

NDIA

AT THE HEART
OF THE MISSION



2021 UNDERSEA WARFARE FALL CONFERENCE

**Enabling the Undersea Force for High-End Combat Today,
While Fielding the Undersea Force of Tomorrow**

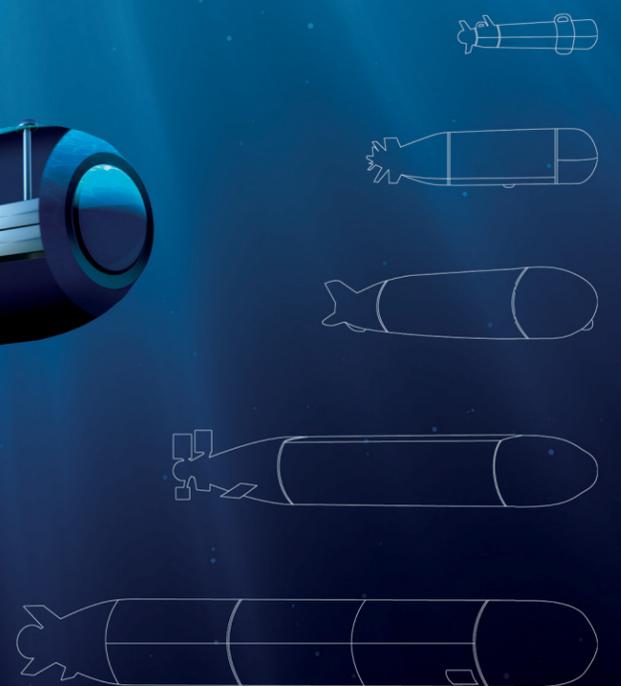
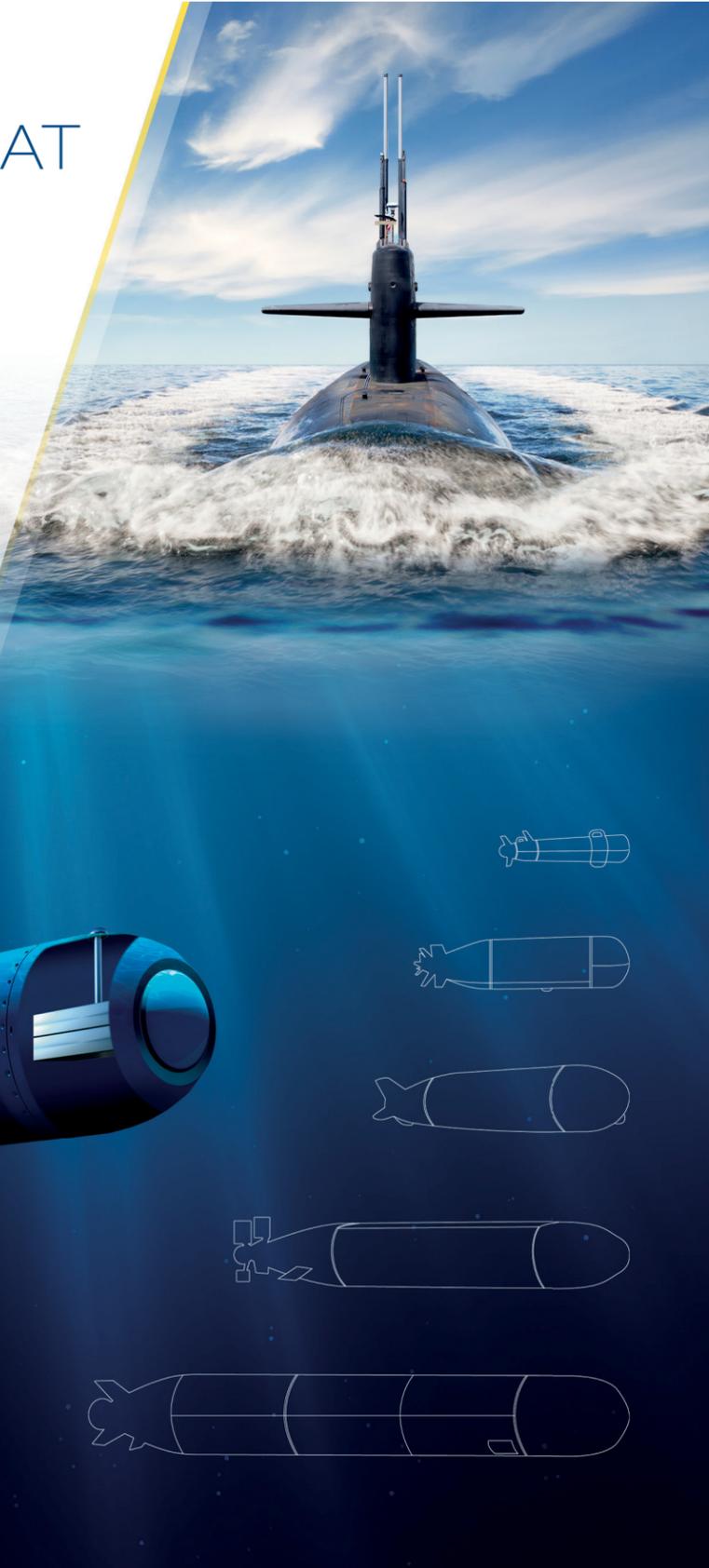


