, decisions in Confucian Asia will be made by persons who have the strength by their status and position to act independently, while the western culture (Canada, USA, England, etc.) believe in being participative and sensitive to people and their opinions is highly valued. Beside such academic views a short comparison of having dinner in the US and China will make some differences tangible.



#### **Multi-Cultural Experiences Selling Military Diving Equipment**

Robert Hennig, Sales Manager  
Moog Naval Systems, USA  
Email: rhennig@moog.com

From 1994 - 2001 Bob Hennig was the Worldwide International Sales Manager for Carleton Technologies Inc selling Underwater Rebreathers used for Military Mine Counter-measure and Special Forces Missions. He will share his multi-cultural experiences dealing with various countries such as the United Kingdom, Malaysia, Thailand, and Australia. Mr. Hennig is responsible for worldwide business development for Moog Space and Defense Group's

Naval Systems business unit. Moog Naval Systems designs and manufactures high performance electrohydraulic, electrohydrostatic, and electromechanical motion control devices and control electronics for submarines, aircraft carriers, surface ships, and unmanned underwater vehicles.

**Military Culture - Life Lessons from an Acquisition Program Manger**

by: Stephen Armstrong  
Mangerton LLC, USA  
Email: mangertonllc@gmail.com



Stephen Armstrong was a plank-holder at Headquarters, US Special Operations Command (HQ USSOCOM) as an Acquisition Program Manager and Science & Technology Manager. His assignments were as the first Program Manager, Undersea Systems; Deputy Program Executive Officer, Naval Systems; Project Manager for Special Air Mobility Systems; Deputy Program Manager (DPM) for various offshore and riverine combatant craft; and the first USSOCOM Navy Science Advisor. Prior to arriving at USSOCOM he served as the first project engineer for the Advanced SEAL Delivery System program at Naval Coastal Systems Center, Panama City; and as a test director at the Navy's Operation Test and Evaluation Force. Mr. Armstrong's maritime operations assignments include Military Sealift Command Liaison Officer to the Commander, US Pacific Fleet (OEF/OIF); Director, Military Sealift Command Liaison Office at U.S. Central Command (OEF/OIF); Commanding Officer, Military Sealift Command Office, United Arab Emirates (ODS). He retired as a Captain in 2008 after 30 years of active and reserve service.

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**1.15 – 1.30 LUNCH**

**RM 230: WED 1.30—2.00 Stockton Rush, OceanGate Inc., USA**

**Review of the Rebuild of the LULA 500 submersible**

by: Stockton Rush  
OceanGate, USA  
Email: Stockton@opentheoceans.com

First constructed in 2000, and in ABS layup status since 2010, the 3 person Lula 500 submersible was acquired in the Azores by OceanGate in November 2012. After a complete review of all the existing systems conducted in March and April 2013, a major refit/rework was begun in earnest in July 2013. OceanGate's first untethered dive of Lula occurred on November 5th, 2013. On November 8th Lula was cleared to begin a series of Office of Naval Research equipment testing dives under a contract with the Applied Physics Laboratory at the University of Washington scheduled for late November, 2013. The extensive changes made to the vehicle to transform her from a complicated research submersible to an effective equipment test platform will be discussed. Also presented will be OceanGate's plans to incorporate Lula's pressure vessel with new upgraded systems and technologies in a full scale working 500 meter capable prototype of the recently announced Cyclops 3000 meter submersible.



**RM 230: WED 2.00—2.30 Jarl Stromer, TRITON Submarines, USA**



**A New Paradigm in Manned Submersible Ownership**

by: Jarl Stromer, Patrick Lahey  
TRITON Submarines, USA  
Email: jarl@tritonsubs.com

Manned submersibles have historically been owned and operated by oceanographic institutions or diving contractors. The 1980's saw the emergence of private companies owning and operating submersibles in the tourism industry. Yet another paradigm shift in submersible ownership is happening right now: private individuals are owning state-of-the-art submersibles for their personal use. Furthermore, these individuals are making their submersibles available to the scientific community and film makers, who might otherwise not have the resources to operate their own dedicated submersibles. This access to the deep ocean is opening up a new era of exploration and a renewed awareness of the vital importance of the earth's oceans as part of the earth's ecosystem.

**RM 230: WED 2.30—3.00 Phil Nuytten, NUYTCO Research Ltd., CANADA**

**Testing & Delivery of the New EXOSUIT Atmospheric Dive System**

by: Phil Nuytten  
Nuytco Research Ltd, CANADA  
Email: nrl@nuytco.com

Nuytco Research is a world leader in the design and fabrication of Manned Submersibles and Atmospheric Diving Suits (ADS). Dr. Phil Nuytten and his Company Nuytco Research, have spent the last several years finalizing the design of their latest Exosuit, 1000 FSW rated ADS. In 2013, Nuytco completed and delivered the first in the line of many Exosuits, the remainder scheduled for delivery through 2016. In addition Nuytco entered into a multi stage contract with the US Navy for advanced ADS systems design and has been working with JM Cousteau to develop Exosuit as a science and research platform. Through a video presentation, Dr. Nuytten will describe the latest developments with Exosuit and ADS technology.



3.00 – 3.30

COFFEE BREAK

RM 230: WED 3.30—4.00    **Brett Phaneuf, Submergence Group, USA**



**The Modification and Retroactive GL Classification of the Diver Lock-Out Submersible, S301**

by: Brett Phaneuf  
 Submergence Group, USA  
 Email: brett@submergencegroup.com

The team of Lockheed Martin and Submergence Group achieved a significant milestone In July and August of this year. Off the coast of South Florida, the manned submersible (diver lockout capable) S301i made a series of test dives leading to classification of the submersible by Germanischer Lloyd (GL). The classification of the S301i, built by Submergence Group in conjunction with MSubs and upgraded with help from Lockheed Martin, is significant in that the classification occurred after the submersible had been designed, built, and operated for a number of years. The ability to transport personnel in a dry environment and allowing the divers to lock-in and lock-out to conduct missions is a unique feature of the submersible. Testing was conducted out of the same facilities where the legacy Perry Submarines built and tested its manned submersibles in the 1970s and 80s prior to becoming part of Lockheed Martin.

