



# 2021 **UNDERSEA WARFARE** VIRTUAL CONFERENCE

**A Novel Force – Integrating Undersea, Subsea, and Seabed Capabilities in Distributed Maritime Operations**

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## WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. For more than 100 years, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise, and energy to ensuring our warfighters have the best training, equipment, and support. For more information, visit **NDIA.org**



# UNDERSEA WARFARE

## WHO WE ARE

NDIA's Undersea Warfare Division fosters both the exchange between government and industry of technical information and the expansion of research and development in areas related to undersea warfare. To this end, the Division furthers communication by providing a variety of ways for government and industry to work together to solve problems, identify affordable solutions, and meet specific requirements. The Division also supports both government and industry by providing advice on undersea warfare policies and acquisition planning.

## LEADERSHIP AND COMMITTEES

### Mike Cortese

Division Chair

### Rick Breckenridge

Division Vice Chair

### Andy Wilde

Spring Conference Chair

### Paul Rosbolt

Session Chair – Combat Systems & C4I

### Jon Tobias

Session Chair – Mine Warfare

### Tom Ruzic

Session Chair – Undersea Vehicles

### Glen Sharpe

Session Chair – Aviation Systems

### Joe Cuschieri

Session Chair – Undersea Sensors

# AGENDA

**TUESDAY, MARCH 23**

10:00 – 10:15 am

## **WELCOME AND OPENING REMARKS**

**MG James Boozer, USA (Ret)**

Executive Vice President, National Defense Industrial Association (NDIA)

**Mike Cortese**

Senior Manager, Washington Operations, General Dynamics Electric Boat  
Chair, Undersea Warfare Division, NDIA

10:15 – 10:45 am

## **SPEAKER SESSION**

**Don Hoffer**

Executive Director, Commander, Submarine Forces

10:55 – 11:25 am

## **SPEAKER SESSION**

**RADM Blake Converse, USN**

Commander, Submarine Forces, U.S. Pacific Fleet

11:35 am – 12:05 pm

## **SPEAKER SESSION**

**RADM William Houston, USN**

Director, Undersea Warfare Division, N97, Office of the Chief of Naval Operations

12:05 – 12:35 pm

## **NETWORKING CHAT LOBBY BREAK**

12:35 – 1:05 pm

## **SPEAKER SESSION**

**RDML Richard Seif, USN**

Commander, Undersea Warfighting Development Command

1:15 – 1:45 pm

## **SPEAKER SESSION**

**Dr. Vic Ricci**

Chief Technology Officer, Naval Undersea Warfare Center HQ

1:55 – 2:25 pm

## **SPEAKER SESSION**

**RDML Kurt Rothenhaus, USN**

Program Executive Officer, Command, Control, Computers, Communications, & Intelligence, and  
Program Executive Officer, Space Systems, Naval Information Warfare Systems Command

2:25 – 2:45 pm

## **NETWORKING CHAT LOBBY BREAK**

2:45 – 3:15 pm

## **SPEAKER SESSION**

**RDML Scott Pappano, USN**

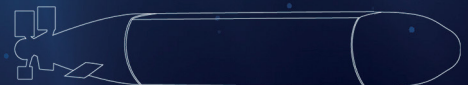
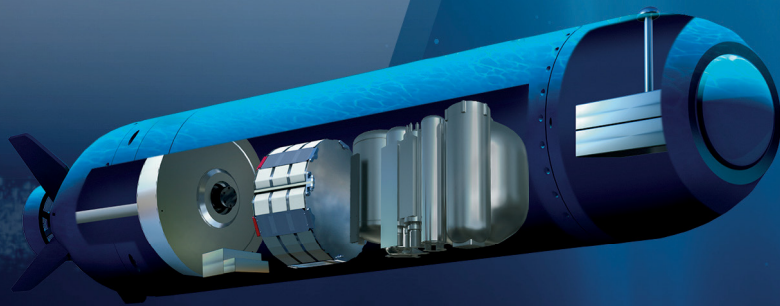
Program Executive Officer, COLUMBIA



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3:25 – 3:55 pm **SPEAKER SESSION**  
**RADM Lorin Selby, USN**  
 Chief of Naval Research, Office of Naval Research

3:55 – 4:00 pm **CLOSING REMARKS**  
**Andy Wilde**  
 Director, Undersea Requirements & Capabilities, Raytheon Technologies  
 Chair, Spring Conference, Undersea Warfare Division, NDIA

## WEDNESDAY, MARCH 24

10:00 – 10:05 am **OPENING REMARKS – PROGRAM MANAGER SESSIONS**  
**Mike Cortese**  
 Senior Manager, Washington Operations, General Dynamics Electric Boat  
 Chair, Undersea Warfare Division, NDIA

## COMBAT SYSTEMS & C4I

10:05 – 10:10 am **INTRODUCTORY REMARKS**  
**Paul Rosbolt**  
 Group Leader, Naval Surface Warfare Analysis Group, Systems Planning and Analysis, Inc.  
 Chair, Combat Systems & C4I Session, Spring Conference, Undersea Warfare Division, NDIA