Groton, CT | October 25 – 27 | [NDIA.org/FallUSW](https://ndia.org/FallUSW)

EXPERTISE THAT RUNS DEEP

INNOVATIONS FOR A NEW ERA OF SEAPOWER

- Delivering power, propulsion, weapons and communications technologies
- Build-to-print manufacturing, including large complex structures and parts
- Specialized design and engineering services for critical system development



Learn more at www.ga.com/ems

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JOIN THE CONVERSATION



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NDIA

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

SCHEDULE AT A GLANCE

TUESDAY, OCTOBER 26

Registration
Dealey Center Auditorium
7:00 am – 5:00 pm

Networking Continental Breakfast**
Outside Plaza
7:00 – 8:00 am

Plenary Sessions
Dealey Center Auditorium
8:00 am – 5:00 pm

Networking Lunch**
Base Gymnasium
11:55 am – 1:00 pm

***Networking Reception**
Base Gymnasium
6:00 – 7:00 pm

***Networking Dinner**
Base Gymnasium
7:00 – 9:30 pm

WEDNESDAY, OCTOBER 27

Registration
Dealey Center Auditorium
7:00 am – 5:00 pm

Networking Continental Breakfast**
Outside Plaza
7:00 – 8:00 am

Technical Sessions
Various Base Locations
8:00 am – 5:00 pm

Networking Lunch**
Base Gymnasium
12:45 – 1:45 pm

*A ticket is required to attend these events and will be distributed during on-site registration.

**Government attendees are required to purchase a meal ticket

WELCOME TO THE 2021 USW FALL CONFERENCE

I welcome all of our attendees to the National Defense Industrial Association's 2021 Undersea Warfare Fall Conference. The NDIA Undersea Warfare Division members are proud to again bring you this annual conference.

This conference concentrates on the Navy's core mission of countering submarine and mine threats to the free and open flow of sea borne commerce and to the conduct of power projection from the sea. All Navy platforms and elements of the Navy force structure are involved in undersea warfare: submarines, surface combatants, fixed and rotary wing aircraft, surveillance units, and the Navy's command and control infrastructure. The USW Division has five active Technical Committees that focus on the Navy's mission areas: Sensor Systems, Mine Warfare Systems, Undersea Vehicles (including weapons), Aviation, and C4I and Combat Systems and Warfighter Performance. The technical sessions on the second day of the conference focus on recent events, advancements and challenges in each of these mission areas.

The mission of the NDIA's Undersea Warfare Division is to focus on critical undersea warfare areas related to the development, production, testing and logistic support of underwater combat systems. This includes mines, torpedoes, manned and unmanned underwater vehicles, countermeasures, sensors, weapon control and handling equipment; and the integration of systems aboard aircraft, ships and submarines.

The NDIA's Undersea Warfare Division fosters the exchange of technical information between government and industry 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 group also supports both government and industry with advice on undersea warfare policies and acquisition planning.

Your feedback is highly encouraged to ensure we continue to meet your needs.

CAPT Robert Dunn, USN (Ret)
Chairman, NDIA Undersea Warfare Fall Conference

GET INVOLVED

Learn more about NDIA's Divisions and how to join one at [NDIA.org/Divisions](https://www.ndia.org/Divisions)



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
- Rob Dunn**
Fall Conference Chair
- Paul Rosbolt**
Session Chair – Combat Systems
Warfighter Performance & C4I
- Kevin Hagan**
Session Chair – Mine Warfare
- Tom Ruzic**
Session Chair – Undersea Vehicles
- Glen Sharpe**
Session Chair – Aviation Systems
- Joe Cuschieri**
Session Chair – Undersea Sensors

EVENT INFORMATION

LOCATION

Conference Venue
U.S. Navel Submarine Base New London
1 Crystal Lake Road
Groton, CT 06340

Host Hotel
Mystic Marriott Hotel & Spa
625 N Road
Groton, CT 06340

ATTIRE

Civilian: Business
Military: Uniform of the Day

SURVEY AND PARTICIPANT LIST

You will receive via email a survey and list of participants (name and organization) after the conference. Please complete the survey to make our event even more successful in the future.

EVENT CONTACT

Meredith Mangas
Associate
Director, Meetings
(703) 247-9467
mmangas@NDIA.org

George Webster
Manager, Divisions
(703) 247-9491
gwebster@NDIA.org

Andrew Peters
Meeting Manager
(703) 247-2572
apeters@NDIA.org

SPEAKER GIFTS

In lieu of speaker gifts, a donation is being made to the Fisher House Foundation.