RM 230: WED 4.00—4.30    **Jim Hierholzer, DNV GL Americas, USA**

**Recent Activity at DNV GL Americas - Department of Pressure and Underwater Technology**

by: Jim Hierholzer, Harald Pauli  
 DNV GL Americas, USA  
 Email: james-paul.hierholzer@gl-group.com

In September 2013 Det Norske Veritas (DNV) and Germanischer Lloyd (GL) merged, combining operations worldwide to form a technical powerhouse in the field of Underwater Technology, amongst other things. Built on competition in the marketplace, the merger resulted in one of the largest certification, verification, and classification entities on the planet. This presentation will highlight several projects during 2013 and extending into 2014 administered out of our Americas Regional Operations Centre located in Houston Texas, and our Global Headquarters in Hamburg Germany.



***Become MTS MUV Member***

[www.mtsociety.org/membership/new/add.aspx](http://www.mtsociety.org/membership/new/add.aspx)

RM 230: WED 4.30—5.00 Tommy Beals, NAVSEA, USA



**Overview & New Developments of NAVSEA Regulations for 2014**

by: Tommy Beals, PMS399 - Special Operations Forces (SOF)  
Undersea Mobility Program Management Office  
Naval Sea Systems Command, USA  
Email: tommy.beals@navy.mil

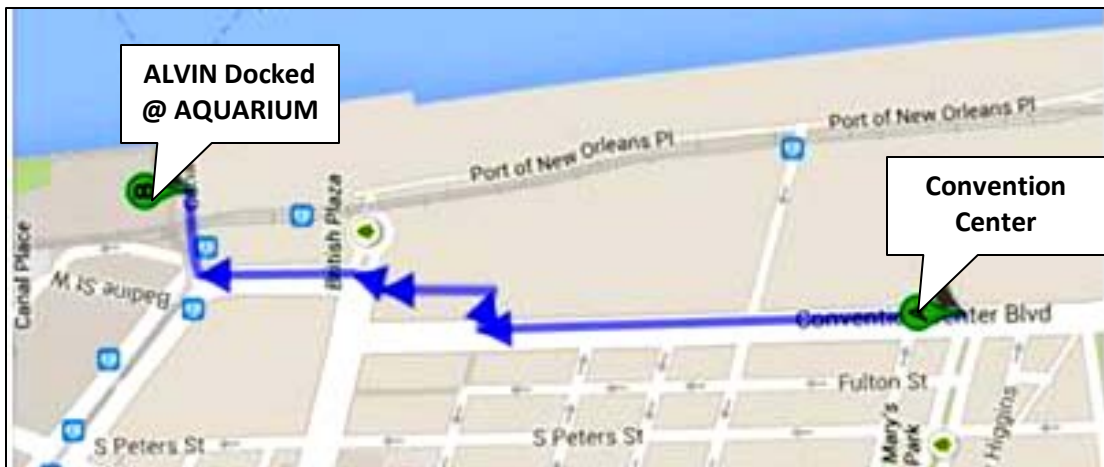
During 2013, NAVSEA issued its certification for the new overhaul of DSV ALVIN. The diver delivery submersible S301 was also certified to GL class and as part of that commercial classification process, NAVSEA worked concurrently with Submergence Group and Lockheed Martin to generate a database of 46 hazards, outside the scope of commercial classification, for which it worked to reduce the contingent risk to an acceptable level. Following an extensive hazard risk analysis, NAVSEA agreed to recommend SOF embarkment of Navy personnel on a commercial vehicle. NAVSEA also announced that it will be approving a Phosphate-Manganese based lithium battery working with General Atomics to produce a higher density power source for manned submersibles. NAVSEA is also in the process of undertaking a complete review of P9290 in an effort to make it more industry friendly. The presentation will give an overview of the many developments taking place at NAVSEA and present an overview of things to come in 2014..

**5:30 – 7:00 MTS MUV Group TOUR of DSV ALVIN**

**COME and JOIN US**

***TOUR the RV ATLANTIS and New ALVIN Submersible***

**WHERE: R/V ATLANTIS, docked at:  
AUDUBON Aquarium of the Americas  
Canal Street, New Orleans LA 70130**



# Advanced Underwater Engr PROGRAM

Day 2 Room 228- Wed.12 February

RM 228: WED 8.30 – 9.00 Peter Eriksen, Norbit Group AS, USA



## Advanced Sonar Technology for Subsea Hydrocarbon Detection

by: Peter Eriksen  
Norbit Group AS, USA  
Email: pke@norbit.no

The presentation will describe recent sea trial results conducted with a major oil company; focus of the sea trials is to demonstrate acoustic sonars detection capabilities against hydro carbon leakages both in fluid and gas form. Several modified COTS based sonars in various configurations were used during the trials, sonars were bottom mounted on a tripod on the seafloor with abilities to perform both 2 dimensional as well as 3 dimensional measurements of simulated hydro carbon target in open sea. This paper will discuss realistic active acoustic sonar performances against very small leakages, also the paper will demonstrated some results of the build in automatic leakage detection real time processing. This paper also shows examples of 3 Dimensional visualization of the plume structure that provide valuable leakage mechanisms for further enhancements of false alarm processing.

RM 228: WED 9.00 – 9.30 Matthew James, Southwest Research Institute, USA

## Hydrostatic Testing for HOV Applications

by: Matthew James, Jerry Henkener  
Southwest Research Inst., USA  
Email: matt.james@swri.org

This advanced engineering presentation offer a detailed view into hydro testing subtleties and includes a discussion of the following: (1) Requirements - ASME B&PV Code, ASME PVHO, ABS, NAVSEA, GL, DNV, (2) Benefits - Seal integrity, Structural Integrity, Validation of FEA Strain and Buckling Predictions, Structural Shakedown and Relieving of Residual Stresses, Validation of Acceptable or no Creep, and (3) Special Testing Features – Strain, Deflections, Remote Operations, Unique Environments. The presentation will provide specific examples of projects and provide conclusions and recommendations.