10:10 – 10:40 am **IWS 5.0 PROGRAM STATUS & PLANS**  
**CAPT Jill Cesari, USN**  
 Major Program Manager, PEO IWS 5.0, Undersea Warfare Systems

10:50 – 11:20 am **PMS 425 PROGRAM UPDATE**  
**CAPT Michael Daigle, USN**  
 Major Program Manager, Submarine Combat Systems PMS 425  
*Pre-Recorded*  
**Sean Watterson**  
 Principal Assistant Program Manager, PMS 425  
*Answering Q&A*

11:30 am – 12:00 pm **PMW 770 PROGRAM UPDATE**  
**CAPT David Kuhn, USN**  
 Program Manager, Undersea Communications & Integration PMW 770

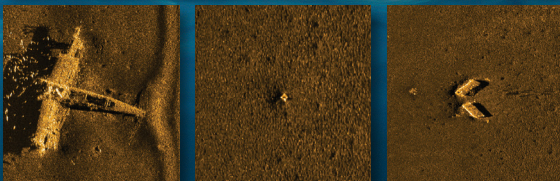
12:00 – 12:30 pm **NETWORKING CHAT LOBBY BREAK**

## UNDERSEA VEHICLES

12:30 – 12:35 pm **INTRODUCTORY REMARKS**  
**Tom Ruzic**  
 Engineering Manager, Newport News Shipbuilding  
 Chair, Undersea Vehicles Session, Spring Conference, Undersea Warfare Division, NDIA



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12:35 – 1:05 pm **PMS 406 UPDATE**  
**CAPT Pete Small, USN**  
 Program Manager, Unmanned Maritime Systems PMS 406

1:05 – 1:25 pm **NETWORKING CHAT LOBBY BREAK**

## AVIATION SYSTEMS

1:25 – 1:30 pm **INTRODUCTORY REMARKS**  
**Glen Sharpe**  
 Chair, Aviation Systems Session, Spring Conference, Undersea Warfare Division, NDIA

1:30 – 2:00 pm **AIR ANTI-SUBMARINE WARFARE SYSTEMS OVERVIEW**  
**CAPT Dan Papp, USN**  
 Program Manager, Air Anti-Submarine Warfare Systems PMA 264

2:10 – 2:40 pm **SPEAKER SESSION**  
**CAPT Eric Gardner, USN**  
 Maritime Patrol and Reconnaissance Aircraft Program PMA 290

2:50 – 3:20 pm **SPEAKER SESSION**  
**CAPT Todd Evans, USN**  
 H-60 Multi-Mission Helicopters Program PMA 299

3:20 – 3:40 pm **NETWORKING CHAT LOBBY BREAK**

## UNDERSEA SENSORS

3:40 – 3:45 pm **INTRODUCTORY REMARKS**  
**Joe Cuschieri**  
 Fellow, Lockheed Martin Corporation  
 Chair, Undersea Sensors Session, Spring Conference, Undersea Warfare Division, NDIA

3:45 – 4:15 pm **SPEAKER SESSION**  
**CAPT Christopher Polk, USN**  
 Program Manager, Naval Sea Systems Command PMS 401

4:25 – 4:55 pm **SENSING & AUTOMATION FOR EXPANDING THE MARITIME MILITARY ADVANTAGE**  
**Dr. Daniel Sternlicht, SSTM**  
 Distinguished Scientist, Littoral Sensing Technologies  
 Naval Surface Warfare Center, Panama City Division, Code X

4:55 – 5:00 pm **CLOSING REMARKS**  
**MG James Boozer, USA (Ret)**  
 Executive Vice President, NDIA  
*Pre-Recorded*



## HARASSMENT STATEMENT

NDIA is committed to providing a professional environment free from physical, psychological and verbal harassment. NDIA will not tolerate harassment of any kind, including but not limited to harassment based on ethnicity, religion, disability, physical appearance, gender, or sexual orientation. This policy applies to all participants and attendees at NDIA conferences, meetings and events. Harassment includes offensive gestures and verbal comments, deliberate intimidation, stalking, following, inappropriate photography and recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome attention. Participants requested to cease harassing behavior are expected to comply immediately, and failure will serve as grounds for revoking access to the NDIA event.

## ANTITRUST STATEMENT

NDIA has a policy of strict compliance with federal and state antitrust laws. The antitrust laws prohibit competitors from engaging in actions that could result in an unreasonable restraint of trade. Consequently, NDIA members must avoid discussing certain topics when they are together at formal association membership, board, committee, and other meetings and in informal contacts with other industry members: prices, fees, rates, profit margins, or other terms or conditions of sale (including allowances, credit terms, and warranties); allocation of markets or customers or division of territories; or refusals to deal with or boycotts of suppliers, customers or other third parties, or topics that may lead participants not to deal with a particular supplier, customer or third party.

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# BIOGRAPHIES



## RADM BLAKE CONVERSE, USN

### *Commander*

Submarine Forces, U.S. Pacific Fleet

Rear Admiral Blake Converse is a native of Pennsylvania and graduated from Penn

State University in 1987 with a Bachelor of Science in Mechanical Engineering. He also holds Master of Science degrees in Space Systems Engineering and Applied Physics from the Navy Post Graduate School.