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.

EVENT CODE OF CONDUCT

NDIA's Event Code of Conduct applies to all National Defense Industrial Association (NDIA), National Training & Simulation Association (NTSA), and Women In Defense (WID) meeting-related events, whether in person at public or private facilities, online, or during virtual events. NDIA, NTSA, and WID are committed to providing a productive and welcoming environment for all participants. All participants are expected to abide by this code as well as NDIA's ethical principles and practices. Visit [NDIA.org/CodeOfConduct](https://www.ndia.org/CodeOfConduct) to review the full policy.

ANTITRUST STATEMENT

The 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.



TRACK INFORMATION

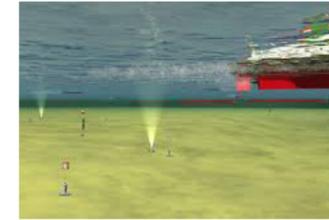


Aviation Systems

Glen Sharpe
Lockheed Martin Corporation

This Aviation session focuses on the capability, integration and synergies that the airborne Undersea community brings to the fight. Because of the wide

range of "aviation platforms," from wide-body fixed-wing to rotary winged, as well as the gamut of unmanned systems, the committee is interested in articulating the contributions and potential of these weapons systems. Desired technical subjects cover the broad areas of signal processing, human factors, training, undersea capable weapons, sensors, man-machine interface, littoral and large area search as well as the networking required to make all of this happen. The presentations cover a range of topics, including theoretical discussions by academic institutions and laboratories, reports on experimental systems and systems being developed for Fleet introduction, and discussions of Navy programs of record.

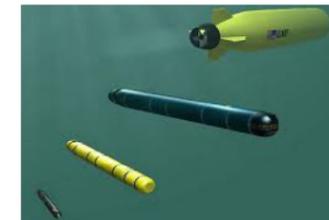


Undersea Sensors

Joe Cuschieri
Lockheed Martin Corporation

The focus of the Undersea Sensors session is to provide guidance to the U.S. Navy about the application of cutting edge technology. Abstracts

submitted to this section relate to the following: underwater acoustic transduction and acoustic sensor arrays, electro-optic sensors, magnetic sensors, electrostatic sensors, chemical sensors, gravity sensors, signal processing, test and evaluation, operational use/sea test results, and theoretical studies. This list is not exhaustive but representative of several disciplines and associated sciences.



Undersea Vehicles

Tom Ruzic
Huntington Ingalls Industries

The Undersea Vehicles session focuses on both large and small hull undersea vehicles (both manned and unmanned) and unmanned surface vehicles.

Technical subjects cover the broad areas of weapons, unmanned vehicles, defensive systems and hull, mechanical and electrical systems. The technical presentations range from theoretical discussions by academic institutions and laboratories, reports on experimental systems and systems being developed for Fleet introduction, to discussions of Navy programs of record.



C4I

Paul Rosbolt
Systems Planning and Analysis, Inc.

The C4I Technical session focuses on Communications, Information Exchange, Data Fusion and Command and

Control enablers for the ASW Kill Chain F2T2EA (Find, Fix, Track, Target, Engage and Assess). Committee presentations are given by academia, government and industry and cover a broad range of topics from theoretical discussions to updates on technology, programs of record and test results. A special focus for this year's conference will be Information Assurance/Cyber-Security as it relates to Undersea Warfare.



Warfighter Performance & Combat Systems

Paul Rosbolt
Systems Planning and Analysis, Inc.

This special session on Warfighter Performance & Combat Systems is intended to address evolving

operational needs and solutions in the area of USW Warfighter Performance which employ a combination of components such as technology, HSI, Serious Games, Virtual Worlds, and other emerging concepts. Presentations in this session will address approaches that effectively combine cross discipline techniques and methodologies to provide real capability to the Warfighter across all USW Warfare Domains/Enterprises (i.e., Submarine, Surface, Air, and MIW Enterprises).

Human Systems Integration (HSI) – Improving data visualization techniques and enhancing intuitive decision making; improving the reliability of critical information Operator Capability

Training – Establishing linkages between theory, experiments, and training system design; integrating M&S to increase realism as well as cost efficiency of onboard submarine training capability

Health and Wellness – Reducing or countering the negative effects of fatigue, stress, illness, etc.; improving on-board environment with respect to atmosphere, nutrition, exercise, noise exposure, etc.



Mine Warfare

Kevin Hagan
Peraton, Inc

The Mine Warfare (MIW) session provides the opportunity for industry, government, and academia to exchange information and express their views in

addressing technical, programmatic and operational issues and activities in the MIW community. The Committee addresses threats, programs, operations, CONOPS, and future technologies across the MIW spectrum of mine hunting, mine sweeping, neutralization, command and control, mining and other areas of interest.