RM 228: WED 9.30 – 10.00 Bapi Surampudi, Southwest Research Institute, USA



**Lithium Ion battery Consortium for HOV Applications**

by: Bapi Surampudi, Marshall Sharp  
Southwest Research Inst., USA  
Email: bapiraju.surampudi@swri.org

The presentation is to introduce the manned submersible industry to the concept of a consortium to address Li-Ion battery requirements and a third party laboratory where meeting the requirements can be validated as is presently done for automotive Li-Ion Batteries. The presentation includes discussion of (1) Reference to Subsea HOV Guidelines (NAVSEA, ABS, GL, etc.), (2) Reference to Commercial Requirements, (3) Reference to Automotive (Land-Based HOV) Battery requirements (US Dept of Transportation, SAE 2464), (4) Potential need for Consortium for Subsea HOV Batteries, and (5) Li-Ion Battery Testing. Discussion includes testing of: Battery Cells, Battery Packs, Fire, Puncture, Impact, Hazardous Gas, Short Circuit and need for pressure testing for subsea HOV applications.

10.00 – 10.30 COFFEE BREAK

RM 228: WED 10.30 – 11.00 Joseph Crouch, SouthWest Research Institute, USA

**Fracture Mechanics Assessment Applied to HOV Hull Structures**

by: Joseph E. Crouch  
Southwest Research Inst., USA  
Email: jcrouch@swri.org

The fatigue life is a key design consideration that affects the service life and inspection interval of an HOV pressure hull. Often during design the life is calculated using a strain-life approach to determine the permissible number of cycles before crack initiation is a concern. When this life is exhausted a fracture mechanics damage tolerance and fatigue crack growth analysis must be performed to justify continued operation. This paper will provide a brief overview of the fracture mechanics methodology and discuss the acceptance procedure (safety factor) accepted by ABS and NAVSEA as well as the industry accepted approach for pressure vessels outlined in API-579 / ASME FFS and the damage tolerance practice accepted by the USAF and the FAA.



RM 228: WED 11.00—11.30

Stefan Delin, Hydrospace Group Inc, USA



**Finite Element analysis for Acrylic Pressure Vessels  
for Human Occupancy**

by: Stefan Delin  
Email: deltica@aol.com

by: William Kohnen  
Email: wkohnen@hydrospacegroup.com

Acrylics are commonly utilized in the modern design of pressure vessels for human occupancy. Use of finite element analysis (FEA) allows for better understanding of the structural margins and requires further advancement in the PVHO position on acrylic vessels qualification. This paper summarizes the analytical process in the development of a novel hyperbaric pressure vessel, designed as clear acrylic cylinder. The goal of efficient design, qualified to all safety requirements of ASME PVHO-1 is achieved, based on a system analysis approach. It includes manufacturing of detailed scale model, FEA simulation, and testing. The steps in the generation of the finite element model are discussed and a comparative analysis of different models is provided. Analyses started using a simplified linear model and then expanded further with a 3D non-linear model. As part of the verification process, scale models were pressurized and tested. Results of the FEA were verified based on destructive pressure test measurements. In conclusion, recommendations for the FEA of acrylic PVHO are presented.

RM 228: WED 11.30—12.00

Jason Weiss, Moog Naval Systems, USA

**Control Actuation Reliability & Redundancy for Long Duration  
UW Vehicle Missions with High Value Payloads**

by: Jason Weiss  
Moog Naval System, USA  
Email: jweiss@moog.com



The current trend in the undersea community is toward requiring Undersea Vehicles, manned and unmanned, remotely operated or autonomous, to perform ever longer more demanding, and increasingly critical missions. Longer duration Unmanned Underwater Vehicle (UUV) missions will depend on highly reliable control actuation to ensure mission success, survivability of high value payloads, and plausible deniability. This paper presents a detailed trade study of various actuation architecture options available for large UUV control systems, examining electro-hydraulic, electro-mechanical, and electro-hydrostatic technologies.

12.00 – 1.30

**LUNCH**

PANEL DISCUSSION (12:15 to 1:15)  
MAIN FLOOR – Market Showcase

**Cross Cultural Relations in International Business**

RM 228: WED 1.30—2.30

Thomas C. Schmidt, Lockheed Martin, USA



**O<sub>2</sub>, CO<sub>2</sub> and Endogenous Contaminants:  
Limits, Dependencies and Some Misconceptions**

by: Thomas C, Schmidt  
Lockheed, USA

Email: thomas.c.schmidt@lmco.com

Some Classification Rules can result in an overly conservative and/or restrictive design. Conversely, they may not account for some circumstances that are not uncommon. Some include (but are not limited to) the following, which will be discussed in more detail. The values of O<sub>2</sub> consumption and CO<sub>2</sub> production most commonly used are based on average values of many persons over long duration (60-days) in fleet submarines. By comparison, they may vary meaningfully in manned submersibles over the short-term – being dependent on the relationship between the “fuel” being burned by the body at the time and metabolic energy demands. And, some of the CO<sub>2</sub> limits are based on adaptive biochemical changes that may occur after continuous long duration exposure -- in concert with an almost unlimited capacity to remove it. By comparison, the exposure duration in most submersibles is hours (vs months) -- and the ability to remove it is relatively limited (with absorption capacity being temperature dependent). Although submersibles are nominally 1 ATA, variations in pressure may be meaningful. For example, a closed-hatch decrease in O<sub>2</sub> from 21% (initial) to 18%, in concert with a decrease in temperature, can result in mild hypoxia. Carbon Monoxide is the second most plentiful exhaled contaminant, but does not accumulate in the atmosphere as would be predicted. Rather, it becomes bound as COHb (in equilibrium with the atmospheric concentration) and the binding capacity is significant. The non-toxic hydrocarbon Methane (from flatus) is sometimes cited as being a flammability concern. However, the Hydrogen content of flatus is just as important, with their flammability being additive. And fire risk is better addressed based on relative burning rate -- versus one single limit on % O<sub>2</sub> (independent of pressure).