His career as a nuclear submarine warfare officer includes assignments aboard USS Lapon (SSN 661), USS Olympia (SSN 717), and USS Minneapolis-St.-Paul (SSN 708) as the executive officer. Command assignments include Commanding Officer, USS Louisiana

(SSBN 743) from February 2006 to February 2009 and Commander, Submarine Squadron 6 from October 2012 to August 2014.

Ashore, he served as the Radiological Controls Officer on the staff of Commander, U.S. Pacific Fleet Submarine Force; as a Special Assistant to the Commander, U.S. Joint Forces Command; as a Deputy Commander of Submarine Squadron 17; as the Prospective Commanding Officer Course Instructor at Naval Reactors headquarters; and as Chief of Staff to Commander, U.S. Submarine Force.

As a flag officer, he served as Director, Joint and Fleet Operations (N3), U.S. Fleet Forces Command and Commander, Submarine Group 9 in Silverdale, WA.

Rear Admiral Converse is currently the Commander Submarine Force, U.S. Pacific Fleet.

His personal decorations include the Defense Superior Service Medal, Legion of Merit (four awards), Defense Meritorious Service Medal, Meritorious Service Medal (four awards), Joint Commendation Medal, Joint Achievement Medal, Navy Commendation Medal, Navy Achievement Medal (three awards) and various unit awards. In 2008, he was awarded the Rear Admiral Jack N. Darby award for Inspirational Leadership and Excellence of Command.



## DON HOFFER

### *Executive Director*

Commander, Submarine Forces

Mr. Hoffer serves as the Executive Director, Submarine Forces, where he

is the principal advisor to the Submarine Force Commander on all matters relating to Strategic Deterrence and Undersea Warfare programs and requirements. His responsibilities include the prioritization of future Submarine Force capabilities and the development of strategy, undersea technology adoption and the implementation of unmanned systems in the undersea. He is the Executive Secretary of the Commander's Executive Board and chairs the Transition Advisory Board. Mr. Hoffer serves on the Columbia-class, Tactical Submarine Evolution, and SUBTEAM 1 Flag Oversight Boards and is the Office of the Secretary of Defense (OSD) Pathfinder for Undersea Warfare with the United Kingdom in the Next Generation Cooperative Capability initiative.

Mr. Hoffer began his Federal career as an engineer at the Naval Sea Systems Command (NAVSEA), detachment Submarine Maintenance Engineering,

Planning and Procurement (SUBMEPP). He joined the Deep Submergence Systems Program as the project engineer for numerous programs including USS Dolphin (AGSS 555), Unmanned Undersea Vehicle development, the ASR-21 Class Submarine Rescue Ships, diving programs and the Advanced SEAL Delivery System project.

Mr. Hoffer was the Multi-Mission Program Technical Director and then Deputy Program Manager for the Seawolf Program Office (PMS 350) in PEO Submarines. The ACAT-1C program completed the class operational evaluation and delivered USS Jimmy Carter (SSN 23) within the Seawolf Class Congressional cost cap, earning the program office a Meritorious Unit Commendation.

In 2005, he established and led the Advanced Undersea Systems Program (PMS 394) as Deputy Program Manager. Subsequently, he was selected to Defense Intelligence Senior Leader rank at the Office of Naval Intelligence and used his programmatic expertise to manage resource portfolios. In late 2008, he was selected to the Senior Executive Service

and returned to NAVSEA as the Director for Advance Undersea Integration. In 2014, he was selected as Executive Director, Submarine Forces.

Mr. Hoffer holds a Bachelor of Science in Mechanical Engineering, a Master of Science in General Administration, and a Master of Science in National Resource Strategy from the Eisenhower School. He is a graduate of the Program Managers Course, Defense Systems Management College. Mr. Hoffer is a graduate of the Senior Acquisition Course of the Defense Acquisition University and the Information Strategies Concentration Program of the National Defense University. He holds an Executive Certificate in Public Leadership from the Harvard Kennedy School.

Mr. Hoffer has received two Navy Superior Civilian Service Awards, the Navy Meritorious Civilian Service Award, two Navy Unit Commendations, three Meritorious Unit Commendations, the VADM Charles Weakley Award from NDIA and the Navy Safety Excellence Award.



## RADM WILLIAM HOUSTON, USN

*Director, Undersea Warfare Division, N97*  
Office of the Chief of Naval Operations

Rear Adm. Houston is a native of Buffalo, New York, and graduated from the

University of Notre Dame in May 1990 with a Bachelor of Science in Electrical Engineering and was commissioned via the Navy Reserve Officer Training Corps (NROTC) program. He holds a Master of Business Administration from the College of William and Mary.

His sea tours include, division officer assignments on USS Phoenix (SSN 702), engineer officer onboard USS Hampton (SSN 767), and executive officer onboard USS Tennessee (SSBN 734)(B). He commanded

USS Hampton (SSN 767) in San Diego and was commodore of Submarine Squadron 20 in Kings Bay, Georgia.

His staff assignments include flag lieutenant for Commander Submarine Force, U.S. Atlantic Fleet; the Atlantic Fleet Nuclear Propulsion Examining Board; special assistant to the Director of Naval Reactors for Personnel and Policy; deputy commander for Submarine Squadron 20; the principal director for Nuclear Matters within the Office of the Secretary of Defense; the submarine and nuclear community manager, Military Personnel Plans and Policy (N133) and

division director of Submarine and Nuclear Propulsion Distribution, Navy Personnel Command (PERS-42).