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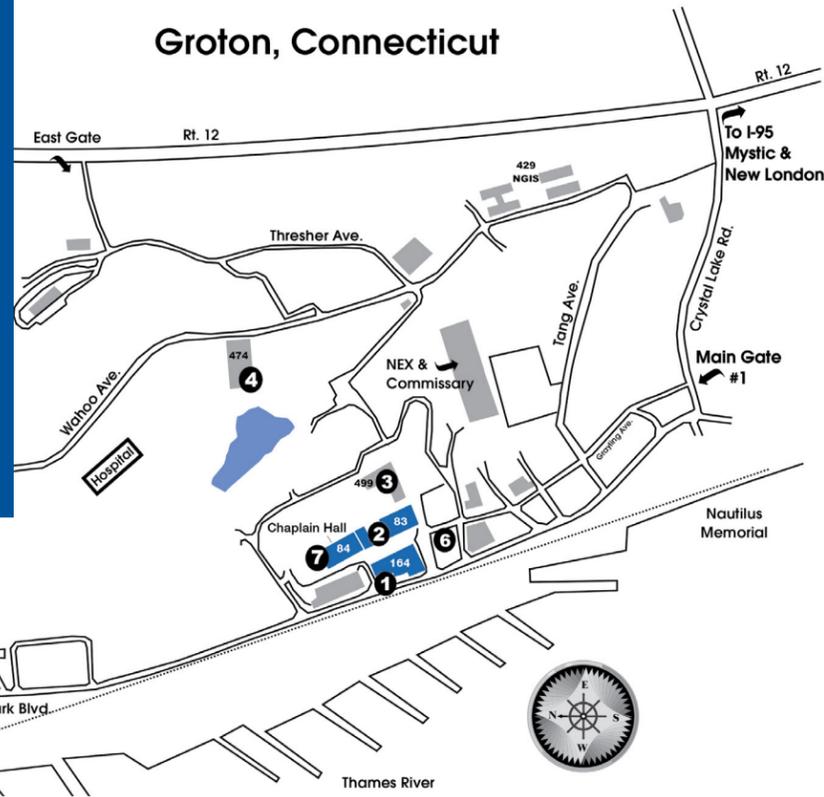
Shock and Vibration Tested

Dan Berwitz

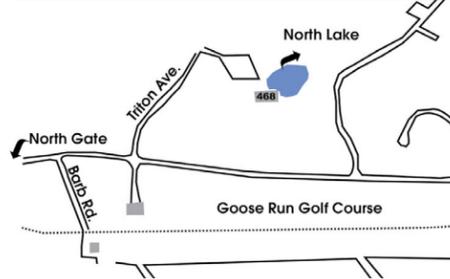
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Naval Submarine Base New London

Groton, Connecticut



- SPEAKING SITES**
- PLENARY SESSIONS**
1. Dealey Center Auditorium (no general parking available)
- TECHNICAL SESSIONS**
2. Building 83: Aviation Systems
 7. Building 84: C4I
1. Dealey Center Auditorium : Undersea Sensors
1. Dealey Classroom: Undersea Sensors
 3. Bledsoe Hall: Undersea Vehicles
 4. Lewis Hall: Combat Systems & Warfighter Performance
 7. Building 84, Room 106 : Mine Warfare
- PARKING**
6. VIP Parking



AGENDA

MONDAY, OCTOBER 25

3:00 – 6:30 pm **REGISTRATION**
MYSTIC MARRIOTT HOTEL AND SPA



5:00 – 6:30 pm **RECEPTION**
MYSTIC MARRIOTT HOTEL AND SPA



TUESDAY, OCTOBER 26

7:00 am – 5:00 pm **REGISTRATION**
DEALEY CENTER AUDITORIUM



7:00 – 8:00 am **NETWORKING BREAKFAST**
OUTSIDE PLAZA

8:00 – 8:15 am **CALL TO ORDER & INTRODUCTION OF SPEAKERS**
DEALEY CENTER AUDITORIUM

Mike Cortese
Senior Manager, Washington Operations, General Dynamics Electric Boat
Chair, Undersea Warfare Division, National Defense Industrial Association (NDIA)

Col Wesley Hallman, USAF (Ret)
Senior Vice President, Strategy & Policy, NDIA

Rob Dunn
Chairman, NDIA Undersea Warfare Fall Conference

8:15 – 8:45 am **PRESENTATION**
DEALEY CENTER AUDITORIUM

ADM James Caldwell, USN
Director, Naval Nuclear Propulsion Program, Department of the Navy/Energy

8:45 – 9:15 am **PRESENTATION**
DEALEY CENTER AUDITORIUM

VADM Bill Houston, USN
Commander, Naval Submarine Forces/Submarine Force, U.S. Atlantic Fleet/Allied Submarine Command

9:15 – 9:45 am **PRESENTATION**
DEALEY CENTER AUDITORIUM

RADM Jeffrey Jablon, USN
Commander, Submarine Force, U.S. Pacific Fleet

9:45 – 10:15 am **NETWORKING BREAK**
OUTSIDE PLAZA

10:15 – 10:40 am **PRESENTATION**
DEALEY CENTER AUDITORIUM

Ron Vien
Technical Director, Naval Undersea Warfare Center

10:40 – 11:10 am **PRESENTATION**
 DEALEY CENTER AUDITORIUM
RADM David Goggins, USN
 Program Executive Officer, Attack Submarines