RM 228: WED 2.30—3.00

OPEN DISCUSSION

**Life Support System Regulations and Control Parameters for MUVs**  
OPEN DISCUSSION

## Manned UW Vehicle PROGRAM

Day 3 Room 230- Thur.13 February

RM 230: THUR 8.30—9.00 Roy Thomas, ABS Corporate, USA

### Overview of the ABS Underwater Rule Change Proposals for 2014

by: Roy Thomas  
American Bureau of Shipping, USA  
Email: rthomas@eagle.org

Open meeting of the American Bureau of Shipping (ABS) with the subsea industry to review proposed rule changes to the ABS Rules for Building and Classing Underwater Vehicles, Systems and Hyperbaric Facilities. The meeting facilitates an open dialogue with the industry on current issues that work well or do not work. All active designers, fabricators, owners and operators are invited to attend and provide feedback.



RM 230: THUR 9.00—9.30 Jeff Heaton, NUYTCO Research Ltd, CANADA



### Overview of Submersible Activities 2013

by: Jeff Heaton  
Nuytco Research Ltd, CANADA  
Email: jeff@nuytco.com

Nuytco Research is a world leader in the design, manufacture and operation of manned submersibles and ADS. Nuytco Research saw another busy year in 2013. A highlight in operations was a trip to Normandy to take part in Operation D-Day. Nuytco used the Aquarius submersible to survey several wrecks in the Bay of Seine. These wrecks were casualties of the Allied invasion of France in 1944 and in the months following until the end of WWII. Aquarius proved to be the ideal platform for filming/lighting and was able to provide the opportunity for several D-Day Veterans to visit their ships once again. In addition to operations, Nuytco delivered the first 1,000m Dual DeepWorker and 1,000m Deep Worker. The delivery of these two vehicles represents partial completion of an 8 vehicle contract scheduled for completion in 2015. A brief overview of selected operations and the 1,000m DeepWorker project will be presented.

RM 230: THUR 9.30—10.00 Ian Sheard, SEAmagine Hydrospace Corp, USA

**New 1000m Aurora Submersible and Overview of 2013 Sub Operations**

by: Ian Sheard  
SEAmagine Hydrospace Inc, USA  
Email: [ian.sheard@seamagine.com](mailto:ian.sheard@seamagine.com)

SEAmagine will present the company's latest developments regarding its manned submersibles and introduce the company's new 3, 4 and 5 person Aurora submersible designs that have depth ratings of up to 1000m (3300ft) and represents the culmination of 18 years expertise in the industry and a design evolution from over 12,000 dives accumulated around the world on the company's submersibles. SEAmagine's innovative Aurora technology is a new approach to submersible design, maximizing the field of view of the spherical cabin and providing an unparalleled vista. The occupants have a view, unobstructed by top hatches and side pontoons that provide a far greater field of view. When floating at surface the submersible has a high freeboard with a stable platform for people to walk on. Telescopic handrails come up from the top deck to provide a safe environment for people to board in a variety of sea states.



10.00 – 10.30

COFFEE BREAK

RM 230: THUR 10.30—11.00 David White, Southwest Electronic Energy, USA



**Pressure Tolerant Subsea LI-ION Battery System**

by: David White, Leon Adams  
Southwest Electronic Energy, USA  
Email: [DWhite@swe.com](mailto:DWhite@swe.com)

This presentation is a technical description of the SWE SeaSafe™ pressure tolerant Lithium –Ion battery module and battery system components that were introduced at UI2013. This presentation will recount the stages of the robustness of the SeaSafe battery module design and test, with a focus on the pressure testing we have completed for 6000 meter depth pressure tolerance.

RM 230: THUR 11.00—11.30 Kevin Bowen, San Diego, USA



**Past Experience in Design, Fab and Testing  
of MUV power plants**

by: Kevin Bowen  
San Diego, USA

Email: KBowen6@icloud.com

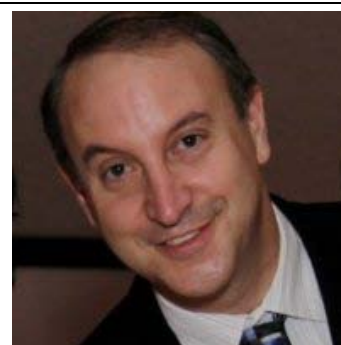
The Deep Range is a 1957 Arthur C. Clarke science fiction novel concerning a future sub-mariner who rides the undersea ranges checking on pelagic fish and undersea farms. The Deep Voyage is a 2006 Will Forman novel about an international submarine race from Hawaii to San Diego using the latest energy technology. This talk is about real-life development programs in search of long range undersea vehicle technology..

RM 230: THUR 11.30—12.00 Rich Maurer, AquaVenture WaterCrafts, USA

**Choosing the Right Business Model for Manned Submersibles**

by: Rich Maurer  
AquaVenture WaterCrafts, USA  
Email: richardmaurer@comcast.net

New technologically-based products typically evolve from product focus to specialty-user focus to a mainstream-user focus. Limited utility and other barriers to entry, particularly high capital requirements, can delay or prevent technologically-based products from achieving mainstream adoption where profit and societal benefit is maximized. Manned submersibles have been firmly entrenched at the specialty-user stage for many decades. This discussion will deliberate upon causes of this entrenchment as well as the selection of business models that could contribute solutions to growing the manned submersible market into mainstream adoption. Topics of discussion will include benchmarking off of similar industries (most notably aerospace) and building a network of stakeholders by aligning common interests.