His first flag assignment was deputy director for Strategic Targeting and Nuclear Mission Planning (J5N) United States Strategic Command. Following this he served as director of Operations, Naval Forces Europe-Africa; Deputy Commander, U.S. 6th Fleet, and commander, Submarine Group Eight.

Houston is currently serving as director, Undersea Warfare Division, Office of the Chief of Naval Operations (N97).



## RDML SCOTT PAPPANO, USN

*Program Executive Officer*  
COLUMBIA

Rear Adm. Scott Pappano is a native of Bethlehem, Pennsylvania. He is a

1989 graduate of the U.S. Naval Academy with a Bachelor of Science in Marine Engineering and also holds a Master of Science in Nuclear Engineering from the Massachusetts Institute of Technology.

At sea, Pappano served onboard USS City of Corpus Christi (SSN 705), USS Albuquerque (SSN 706), USS Michigan (SSBN 727 Gold), and USS Ohio (SSGN 726). He commanded USS Buffalo (SSN 715) while forward-deployed in Guam.

Assignments ashore include duty with Commander, Submarine Development Squadron 12 Tactical Action Group; onboard X-Daniel Webster (MTS 626) at Naval Nuclear Power Training Unit Charleston, South Carolina military assistant to the Assistant Secretary of Defense for International Security Policy; and executive assistant to the Director, Programming Division (N80) on the Navy Staff.

After selection as an acquisition professional, Pappano served in the Special Operations Forces Mobility Program Office (PMS 399); as executive assistant to Commander, Naval

Sea Systems Command; and as major program manager for the Strategic and Attack Submarine Program Office (PMS 392).

Pappano was assigned as program executive officer, Columbia in March 2019. His previous flag assignments include commander, Naval Undersea Warfare Center and Director, Comprehensive Test Facility.

Pappano served on teams that have been awarded the Joint Meritorious Unit Award, Navy Unit Commendation, Meritorious Unit Commendation, and the Navy "E" Ribbon.

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- Joint Program Support
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## DR. VIC RICCI

*Chief Technology Officer*  
Naval Undersea Warfare Center HQ

As the Chief Technology Officer (CTO) at the Naval Undersea Warfare Center (NUWC) Headquarters, Dr. Vittorio (Vic) Ricci is the senior advisor for Science and Technology (S&T) for Commander NSWC/NUWC and NSWC/NUWC Executive Director and is responsible for leading and focusing the realignment of the NUWC's efforts to revitalize basic and applied research in all areas of Undersea Warfare (USW), which includes Divisions, Newport and Keyport. As a nationally-recognized technical expert, Dr. Ricci guides the Center in all S&T matters and is responsible for shaping and implementing overall strategy and policy on technology matters, developing science and technology (S&T) roadmaps, and creating a vision to support strategic planning initiatives for the Command. He is also responsible for communicating NUWC's technical vision with a wide range of stakeholders, including military, government, industry, and academia.

Until 2020, Dr. Ricci concurrently served as the CTO at NUWC Division, Newport and was the senior S&T advisor for NUWC Division Newport Commander and Technical Director. As such, he led the Division's efforts

to revitalize basic and applied research and was responsible for developing the Division's overall S&T vision and strategy as well as communicating it with a wide range of stakeholders within government, industry, and academia.

Prior to taking on the role of CTO, Dr. Ricci assumed collateral duties as the Technical Project Manager for the NUWC Undersea Distributed Networked Systems strategic initiative as part of the NUWC Technical Director's Technical Grand Challenge, impacting the technical direction for multiple warfare centers and thousands of Navy civilian personnel.

Dr. Ricci had previously served as the Director of Science & Technology for the Sensors and Sonar Systems Department and as the Technical Manager for the SPARTAN Scout Advanced Concept Technology Demonstration (ACTD), which provided unmanned surface vehicles (USV) with operational mission capabilities in force protection, antisubmarine warfare, mine warfare, and precision engagement to the warfighter.

In 2003, the ACTD joined the Global War On Terror and deployed the U.S. Navy's first-ever operational USV to

support missions during Operation Iraqi Freedom. In November 2004 and April 2005, SPARTAN completed the U.S. Navy's first-ever USV live-fire tests at the Aberdeen Proving Grounds, Maryland with a .50 cal machine gun. The technology development subsequently transitioned to the Navy's Littoral Combat Ship program. Dr. Ricci received the 2004 ACTD Technical Manager of the Year award from the Deputy Under Secretary of Defense for Advanced Systems and Concepts.

As Program Manager for the SPARTAN USV initiative at NUWC Division, Newport, Dr. Ricci led the development efforts of a government/industry team and was responsible for development of system requirements and concept of operations for USVs. He has served as Assistant NUWC Tomahawk Program Manager and as Project Manager for the NUWC Tomahawk Test and Evaluation Project.

Dr. Ricci holds a Bachelor of Science degree in Aerospace Engineering from Syracuse University as well as a Master of Science degree and a Doctorate degree in Mechanical Engineering and Applied Mechanics from the University of Rhode Island.