11:10 – 11:40 am **PRESENTATION**
 DEALEY CENTER AUDITORIUM
RADM Scott Pappano, USN
 Program Executive Officer, Strategic Submarines

11:40 – 11:55 am **AWARDS CEREMONY**
 DEALEY CENTER AUDITORIUM
Pierre Corriveau
 Awards Chair, Undersea Warfare Division, NDIA

11:55 am – 1:00 pm **NETWORKING LUNCH**
 BASE GYMNASIUM

1:00 pm **INTRODUCTION OF SPEAKERS**
 DEALEY CENTER AUDITORIUM
Rob Dunn
 Chairman, NDIA Undersea Warfare Fall Conference

1:00 – 1:30 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
RDML Edward Anderson, USN
 Program Executive Officer, Undersea Warfare Systems

1:30 – 2:00 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
Andrew Richardson
 Deputy Commander, Office of Naval Intelligence

2:00 – 2:30 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
Jay Dryer
 Director, Strategic Capabilities Office, Office of the Secretary of Defense

2:30 – 3:00 pm **NETWORKING BREAK**
 OUTSIDE PLAZA

3:00 – 3:30 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
Dr. William Burnett
 Technical Director to the Commander, Naval Meteorology and Oceanography Command/Task Group



3:30 – 4:00 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
CAPT Pete Small, USN
 Unmanned Maritime Systems (PMS 406)

4:00 – 4:30 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
CAPT Daniel Papp, USN
 Program Executive Officer, Air Anti-Submarine Warfare (PMA 264)

4:30 – 5:00 pm **PRESENTATION**
 DEALEY CENTER AUDITORIUM
RADM Douglas Perry, USN
 Director, Undersea Warfare Division, N97, Office of the Chief of Naval Operations

5:00 pm **CLOSING REMARKS**
 DEALEY CENTER AUDITORIUM
Mike Cortese
 Senior Manager, Washington Operations, General Dynamics Electric Boat
 Chair, Undersea Warfare Division, NDIA

6:00 – 7:00 pm **NETWORKING RECEPTION**
 BASE GYMNASIUM
 Pre-Registration Required



7:00 – 9:30 pm **NETWORKING CLAMBAKE DINNER**
 BASE GYMNASIUM
 Pre-Registration Required