12.00 – 1.30

LUNCH

RM 230: THUR 1.30—3.00 MTS MUV ANNUAL COMMITTEE MEETING

**MARINE TECHNOLOGY SOCIETY  
Manned Underwater Vehicles Committee**

**1:30 to 3:00PM**

Chair: William Kohnen  
Email: wkohnen@HydroSpaceGroup.com

## MTS MUV 2014 PRESENTERS

### **ARMSTRONG, Stephen**

President  
MANGERTON LLC

Mangerton LLC  
Tampa, Florida, USA  
Email: mangertonllc@gmail.com  
Tel: +1 (813) 300-4260

Mr. Steve Armstrong grew up just up the road from John Holland's submarine workshop in New Jersey. He is currently transitioning from Federal service and is the new laird of Mangerton LLC, a technology consultant company. Previously he was a plank-holder at Headquarters, US Special Operations Command (HQ USSOCOM) as an Acquisition Program Manager and Science & Technology Manager. His assignments were as the first Program Manager, Undersea Systems; Deputy Program Executive Officer, Naval Systems; Project Manager for Special Air Mobility Systems; Deputy Program Manager (DPM) for various offshore and riverine combatant craft; and the first USSOCOM Navy Science Advisor. Prior to arriving at USSOCOM he served as the first project engineer for the Advanced SEAL Delivery System program at Naval Coastal Systems Center, Panama City; and as a test director at the Navy's Operation Test and Evaluation Force. Mr. Armstrong was also a consultant with Planning Systems Incorporated and Research Incorporated performing operations research and engineering analysis. Mr. Armstrong earned a BS (Engineering Physics) at University of Colorado and an MBA at University of South Florida. Personal awards include the Legion of Merit and he has led two acquisition program teams to win DOD's David Packard Award. (Test & Evaluation, Logistics Support).

### **BEALS, Tommy**

PMS399 - Special Operations Forces (SOF)  
NAVSEA

Naval Sea Systems Command  
Undersea Mobility Program Management Office  
Tel: +1 (202) 781-0518  
Email: tommy.beals@navy.mil

Tommy Beals is currently the Deep Submergence System Point of Contact (DSS POC) for PMS399, the Special Operations Forces (SOF) Undersea Mobility Program Office (PMS399) within Naval Sea Systems Command (NAVSEA). As the DSS POC, he is the PMS399 focal point for all DSS SOC matters and is accountable and responsible for implementation and proper execution of the DSS SOC Program within PMS399. Mr. Beals is also the Deputy Principal Assistant Program Manager responsible for the management of various Small Business Innovation Research and SOF submersible certification projects under NAVSEA and US Special Operations Command cognizance. Prior to joining NAVSEA's team in 2010, Mr. Beals was an active duty Submarine Engineering and Repair Limited Duty Officer and a qualified Submarine and Surface Warfare Officer. In this capacity he was assigned to various ships, submarines and submarine repair activities. Prior to receiving a commission in 1997 he was a submarine Machinist Mate responsible for maintenance and operation of various submarine auxiliary systems. Mr. Beals has achieved Program Management Level III certification and has a bachelor of science in Occupational Education from Wayland Baptist University.

### **BOWEN, Kevin**

Kevin Bowen  
San Diego, California, USA  
Tel. +1 (858) 997-4792  
Email: KBowen6@icloud.com

Kevin Bowen, Engineering Fellow for Raytheon Integrated Defense Systems, Retired July 2013. Mr. Bowen was Chief Engineer for Maritime Vehicle Technology Development and has performed Systems Engineering development on manned and unmanned Surface and Undersea Vehicles for 40 years. He has held lead technical and management positions in the development of Riverine Combat Craft C4ISR, Autonomous Unmanned Surface Vehicles, Diver Detection Interdiction Systems, External Combustion Engines, Renewable Energy Systems, Large Scale Vehicle, MK 30 ASW Training Target System, proprietary UUV's and Submarine Payloads & Sensors. He was a major contributor to the US Navy and Japanese Deep Submergence Rescue Vehicles design, test and evaluation.

**CIAUSU, Viorel**

Nautilie Chief Engineer  
IFREMER

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Zone Portuaire de Brégaillon  
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In 2005, Dr. Ciausiu joined IFREMER as a Mechanical Engineer in the Underwater Systems Department and is currently the Chief Engineer of the Nautilie Submersible. Starting in 2010, he was involved in the design of the Nautilie's new titanium frame, specializing in the analysis of fatigue phenomena. Prior to joining IFREMER, Dr. Ciausiu had been an Associate Professor with the Mechanisms and Robotic Department at the Technical University of Iasi, Romania, where he received his degree in Mechanical Engineering, and his PhD, also in Mechanical Engineering. In 2012, Dr. Ciausiu received a Masters in Mechatronics Systems for Physical Oceanography from Toulon University in France. Mr. Ciausiu has four patents and has published over thirty articles.

**CROUCH, Joseph E.**

Manager, Marine Offshore Systems  
SOUTHWEST RESEARCH INST.

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Joe Crouch, P.E. is Manager of the Marine Offshore Systems Sections at Southwest Research Institute. His group includes both the Marine Structures and Engineering Section and the Ocean Simulation Laboratory, which are primarily engaged in projects for the offshore energy and marine industries, but do support project efforts in many other industries as well. Joe participated in the design, fabrication, test and certification efforts that produced the pressure hull for Woods Hole Oceanographic Institute's Alvin. Principally a designer and structural analyst, he has 23 years of experience in diverse industry settings with projects ranging for deep space, aerospace, land based and deep ocean.

**DELIN, Stefan**

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Peter R. Girguis is a Professor of Natural Sciences at Harvard University. His research focuses on microbes that flourish in so-called "extreme environments". He is particularly interested in understanding the role they play in mediating global biogeochemical cycles. His research is highly interdisciplinary, and he employs a variety of molecular microbiological and geochemical techniques as appropriate. He has also developed a number of novel instruments and samplers for use on HOVs, ROVs, and AUVs –such as underwater mass spectrometers and microbial samplers- to enable his research group and the broader community to interrogate these relationships in a manner previously unattainable. He received his B.Sc. from U.C.L.A. and his Ph.D. from the University of California Santa Barbara, where he worked with Dr. James Childress on the physiology of deep-sea hydrothermal vent tubeworms. He did postdoctoral research at the Monterey Bay Aquarium Research Institute with Dr. Ed Delong on the growth and population dynamics of anaerobic methane oxidizing microbes. He is currently chair of the National Science Foundation's Deep Submergence Science Committee, which advises the US National Deep Submergence Facility.