## RDML KURT ROTHENHAUS, USN

*Program Executive Officer*  
Command, Control, Computers, Communications, & Intelligence, and Space Systems,  
Naval Information Warfare Systems Command

Rear Adm. Kurt Rothenhaus is a native of New York City, New York. He received his commission in 1992 upon graduating from the University of South Carolina where he earned a Bachelor of Science degree. He also earned a Master of Science in Computer Science and a Ph.D. in Software Engineering from the Naval Postgraduate School and transferred into the Engineering Duty Officer community in 2003.

His operational assignments include serving as the combat systems/C5I officer on USS Harry S. Truman (CVN 75) and chief engineer

on USS O'Brien (DD 975). Additionally, he served on the staff of Destroyer Squadron 15 and on USS Fife (DD 991). He completed an Individual Augmentee tour in Baghdad, Iraq.

His shore tours include: program manager for PMW 160, the Navy's Tactical Networks Program Office, at PEO C4I and commanding officer of Space and Naval Warfare Systems Center Pacific. He also served as the deputy program manager for the Navy Communications and GPS Program Office (PMW/A 170), the assistant program manager for the Consolidated Afloat Network Enterprise Services (CANES) in PMW 160,

and the Maritime Tactical Command and Control (MTC2) assistant program manager in the Navy Command and Control Program Office (PMW 150).

In May 2020, he assumed duty as program executive office Command, Control, Computers, Communications and Intelligence and program executive office Space Systems, Naval Information Warfare Systems Command.

His personal awards include the Legion of Merit, Meritorious Service Medal, Joint and Navy and various unit and service awards.





## RDML RICHARD SEIF, USN

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### *Commander*

#### Undersea Warfighting Development Command

Rear Adm. Seif is a native of Pittsburgh, Pennsylvania. He graduated from the U.S. Naval Academy in 1992 with a Bachelor of Science in Marine Engineering. He also holds a Master's in Business Administration from the College of William and Mary's Mason School of Business.

At sea, he has served aboard five nuclear fast attack submarines. He served as a junior officer aboard USS Newport News (SSN 750), engineer officer and combat systems officer aboard USS Oklahoma City (SSN 723), and executive officer aboard USS Houston (SSN 713).

He commanded USS Buffalo (SSN 715), homeported in Guam, from April 2010 to February 2013. During this tour,

he conducted extensive operations in the Western Pacific, and the boat was awarded the Navy Unit Commendation, the Meritorious Unit Commendation, two Battle Efficiency awards, and the Arleigh Burke Fleet Trophy. He also commanded USS Jacksonville (SSN 699), completing a U.S. 5th and 7th Fleet deployment. Most recently, he served as commodore, Submarine Squadron One and chief of staff to Commander Submarine Force, U.S. Pacific Fleet.

Ashore, he served as the military assistant to the Assistant Secretary for Defense for Strategy, Plans, and Capabilities; deputy chief of staff for Operations for Submarine Group Seven/Task Force 74 in Yokosuka, Japan; the Navy's national director of Submarine and Nuclear Power Recruiting;

board member and executive officer of the Fleet Forces Command Nuclear Propulsion Examining Board; and flag aide to Commander Submarine Force, U.S. Atlantic Fleet/Submarine Allied Command Atlantic.

His personal decorations include the Defense Superior Service Medal (two awards), Legion of Merit (three awards), Meritorious Service Medal (four awards), Joint Commendation Medal, Navy and Marine Corps Commendation Medal (five awards), and Navy and Marine Corps Achievement Medal (three awards). He has served with crews that have earned seven Battle Efficiency awards, two Arleigh Burke Fleet Trophies, and various unit and campaign awards.



## RADM LORIN SELBY, USN

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### *Chief of Naval Research*

#### Office of Naval Research

Rear Adm. Lorin C. Selby is a native of Baltimore, Maryland. He graduated from the University of Virginia with a Bachelor of Science in nuclear engineering and earned his commission through the Navy's Reserve Officers Training Corps program. He also holds a Master of Science in nuclear engineering and a Nuclear Engineer degree from the Massachusetts Institute of Technology.

His shipboard tours include USS Puffer (SSN 652), USS Pogy (SSN 647) and USS Connecticut (SSN 22). From July 2004 to May 2007, he commanded USS Greenville (SSN 772) in Pearl Harbor, Hawaii. During these assignments, Selby conducted several deployments to the western and northern Pacific, northern Atlantic and Arctic oceans.

Ashore, Selby's staff assignments include duty as a company officer and instructor at the U.S. Naval Academy; service as the

deputy director of the Navy's liaison office to the U.S. House of Representatives; and duty as the Submarine Platforms and Strategic Programs branch head in the Submarine Warfare Directorate on the Navy Staff. Following selection as an acquisition professional, he served as the program manager for both the Submarine Imaging and Electronic Warfare Systems Program Office (PMS 435) and the Advanced Undersea Systems Program Office (PMS 394).

As a flag officer, Selby served as commander, Naval Surface Warfare Center (NSWC) from October 2014 to August 2016. In this position, he led more than 17,000 scientists, engineers, technicians and support personnel, both civilian and active duty, within eight NSWC divisions located across the country.