WEDNESDAY, OCTOBER 27

7:00 am – 5:15 pm **REGISTRATION**
 DEALEY CENTER AUDITORIUM



7:00 – 8:00 am **NETWORKING BREAKFAST**
 OUTSIDE PLAZA

CONCURRENT BREAKOUT SESSIONS

	Combat Systems and Warfighter Performance	Undersea Vehicles	Aviation Systems		Undersea Sensors	Mine Warfare	C4I	Undersea Sensors
	BUILDING 83, ROOM 317	BLED SOE HALL	BUILDING 83, ROOM 318		DEALEY CENTER AUDITORIUM	BUILDING 84, ROOM 106	LEWIS HALL	DEALEY CLASSROOM
8:00 – 8:30 am	23984 PEO IWS 5.0 Program Status and Plans CAPT Jill Cesari, USN Major Program Manager, Program Executive Office for IWS 5.0	24169 Enabling Undersea Technology CAPT Gary Montalvo, USN Commodore, COMSUBDEVRON 5	PMA-264 Program CAPT Daniel Papp, USN Program Manager, Air Anti-Submarine Warfare Systems Program		ONI - 03 Undersea Warfare Sensors	24055 NSWC Panama City Division NISE Program Supporting MIW Dr. Kerry Commander Chief Technology Officer, NSWC – Panama City	24146 Sustaining The Undersea Advantage: Transforming Anti-Submarine Warfare Using Autonomous Systems Bryan Clark Senior Fellow, Hudson Institute	24097 Waveform Identification, Source Localization, and Fully-Automated Active Bistatic Processing Dr. Ryan Pirkel Research Scientist, Applied Research Laboratories, University of Texas at Austin
8:30 – 9:00 am	24127 IWS 5.0 Combat Systems Update Peter Scala Director, Advanced Development, Program Executive Office for IWS 5.0	24136 Robotic Submarine Sustainment and a Vision Towards Sustainment Operations at Sea: Extending Operational Lifecycle, Maximizing Operational Availability, and Automated Battle Damage Assessment David Shane Program Manager, Business Development, Boston Engineering	24140 Development of a Cable Pack for a Rap Depth Sonobuoy David Hammond Program Manager, Navmar Applied Sciences Corp		24135 Multi-Ship Sonar Bi-Static Automatic Active Localization Dr. Terence Bazow Director, Advanced Systems Technology, Metron Incorporated	OPNAV N952 Update CAPT Mike Egan, USN Branch Head, OPNAV N952	24149 Autonomous Systems at Sea: Implications for Future Undersea Networking Trends Dr. Pedro Forero Engineer, Naval Information Warfare Center (NIWC) – Pacific	24065 A Machine Learning Model for Classification of Passive Sonar Signals, Opportunities, and Challenges LT Andrew Pfau, USN Military Instructor, U.S. Navy
9:00 – 9:15 am	NETWORKING BREAK OUTSIDE PLAZA							
9:15 – 9:45 am	24104 Future State for Submarine Computing: Progress Report Daniel Moniz Engineer, Naval Undersea Warfare Center (NUWC)	24137 The Dive-LD: A Transformational LDUUV for Advanced Subsea Applications James Buescher Director, Programs, Dive Technologies	24162 Next-Generation Air ASW: Extended-Range DIFAR (ER-DIFAR) Development, Results, and Challenges Tim Rorick Chief Technologist, Ultra Maritime		24094 IWS 5.0 Sensors Update Peter Scala Program Executive Officer, IWS 5.0	24175 Developments and Applications in Standoff Command and Control for Undersea Systems Dr. Anthony Jones Engineer, NIWC – Pacific	24092 Innovation at Speed Through Lab-As-A Service (LAAS) John Sprague Engineering Director and Strategic Advisor, World Wide Technology Bruce Rice Consulting Solutions Engineer, Navy, World Wide Technology	24107 Installation of Expeditionary Distributed Acoustic Sensor Systems Using Unmanned Surface Vessels CDR Steve McLaughlin, USN (Ret) Senior Program Manager, Unmanned Systems, Sound & Sea Systems
9:45 – 10:15 am	24132 The Submarine Track Picture – Bringing a Cop to the Edge William Roman Undersea Warfare Combat Systems Future Capabilities, NUWC – Newport Mike Fleming Vice President, Tactical Solutions, SEACORP	24152 LDUUV Launch and Recovery on Submarine Host Platforms Jack Chapman Staff Engineer, Electric Boat Corporation			24158 Maritime Surveillance Systems Program's (PMS-485) Role in the Undersea Domain CAPT Doug Adams, USN Major Program Manager, Maritime Surveillance Systems (PMS 485)	ONR Mine Warfare Update Emily Medina Program Manager, Mine Warfare & Ocean Engineering Programs (Code 32), Office of Naval Research (ONR)	24150 Communications Architecture Trade Study William Craig Advanced Technology Technical Project Manager, NUWC	24161 USV ASW Capability Results from UXS Integrated Battle Problem 21 Dr. Linda Frizzell-Makowski Program Manager, Johns Hopkins University Applied Physics Laboratory (JHU APL)
10:15 – 10:30 am	NETWORKING BREAK OUTSIDE PLAZA							