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Colleen Hahn has over 20 years of global marketing, sales and communications experience in the business-to-business and consumer sectors. She has developed comprehensive sales and product entry strategies for top-tier clients in the US, Western Europe and Asia. As OceanGate's Chief Marketing Officer, she is responsible for the company's global marketing, corporate communications, and government affairs programs. Hahn's strategic initiatives include positioning OceanGate's growth strategy

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J. Patrick Hickey has over 40 years experience in the offshore/marine industry. He began his career working in his father's Singapore based offshore seismic company. Upon completion of Oceaneering Diver Training, he worked primarily in his native Canada in the Canadian Arctic. Pat became involved in manned submersibles when he joined Canadian based HYCO piloting their Aquarius and Pisces vehicles. He then moved to the US and began a 15 year career in the oil field as a diver, MUV and ROV operator and supervisor for such major companies as MARTECH International, SubSea International and Oceaneering until an opportunity arose to join Woods Hole Oceanographic Institution in 1987, first as a pilot of DSV ALVIN, then Expedition Leader and finally ending a 25 year career at WHOI as ALVIN Group Manager for the past 7 years. Pat has over 630 dives in ALVIN and has accumulated in excess of 4600 hours of submerged time in that vehicle. Over his career Pat has also operated Perry class submersibles, Nekton Beta, MARTECH's Pioneer 1 and HYCO' Leo. He has also operated many commercially available ROV's. Pat is owner of Hickey Underwater Vehicle Consulting LLC.

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Jim was educated at the University of Rhode Island's Ocean Engineering program studying AUV design and control, while subsequently earning a degree in Naval Architecture & Marine Engineering at the University of Michigan. Upon graduating, he took a position with BMT Scientific Marine Services where he was responsible for the specification, fabrication, and installation of real-time monitoring systems aboard GOM production platforms to track environmental loading and platform response. Desiring to spend more time ashore, he then took a desk job with the American Bureau of Shipping (ABS). Here, he performed design approval of diving systems according to the ABS Rules for Building and Classing Underwater Vehicles, Systems, and Hyperbaric Facilities. Upon leaving ABS, he continued this work as consulting naval architect on hire to Cal Dive International, maintaining regulatory compliance of their GOM fleet of saturation systems and diving support vessels according to ABS and Det Norske Veritas (DNV) requirements. In 2010, he took a position with Germanischer Lloyd (GL). Here Jim spends his time between technical sales, design approval, and on-site survey duties related to PVHO systems in the diving, manned submersible, AUV/ROV, tunneling, aerospace, medical chamber, and naval submarine sectors.

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Matthew James is a Program Manager and Engineer in the Structural Engineering Department at Southwest Research Institute. Over the past 13 years he has been involved with testing and development of manned and unmanned pressure vessels. He was instrumental in the design and production of the pressure hull of the PRMS Falcon Submarine Rescue System and the titanium personnel sphere for the upgraded Alvin submersible. Currently, Mr. James is the program lead for several projects to develop hydrostatic test chamber systems to test subsea equipment at elevated ambient pressures.

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William Kohnen is President of Hydrospace Group specialized in high reliability underwater vehicle systems and integrated solutions for using manned submersible intervention. Mr. Kohnen combines 25 years of engineering experience in submersible vehicle design. He directs technology and business development for underwater vehicles, PVHO pressure vessels and electric propulsion systems. He is co-founder of SEAmagine Hydrospace Corp manufacturer of manned submersibles which delivered nine ABS classed submersibles to date. Mr. Kohnen has a background in aerospace with a M.Sc. Elec. Engr. from McGill University, Canada. He has been chair of the Marine Technology Society Manned Underwater Vehicles Committee since 2003 leading the MUV program at Underwater Intervention conference to represent the manned submersible industry. Mr. Kohnen is an active member of the ASME Pressure Vessel for Human Occupancy (PVHO) Committee with 20 years experience working with the US Coast Guard and ABS rules and regulations for building submersibles.

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Brian earned a B.S in Oceanography from the University of Washington and an M.S. in Oceanography from the University of Hawaii. After graduate school, Brian worked at the Hawaii Undersea Research Laboratory for three years where he managed the Data Department and continued his research on the hydrothermal system of the submarine volcano, Loihi. In 2001, Brian moved to the National Science Foundation to work in the Marine Geology and Geophysics Program as a Science Assistant. He continued to work at NSF in various capacities, including in the Ocean Drilling Program, until 2008 when he was promoted into his current position as Program Manager for the Submersible Support Program. Brian assumed responsibility for the Program when it was decided upgrading Alvin was a feasible alternative to constructing an all-new submersible. Brian has been active in deep submergence for over 20 years, beginning with his first of several dives to the summit of Loihi Seamount in 1992 aboard Pisces V, the base of the Kilauea in 1998 aboard Shinkai 6500, and most recently off Santa Barbara aboard Alvin during the certification sea trials.

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Gregg Mikolasek has more than 25 years of diving and maritime experience. He holds two degrees from the University of Michigan, including a Masters in Atmospheric and Oceanic Science. A Dive Instructor since 1997, his diving experience ranges from recreational to technical and light commercial and includes work as a Dive Safety Officer. Since 2000, he has been a remote sensing consultant and Project Director, employing sidescan sonar in a number of underwater searches. He has worked in the dive industry for a number of years as a sales representative and subsequently as the Sales & Marketing Manager for Viking Dry Suits. He is currently a Director and CFO of the Undersea Voyager Project, a 501(c)3 organization whose mission is undersea exploration and education. UVP is based in California and has an international branch office in Mongolia, which Gregg established in 2012 as a base of operations from which to conduct environmental research in Lake Hövsgöl. Gregg is a professional skydiver, licensed private pilot, and holds a 100 GT USCG Captain's License.

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An internationally recognized pioneer in the diving industry, Phil Nuytten has spent 40 years creating deepwater dive products that have opened the ocean's depths to exploration and industry. Through his companies, Nuytco Research and Can-Dive, he has developed the technology to allow longer-length diving expeditions with increased safety. Nuytten's one-atmosphere systems – the hard-suits 'Newtsuit' and 'Exosuit', and his deep-diving "DeepWorker" submersibles – are renowned internationally. This deep diving equipment, along with Nuytten's military submarine rescue system (designated 'Remora' by the Royal Australian Navy and 'PRMS' by the US Navy), is standard in nearly a dozen of the world's navies. Contract work has taken him to oilfields, submarine construction sites and sunken wrecks around the world. Phil Nuytten has spent over forty years developing undersea systems that have the safety of the diving technician as their common theme. His goal has been to provide scientific, technical, military, and sport divers full access to continental shelf depths without the hazards of decompression, so that humans can explore, learn about, and protect the world's oceans.