From June 2016 until May 2020, he served as the Navy's chief engineer and the Naval Sea Systems Command deputy commander

for Ship Design, Integration and Naval Engineering, where he led the engineering and scientific expertise, knowledge and technical authority necessary to design, build, maintain, repair, modernize, certify and dispose of the Navy's ships, aircraft carriers, submarines and associated combat and weapons systems.

In May of 2020, he assumed command of the Office of Naval Research as the 26th Chief of Naval Research, with concurrent flag responsibilities as director, Innovation, Technology Requirements and Test and Evaluation (OPNAV N94).

Selby is authorized to wear the Distinguished Service Medal, the Legion of Merit (three awards), Meritorious Service Medal (four awards), the Navy and Marine Corps Commendation Medal (six awards), the Navy and Marine Corps Achievement Medal (three awards) and various unit awards.

# ON-DEMAND TECHNICAL SESSIONS

On-Demand gives you access to the technical presentations and handouts from the 2021 Undersea Warfare Virtual Conference to view at your own convenience. Accessing these presentations from the virtual conference allows you to gain valuable insights from the undersea warfare community.

## AVIATION USW

### HyDrone Multi-Domain (Marine, Ground, Air) Vehicle

#### Scott Kempshall

President and Chief Executive Officer  
HyALTA Aeronautics, Inc.

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### Distributed ASW: Sonobuoy Mission Capability on MQ-8 Fire Scout

#### Gary Morgan

Senior Technical Consultant  
Ultra Maritime, Sonobuoy Systems

Ultra and Northrop Grumman have been jointly developing a pod-launch and processing capability for G-sized sonobuoys for the MQ-8C Fire Scout RWUAV. The system was demonstrated off the Southern California coast in October 2020. This presentation will include an overview of the development effort and summary of the demonstration event, including a conceptual video of the fielded capability.

### Low-Cost Persistent Environmental Measurement System

#### Dr. Fritz Stahr

Vice President and Chief Technology Officer  
MRV Systems, LLC

MRV Systems is developing the ALAMO-2™, an ocean profiling float that measures temperature, salinity, pressure, ambient acoustic noise, and diffuse optical attenuation from the surface to 1500 feet deep many times a day. Designed to be deployed from various aircraft in a standard Sonobuoy Launch Canister, it transmits data ashore by Iridium satellite over periods of weeks to months. High-resolution data of ocean conditions in multiple domains at once (density, sound, light) provides critical input to the Navy's ocean models, tactical decision aids, and general ASW battle-space preparation. Funded by a NAVAIR SBIR program, the ALAMO-2™ is a low-cost, persistent environmental measurement system designed for the ASW warfighter.

## COMBAT SYSTEMS & C4I

### MinAu – Collaborative Autonomy for Navy UxV Swarms

#### Dr. Neil Dhingra

Business and Program Leader  
Orbit Logic, Inc.

Orbit Logic's Data Architecture Enabling Robust Cooperative Autonomy with Minimal Information Exchange (MinAu) solution is onboard software that benefits unmanned underwater vehicle (UUV) missions involving many assets cooperating to achieve a widespread set of mission objectives in a large area with very limited (and highly variable) opportunity to intercommunicate and exchange information. MinAu has been deployed and tested on relevant UUV platforms and shown utility toward a widespread set of missions, such as hull and port inspections, mine countermeasures, marine husbandry (cleaning to improve vessel fuel economy), seabed survey, mapping, search, repair, recovery. MinAu supports homogeneous and heterogeneous systems of assets, including different classes of underwater robots with varying installed capabilities and performance, and surface-going marine vehicles which in addition to hosting sensors might also provide communication relay support and resource resupply roles.

### DEVSECOPS and Observability: The Future of Cybersecurity in the Navy Underwater Systems Arena

#### Jim Pietrocini

Vice President, Space Superiority and Missile Defense Group  
Centauri

**Purpose?** To enhance the undersea community's cybersecurity posture with a better understanding of DEVSECOPS and the concept of continuous monitoring. The recent SolarWinds incident will have an impact on Navy C4I systems.

**Theme?** This research will impact how the undersea community develops and fields future C4I related systems/applications.

**Design/Methodology/Approach?** The value of "observability" is the ability for a real-time view of systems and applications. This continuous monitoring piece of DEVSECOPS allows the government to have real metrics to determine their investment value. The architecture also connects the development environment (i.e., the contractor, navy lab, acquisition community) with the end-user (fleet asset).

**Findings?** True logs and metrics are combined to determine the proper “observability” of a system or specific architecture.

**Practical Applications?** These efforts should focus on a few critical systems or applications currently operational in the fleet today.

**Original Value?** What unique findings will be conveyed through the research? Today’s current cybersecurity processes center around static testing based on a specific scheduled Red Team penetration test or an organized system scan that is a subset of a Risk Management Framework (RMF) process. An approved certification or accreditation of a system or application is approved based on the cybersecurity condition. This process can be in the past (some beyond 3-6 months). Software development and delivery is an ever-changing world. Writing code was once an art form all its own, where you could write and deploy machine code with freedom of purpose and no concern for things like connecting to other computers. But as the world and the variety of systems that software supports became more complex, so did the ecosystem support software development. The advancement in how teams create software, where it runs, what it affects, and how to secure those systems has accelerated Ops and Sec’s need to address the underlying systems’ evolving complexities. The Navy is moving towards DEVSECOPS.