	Combat Systems and Warfighter Performance	Undersea Vehicles	Aviation Systems		Undersea Sensors	Mine Warfare	C4I	Undersea Sensors
	BUILDING 83, ROOM 317	BLEDSOE HALL	BUILDING 83, ROOM 318		DEALEY CENTER AUDITORIUM	BUILDING 84, ROOM 106	LEWIS HALL	DEALEY CLASSROOM
10:30 – 11:00 am	24101 Mitigation of Software Bloat in Integrated Builds Dr. Benjamin Drozdenko Computer Engineer, NUWC – Newport	24145 Glider and Profiling Float Applications for Theater ASW CAPT Peter Furze, USN (Ret) Director, Navy Program Development, Teledyne Marine	24163 Artificial Intelligence for Anti-Submarine Warfare Training: Jargon-Aware AI (JAWA) Dr. Thomas Murray Principal Investigator, Signal Systems Corporation		24126 Next-Generation Surveillance Towed Array System with Open Architecture Telemetry Methodology Nicholas Minovich Sensors Assistant Program Manager, Program Executive Office for IWS 5.0	24128 Modular Undersea Effectors (MUSE) John Dudinsky Project Manager, Naval Surface Warfare Center (NSWC) – Panama City	24177 Undersea Communications CAPT Dave Kuhn, USN Program Manager, Program Executive Office for C4I (PMW 770)	24171 The Maritime Testbed (MTB): An Enabling Navy Capability to Support Subsea & Seabed Warfare (SSW) Technology Development Joshua Henson Ocean Engineer, Naval Facilities, Engineering and Expeditionary Warfare Center Dr. Robert Barton, III Advanced Capabilities Manager, PMS 485 D2, NUWC – Newport
11:00 – 11:30 am	24147 Continuous Integration and Continuous Delivery to Modernize Combat Systems Capability	23977 Autonomous Undersea and Surface Vessel (AUSV) Jeffrey Williams Vice President, Ocean Aero, Inc.	24112 Rapid Acquisition Sensor and Response (RASR): Drifting Passive and Coherent Tactical Surveillance Dr. Geoffrey Edelson Chief Scientist, BAE Systems, FAST Labs		24131 Managing IUSS Mobile Surveillance System Capabilities, The Transition from Today to Tomorrow Donald Ringel, PE, MBA Assistant Program Manager, Future Capabilities, PMS 485	ONI - 08 Potential Adversaries Torpedo Update		24096 Argus: An Expeditionary Maritime Defense System Christian Schumacher Technical Program Manager, NUWC
11:30 – 11:45 am	NETWORKING BREAK OUTSIDE PLAZA							
11:45 am – 12:15 pm	24090 Modern Warfighter Joshua Sadeck Scientist, NUWC – Newport	24089 Architectural Overview of Unmanned Maritime Autonomy Architecture (UMMA) Reference Implementation Michael Wheatman Engineer, Research & Development, Pennsylvania State University	24159 Active Buoy Element Localization (ABEL) Sonobuoy for the Rapid Acquisition Sensor and Response (RASR) System William King Manager, Air Anti-Submarine Warfare Business Development, Ultra Electronics – USSI		24122 PMS 485 Deployable Surveillance Systems Update Susan LaShomb Deployable Surveillance Systems PAPM (PMS 485)	PMS 408 Mine Warfare Update CAPT Dan Malatesta, USN Program Manager, PMS 408	ONI - 04 Potential Adversary #1 ASW Threat	24121 Undersea Array Localization and Passive Thermometry from Acoustic Ambient Noise Dr. Adrian Doran Oceanographer, NUWC – Newport
12:15 – 12:45 pm	24095 Titan Underway Christopher Julius Undersea Mission Analyst, NUWC – Newport	24125 Getting Started with the Unmanned Maritime Autonomy Architecture (UMAA): The Software Architecture of Undersea Autonomous Vehicles Dan King Software Integration Engineer, Real Time Innovations, Inc.	24144 Hydrone Multi-Domain (Marine, Ground, Air) Vehicle Scott Kempshall President and Chief Executive Officer, HyALTA Aeronautics, Inc.		24093 IWS 5.0 Surface ASW Incorporation of Devsecops Principles Robert McNeal Chief Engineer, Program Executive Office for IWS 5.0	PMS 420 Update George Saroch Deputy Program Manager, PMS 420	ONI - 05 Potential Adversary #1 USW Event Reconstruction	24098 Superfrazze(EL) Dr. Ryan PirkI Research Scientist, Applied Research Laboratories, University of Texas at Austin
12:45 – 1:45 pm	NETWORKING LUNCH BASE GYMNASIUM 							
1:45 – 2:15 pm	24116 75 Years of Excellence at the Naval Submarine Medical Research Laboratory (NSMRL) Dr. Ben Lawson Technical Director, Naval Submarine Medical Research Laboratory	24142 Passive Propagation Resistant Li-Ion Batteries for Undersea Vehicles Dr. John Izzo Mechanical Engineer, NUWC – Newport	ONI - 06 Potential Adversary #2 Submarine ASUW		24099 Expanding the Submarine's Influence and Effectiveness through the Use of Small Payloads Robert Kunding Business Development Manager, Undersea Warfare, Sparton	ASTRAnet Dr. Ballard Smith Innovation Area Lead, Undersea Communications, and Outcome Lead, C2, MITRE	23962 Tactical Cybersecurity: Navigating Pitfalls throughout the System Lifecycle Irene Goan Chief Operating Officer, H2L Solutions, Inc.	24160 Novel Additively Manufactured Piezoelectric Transducers for Enhanced Performance Justin Tufariello Lead Sensor Systems Engineer, The MITRE Corporation