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Loral O'Hara has a background in aerospace engineering and been at the Woods Hole Oceanographic Institution for the past four years. She primarily worked on the DSV Alvin Upgrade as the Lead Engineer for the vehicle frame. She also served as the Weight/Balance Engineer and supported NAVSEA certification. She is currently working on a new vehicle development project within the Deep Submergence Laboratory at WHOI

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Brett Phaneuf is the president of Submergence Group, LLC, which along with its subsidiary organizations designs and rapidly prototypes experimental submersibles for research and development programs with the military. Mr. Phaneuf has extensive experience in the operation of manned and unmanned submersibles and remotely operated vehicles, which he also applies to ocean exploration through the non-profit company, ProMare, which he helped found in 2001.

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Stockton Rush is co-founder and Chief Technology Officer of OceanGate. Stockton also currently serves on the Boards of Directors for several Seattle-based technology ventures, including OceanGate strategic partner BlueView Technologies, a manufacturer of small, high frequency sonar systems. Previously, Stockton was a founding partner of Peregrine Partners, a San Francisco based venture capital firm. He began his career as a Flight Test Engineer on the F-15 program with the McDonnell Douglas Corporation and then flew over 400 hours as a DC-8 co-pilot for Overseas National Airways out of Jeddah, Saudi Arabia. Stockton holds a commercial pilot's license with multi-engine, helicopter, instrument, seaplane and DC-8 ratings. He also constructed and flies a Glasair III experimental aircraft and completed a heavily modified Kittredge K-350 two-man submersible in 2006. Stockton earned a BSE in Aerospace Engineering from Princeton University and an MBA from the University of California at Berkeley Haas School of Business.

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Richard served as Research Associate at the Marine Biological Laboratory in Woods Hole for 25 years, where he designed high impedance measurement and signal processing systems, requiring manipulation of sensors via remote telemetry. In 2010 he joined Woods Hole Oceanographic institute, serving as an electrical engineer on the HOV Alvin upgrade project. Currently an Engineer at the Woods Hole Oceanographic Institute and Research Associate at the Marine Biological Laboratory, Richard continues to support the HOV Alvin as well as ROVs and AUVs.

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Bruce Strickrott is the Expedition Leader/Pilot of the manned deep submergence vehicle Alvin, operated as a part of the U.S. National Deep Submergence Facility at Woods Hole Oceanographic Institution. He has worked as a member of the Alvin Group since 1996 and has over 300 dives as Pilot in Command. Bruce obtained an Ocean Engineering degree from Florida Atlantic University and while there he worked as a dive master and mate aboard the R/V Oceanear IV. Bruce is a veteran of the U.S. Navy, working on naval surface vessels, including during Operation Desert Shield/Desert Storm. When not working on the R/V Atlantis (Alvin's support ship) he is working toward promoting science, math and engineering education to high school students.

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Jarl Stromer is Engineering Manager at Triton Submarines where his duties include overseeing the design and manufacture of two- and three-passenger acrylic NEMO type manned submersibles. His background is in pressure vessel technology with emphasis on materials science and technology. Mr. Stromer has worked as a Senior Engineer with the American Bureau of Shipping where he was primarily responsible for design review of underwater systems, vehicles, and hyperbaric facilities. He has held past positions on various technical committees, including ASME PVHO Standard, ASME B&PV Code, ADCI Consensus Standard, and the International Maritime Organization (IMO).

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Bapi Surampudi is a Principal Engineer at Southwest Research Institute. He has been involved in the development of control systems for automotive and industrial applications for the past 20 years. During this tenure, he also had the opportunity to develop the navigation and control system for unmanned ground vehicles. For the past three years he has been managing the Energy Storage System Evaluation and Safety (EssEs) consortium. The EssEs consortium tests rechargeable battery cells, modules and packs for performance, life and safety. Bapi and his team also develop heuristic and chemistry driven algorithms for battery life and health that can be used in development of Battery Management Systems (BMS). BMS system can be calibrated to ensure a safe, long and healthy operation of battery pack for a specific application like submersibles.

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Jody C. Tangredi is an independent consultant, trainer, and coach specializing in the development of global mobility and talent, intercultural competence and communication skills. She currently consults with one of the top US-based global talent development and cross-cultural training firms, delivering services to clients globally. Her experience includes work with multinational corporations, US and Canadian universities, relocation support services for the US Navy, diplomatic personnel and NATO. She worked for several years in Japan in an executive international human resource capacity, managing a global workforce supplying language and cultural skills training for Fortune 500 Japanese multinational clients. With Canadian and British citizenships, an expatriate global upbringing, undergraduate and Education degrees in Canada and a current Masters in Intercultural Relations (US), she has extensive knowledge and experience crossing cultures. Known as a Third Culture Kid (or Global Nomad) she additionally grew up in Iran, France, England, Indonesia, Australia and Singapore. She currently resides in Virginia, USA, and is a certified administrator of the Global Competencies Inventory (GCI).

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Anthony Tarantino has a background in electrical engineering with over 20 years of experience in service, test, operations, and project management. He spent 6 years with the Alvin Operations Group as a Pilot and Electrical Section Leader and was the Assistant Project Manager for the Alvin Upgrade Project. He currently manages the Alucia submersible operations program.

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Mr. Shozo Tashiro is Director of Research Fleet Department, Marine Technology and Engineering Center in Japan Agency for Marine-Earth Science and Technology (JAMSTEC). Currently he and his department manage the operations of (manned and unmanned) submersibles and research vessels except Drilling Vessel Chikyu in JAMSTEC. He is one of the first pilots of DSV SHINKAI2000, and the first senior chief pilot of DSV SHINKAI6500. He worked for submersibles of JAMSTEC as a pilot from 1981 to 1995 for 15 years. Also He has the experience that stayed in Alvin Operations office of Woods Hole Oceanographic Institution for half a year and was embarkation on R/V Atlantis for 2 weeks. He will join the UI conference in first time. He is a graduate in Kobe Merchant Marine Academy as a marine engineer.