The introduction of Blackpearl.us and the Project Overmatch Software Armory leads the Navy’s attempt to develop systems faster and remain competitive with our adversaries. There is also an attempt to keep pace with commercial best practices when hiring and retaining top software development talent. Agile development or DevSecOps has slightly different concerns and priorities, but the goals and methods are symbiotic and supportive. Developers are concerned with ensuring workflows are optimized for speed, measuring progress, and keeping backlog under control, and maintaining quality and compliance standards throughout the Dev cycle. Ops teams care about ensuring that architecture and infrastructure requirements are clearly defined and validated to ensure availability, optimal performance, and scalability. Security and compliance teams care about providing data leakage is limited and that the organization’s security and compliance posture is strong throughout the dev/test lifecycle.

DevSecOps is both a mentality and a workflow that provides the following:

- Automated build, test, scan, and deployment processes
- Reduced “drift” between implementations by standardizing configurations.
- Reduced attack surface using pre-hardened components.
- Full observability across the entire stack, including infrastructure, applications, and access
- Improved resilience with the ability for loosely coupled components to fail gracefully or be replaced easily

A DevSecOps approach requires more coordination and up-front agreement across each of the teams. The dependencies and goals to be achieved at each sprint result in a robust code that adheres to: Continuous integration, continuous delivery/deployment (CI/CD): Building blocks with hardened containers, automated build, and testing. Infrastructure as Code (IaC): System and network automation and orchestration with security controls, zero-trust, and chaos engineering principles built-in. Ruggedness: Security that is built-in at the initial stages rather than being an afterthought. Continuous monitoring: The ability to monitor and measure all aspects of the infrastructure and workloads running there; used for security, auditing, compliance, and performance. Finding all relevant information is the very first step in any program and software development project and often the deciding factor between success and failure for that operation. Fast search over all data sources is the key to making critical business decisions, identifying performance issues, and detecting internal or external threats.?

The recent SolarWinds incident exposes the lack of “observability” in a program or systems network, system logs, and applications. It is one thing to collect logs-records and never have the resources to analyze real-time issues or problems. Combining logs, metrics, and application performance monitoring will become particularly important as the DEVSECOPS side car function.

## UNDERSEA SENSORS

### A Novel Fiber Optic Telemetry System Can Be Integrated into Towed Sonar and Other Sensor Arrays

**Dr. David Sharman**

Chief Executive Officer

Kingfisher Business Solutions, LLC

A novel optical telemetry system has been experimentally integrated into a towed sonar array using traditional sensors. The system harnesses the benefits of an optical network reducing signal noise. Replacing copper wire in a traditional array reduces weight and drives down cost. The optical telemetry system has the potential to be integrated into network system of systems similar to the Undersea Constellation and POSYDON.

### Small USV ASW TTX

**Brian Gregg**

Engineer

U.S. Navy Federal NAVSEA

Conducted Wargame/TTX Wargame 1 at the Lockheed Martin Lighthouse Facility in Suffolk, Virginia from 15-17 Dec 2020. The TTX series in Fall 2020/Winter 2021 is intended to evaluate the potential for small USV Platforms to provide a disruptive technology solution in the Great Power Competition. The purpose of these TTXs is to inform Warfare Center investment/procurement decisions and reduce the time required to deliver emerging technologies to the fleet. The Capability to Fleet initiative is sponsored by the office of Director Surface Warfare (HQ DSW). The proponent for the Small USV TTX Series is Fleet Forces Command (FFC). The Operational Proponent is U.S. PACFLT. TTX 1, 15-17 Dec was directed at evaluated USVs in the ASW Mission Set specifically. The event included evaluation of the existing Navy USV



Programs of record including the GARC very small USV produced by Maritime Applied Physics and the CUSV produced by Textron. The TTX also included examination of the Mobile Hybrid Sensor Package developed by NUWC Keyport, and the GTS TRAPS Variable Towed Active/Passive Array. The event generated a range of useful insights captured in an AAR available at higher classification. The next event will be TTX 19-21 Jan focused on the Surface Warfare Mission Set at the LM Lighthouse. The event supported FFC Distributed Mission Ops analysis. The games are designed as computer assisted games and use the simulation Command PE (Matrix Games) to automatically adjudicate outcomes at real-time/faster than real-time. Players experience a perceived view of enemy forces and have to make decisions dynamically and interactively under realistic time constraints. This simulation has proven highly effective at supporting tactical level naval wargames.

## Undersea Distributed Acoustic Sensor (DAS) Systems for Protection of Expeditionary Advanced Base Operations

**Chelsea Meggitt**

Managing Director and Senior Strategic Planner  
Sound & Sea Systems, LLC

Expeditionary Advanced Base Operations (EABO) is a major Navy/Marine Corps initiative focused on China and the Indo-Pacific area of operations that envisions placement of relatively small Marine Corps units, armed with long-range strike and other weapons, at forward locations. These expeditionary outposts are likely nearshore and are potentially vulnerable to waterborne attacks by units in small boats, by swimmers or divers or by forces inserted from amphibious vessels offshore. This paper describes an expedient, rapidly-deployable undersea sensor system that can detect and classify these types of threats as part of an overall force protection paradigm for EABO.

## Bayesian Inversion Method for Determining Seafloor Sediment and Bathymetric Properties from Simulated Transmission Loss Data

**James Albritton**

Graduate Student

Applied Research Laboratories, University of Texas, Austin

The study focuses on how recent inversion techniques can be used to reinforce and improve understanding of the seafloor's composition and structure by obtaining sediment bulk parameters and bathymetric parameters through inexpensive in situ acoustic data. Parallel tempering is one such technique that has helped overcome some of the pitfalls inversion techniques often face when applied to underwater sound propagation problems. By combining it with Bayesian inversion, our work seeks to determine the viability of inverting for not only the composition of the seafloor, but also its structure in areas where sediment ripples are likely to form.

## Deep Learning for Clutter Reduction in Multistatic Active Sonar Systems

**Bradley Riddle**

Principal Investigator

Signal Systems Corporation

Signal Systems Corporation is developing breakthrough performance improvements for multistatic processing in its Phase II SBIR "Deep Learning for Clutter Reduction in Multistatic Active Sonar Systems". New capabilities aim to reduce training requirements, better integrate with advanced data fusion products and enable new multistatic active sonar platforms.

## UNDERSEA VEHICLES

### Presenting the Hyper-Sub Multi-Purpose Subsea Utility Vehicle (MSV)

**Alasdair Murrie**

Consultant, Business & Product Development, and  
Manufacturers Representative  
Hyper-Sub Platform Technologies, Inc.

The Hyper-Sub Multi-Purpose Subsea utility Vehicle (MSV) is a multi-passenger, multi payload speedboat capable of traveling at speeds of

up to 30Kts and with a potential range of 500 miles.

When required, and with the flick of a few switches, using onboard ballast tanks, MSV can then dive to 500ft or operate in waters as shallow as 15ft, traveling submerged for more than 300 miles on a single mission.

The capabilities of the Hyper-Sub MSV make it a perfect solution for multiple government and military operations, particularly littoral operations.



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## Sea Water Inflated – Launch and Recovery System (SWI-LARS)

**Mitchell Loyd**

Mechanical Engineer

Phoenix International Holdings, Inc.

The Sea Water Inflated Launch and Recovery System (SWI-LARS) is an innovative solution for a Department of the Navy (DON) requested inflatable system to ease the current operations involved with launching and recovering UUVs. SWI-LARS utilizes soft inflatable structures with a compact and predictable deflated shape to extend and retract the UUV through a Virginia-Class submarine torpedo tube. This effort is currently in Round 3 of a direct to Phase 2 SBIR. Current focus of the system is performing 1000 operational cycles and preparing for torpedo tube integration

## Submarine Escape and Rescue Program

**CAPT Jonathan Kim, USN**

PMS 390

The U.S. Navy's submarine escape and rescue program supports U.S. and foreign submarine services, providing needed capability to rescue sailors in the event of a distressed submarine (DISSUB).

The U.S. Navy operates the Submarine Rescue Diving and

Recompression System (SRDRS) and the Submarine Rescue Chamber Fly-away System (SRCFS) for deep and shallow water rescue. In order to maintain and increase the overall capabilities of the USN Submarine Escape and Rescue Program, PMS 391 continues to actively pursuing technology improvements to address capability gaps, enhance survivability challenges of DISSUB sailors before and after rescue, improve operational proficiencies, maintain efficiency, and increase international engagements.

## Getting Started with the Unmanned Maritime Autonomy Architecture (UMAA): The Software Architecture of Undersea Autonomous Vehicles

**John Breitenbach**

Regional FAE Manager

Real-Time Innovations, Inc.

The Unmanned Maritime Autonomy Architecture promotes the development of common, modular, and scalable software for Unmanned Maritime Vehicles. In this session we'll explore how the modular services provided by UMAA connect together to enable humans in, on, and out of the loop. Learn about Data Distribution Service (DDS), the connectivity framework that links UMAA services together and provides a data-centric view of the unmanned system. Finally, we'll see how DDS tools can help visualize and capture the behavior of your unmanned systems.

## WARFIGHTER PERFORMANCE

### Navigating Uncharted Waters: Developing and Deploying Software on Submarines in a DevSecOps Age

**LT Bridger Smith, USN**

Naval Postgraduate School

The research conducted covers the potential uses for submarine digital twins with specific focus on furthering the effort for more efficient maintenance planning. The case study also explores the possibility of rapidly deploying cloud based, containerized, continuous authority to operate software onto submarines to append additional methods to the submarine software playbook.

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General Dynamics Mission Systems partners with the DoD to provide advanced, mission-critical technologies for sustained influence across the maritime domain. From the modernization of the strategic deterrent to leading innovation in cross-domain, multi-level command, control and communication (C3) capabilities using manned and unmanned assets, our team is innovating to make Platforms Smarter and help the nation achieve a truly integrated all-domain force that is lethal, distributed, and networked.



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