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Roy Thomas has worked with the American Bureau of Shipping (ABS) for the past 11 years and serves as the Engineering Manager of the Corporate Chief Engineer's Office. Mr. Thomas has extensive experience with the Classification of underwater vehicles, systems and hyperbaric facilities for commercial and military applications. He has served as the lead design review engineer 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 Diving Systems, Lock-Out Submersibles, Atmospheric Diving Suits, AUVs, ROVs, Lithium Batteries, etc. Mr. Thomas has previously worked as a seagoing marine engineer on board tankers and has hands-on experience in the running, maintenance and overhaul of marine machinery. Mr. Thomas holds a master's degree in Naval Architecture from Memorial University of Newfoundland, Canada with a specialization in underwater vehicles. He also holds a bachelor's degree in Marine Engineering from Marine Engineering and Research Institute, India.

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Don Walsh is head of the Oregon based consulting company, International Maritime Inc., a business he founded in 1976. He was born in Berkeley California and grew up in the San Francisco Bay Area. Joining the US Navy at Naval Air Station Oakland in 1948 he became an aircrew man in torpedo bombers before entering the Naval Academy in 1950. From 1959-1962 Lieutenant Walsh was the first Officer-in-Charge of the Bathyscaph Trieste at the Navy Electronics Laboratory in San Diego. Designated USN Deep Submersible Pilot #1 he was also the first submersible pilot in the US. In January 1960, he and Jacques Piccard dove Trieste to the deepest place in the World Ocean: 35,840 feet. Since graduation from the Naval Academy, his travels have taken him to about 112 nations throughout the world. In 1999, using a Russian Mir submersible, he dove 8,000 feet to the Mid-Atlantic Ridge near the Azores at the Rainbow Vents hydrothermal vents field. Later, in July 2001, he dove 12,500 feet to the wreck of RMS Titanic and the next year to the WWII German Battleship Bismarck at 15,500 feet. Most recently he has dived in Lake Geneva in a Mir submersible.

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Mr Weiss is the chief technologist responsible for design & development programs, internal research & development, and business capture for the Naval Systems business unit of the Moog Inc. Space and Defense Group. The Primary operations of the business unit are in Orrville, OH and East Aurora, NY. Mr. Weiss' team designs and manufactures high performance electrohydraulic, electrohydrostatic, and electromechanical motion control devices and control electronics for nuclear submarines, aircraft carriers, surface ships and unmanned underwater vehicles (UUVs). Moog's motion control solutions comply with stringent naval qualifications requirements such as shock, vibration, low acoustic signature, and seawater corrosion resistance. Prior to joining Moog, Mr. Weiss was an Engineering Manger at the Knolls Atomic Power Laboratory (KALP) in Schenectady, NY, where he was involved in the design, manufacture, and fleet support of nuclear propulsion plants in Los Angeles, Ohio and Virginia Class submarines. He also served as Mechanical Design Manager for the MARF Prototype in West Milton ,NY; used in the training of US Navy nuclear operators and testing of nuclear propulsion technologies. Mr. Weiss hold a Bachelor of Science and Master of Engineering degrees in Mechanical Engineering from the University of Buffalo and Rensselaer Polytechnic Institute.

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David White graduated from Texas A & M University in 1970 with a BS in Electrical Engineering. David's practical design experience is in large, high capacity, high reliability computer and system designs used in battery operated, man portable applications that must work in any environment above, on, or under the earth. David is named with other colleagues at SWE on over 9 patents or patent applications covering inventions for Continuous Cell Balancing Methods, Module Balancing Methods, and BMS algorithms for extending Li-Ion battery life, reliability, and safety. David is a member of the MTS, an emeritus member of the Society of Exploration Geophysics and a Life Senior member of the IEEE, and has been recognized during his employment at Texas Instruments, as a Texas Instrument's Senior member of Technical staff.

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Colin is a pilot and technician with the Hawaii Undersea Research Lab. He has spent the last thirteen years maintaining and operating the Pisces IV and Pisces V manned submersibles. Recently he has been trained as a pilot on the Launch Recovery Transport (LRT) submersible support platform and the new University of Hawaii ROV Lu'ukai. He has been on over twenty expeditions and helped integrate the submersible systems for over a dozen documentaries. As the HURL photographer he often has a wrench in one hand and a camera in the other. His images have made the cover of Sea Technology magazine, Honolulu Advertiser and have been featured in many other web sites and publications.

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***In Memoriam - Natalia Sagalevich***

Dr. Natalia Sagalevich, scientist, ocean advocate and explorer, fought her final battle with cancer this year and died January 25<sup>th</sup>, 2014. Natalia was known throughout the scientific community as a staunch supporter of the MIR programs and as the spirited wife of Dr. Anatoly Sagalevich. Everyone who went on expedition with the MIR submersible program recognized that Natalia was the true backroom boss whenever the Keldysh sailed. She had a PhD in Marine Biology and was a passionate scientist of the deep oceans. She and Anatoly were staunch promoters of the MIR submersible program, committed to its significant impact through exploration, and helping it throughout many tumultuous times. She was fiercely protective of Anatoly and was a constant force both on expedition and at home. Her work and contribution is acknowledged throughout the submersible industry and the ocean community at large. Natalia will be remembered as a wonderful lady and great Keldysh shipmate.



Natalia and Anatoly photographed at a happy time and place during a 2007 visit to California.

*Photo, courtesy of Paul T. Isley*

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A large blue and white banner for the "Manned Underwater Vehicles 11th Annual MTS MUV Program". The top section is blue with the text "Manned Underwater Vehicles" in white, and "11th ANNUAL MTS MUV Program" in a smaller white font below it. The bottom section is white with blue wavy borders at the top and bottom. It features three logos: "Sponsored By: ABS" with the ABS logo (a blue eagle and the text "FOUNDED 1862 ABS"); the "marine technology SOCIETY" logo with the tagline "Opportunity runs deep™"; and the "DNV·GL" logo with its characteristic blue and green horizontal stripes.