	Combat Systems and Warfighter Performance	Undersea Vehicles	Aviation Systems		Undersea Sensors	Mine Warfare	C4I	Undersea Sensors
	BUILDING 83, ROOM 317	BLED SOE HALL	BUILDING 83, ROOM 318		DEALEY CENTER AUDITORIUM	BUILDING 84, ROOM 106	LEWIS HALL	DEALEY CLASSROOM
2:15 – 2:45 pm	75 Years of Excellence at the Naval Submarine Medical Research Laboratory (NSMRL) <i>Continued</i>	24173 Undersea Battery Systems, Current and Future Technologies Timothy Cleary Researcher, Penn State ARL	ONI - 01 Acquisition Support for future Undersea Warfare Programs		24088 14v19 Techdemo: ACB-19 Virtualization Sea Test Kenneth Andronowitz Systems Engineer, NUWC – Newport		24100 Intelligent Cyber Threat Operational Planner For Under Sea (ICTOPUS) Jeffrey Hoyle Vice President, Federal Program, Scalable Network Technologies	24113 Textured Piezoelectric at L3Harris Technologies Dr. Lindsay Fuoco-Castrejon Senior Research & Development Ceramic Engineer, L3Harris Technologies
2:45 – 3:00 pm	NETWORKING BREAK OUTSIDE PLAZA							
3:00 – 3:30 pm	24102 Adaptive Under-Ice Autonomy Josiah DeLange Senior Software Engineer, General Dynamics Mission Systems LT Bradli Howard, USN Submarine Officer, MIT/ WHOI Graduate Student	24118 Use of Nickel Zinc Batteries in Undersea Application Michael Matson Deputy Director, Navy Electronics Manufacturing Center of Excellence (Programmatic), ACI Technologies, Inc. Rebecca Morris Senior Engineer, (Technical), ACI Technologies, Inc.			24156 The Mola Array, A Vertical Aperture Towed Array Dr. Jesse Daily Technical Project Manager, NUWC		24115 Virginia/Columbia Cyber Security Early Developmental Test 2021 and Future Plans Michael Beatty Lead System Engineer, NUWC – Newport	ONI - 10 ONI ACINT Successes with AI/ML
3:30 – 4:00 pm	24114 The Role of AI/ML in Large-Scale Heterogeneous Human-Machine Teaming Dr. Alexander Stimpson Chief Scientist, Artificial Intelligence, VTG (ASSETT Strategic Business Unit)	ONI - 07 Potential Adversary UxVs			24165 The Future of Undersea Fixed Surveillance Systems Dr. Robert Barton, III Manager, Advanced Capabilities, (PMS 485 D2), NUWC – Newport		24151 Modern Security Architecture through the Lens of SCADA/IoT John Sprague Engineering Director and Strategic Advisor, World Wide Technology Ricky Boyd Senior Consulting Solutions Architect, Navy, World Wide Technology	Development of a Deep Depth Capable, Low-Frequency, Broadband Source – Test Results Jason Osborne Technology Development Manager, BAE Systems
4:00 – 4:15 pm	NETWORKING BREAK OUTSIDE PLAZA							
4:15 – 4:45 pm	24091 Facilitating Undersea Decision-Making with Automated Mission Planning Dr. Benjamin Cooper Senior Scientist, BAE Systems	24119 Over the Horizon Targeting Using Autonomous Undersea Vehicles CDR Ronald Carvalho, USN (Ret) Director II, FAST Labs, BAE Systems			24174 Small Aperture Velocity Sensor (SAVS) Status Update Jerald Mullison Senior Scientist, Teledyne RD Instruments		24143 Network Switch Configuration Using Model-Based Systems Engineering (MBSE) Matthew Ferrier Vice President, Sonalysts, Inc.	24154 Low-Frequency Wind-Generated Noise Christopher Stockinger Student, Applied Research Laboratories, University of Texas at Austin
4:45 – 5:15 pm	24166 Virginia Class Evolution to Maintain Undersea Superiority Brandon Ball Program Representative, Electric Boat Corporation	24164 Virginia Class Improved Internal Countermeasure Launcher LCDR Timothy “T.J.” Buckley, USN Program Representative, Payload Integration, General Dynamics Electric Boat			24123 UUV Passive Acoustic Sensor Dr. Ashwin Sarma Senior Principal Scientist, FAST Labs, BAE Systems		ONI – 02 Adversary AI/ML	24105 Advancements in Nonlinear Acoustics at NUWC for Navy Applications Dr. Richard Katz Senior Engineer and Scientist, NUWC – Newport Dr. Derke Hughes Senior Research Scientist, NUWC – Newport
5:15 pm	CONFERENCE ADJOURNS							

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BIOGRAPHIES



ADM JAMES CALDWELL JR., USN

Director
Naval Nuclear Propulsion Program

Admiral James Caldwell received his commission graduating with distinction from the United States Naval Academy in 1981 with a Bachelor of Science in Marine Engineering. He also holds a Master of Science in Operations Research from the Naval Postgraduate School.

Caldwell commanded USS Jacksonville (SSN 699) homeported in Norfolk, Virginia; Submarine Development Squadron (DEVRON) 12 in New London, Connecticut; Submarine Group 9 in Bangor, Washington; and the Submarine Force, U.S. Pacific Fleet, Hawaii. His sea tours include service in both the Atlantic and Pacific Fleets. His

Operational assignments include duty as a division officer on USS Boston (SSN 703), engineering officer on USS Alabama (SSBN 731) (GOLD), and executive officer on USS Buffalo (SSN 715).

Ashore, Caldwell served on the Pacific Fleet Nuclear Propulsion Examining Board and later as Undersea Warfare (USW) Requirements officer on the staff of Commander in Chief, U.S. Pacific Fleet. He also served as senior member of the Naval Submarine Force's Tactical Readiness Evaluation Team; on the Joint Staff as deputy director for Politico-Military Affairs for Europe, the North Atlantic Treaty Organization, Russia and Africa; and deputy commander for U.S. Strategic Command's

Joint Functional Component Command for Global Strike in Omaha, Nebraska and as Naval Inspector General, Washington Navy Yard, D. C. His most recent tour was on the (Office of Naval Operations) OPNAV Staff as the Director, Navy Staff.

He assumed his duties as the Director, Naval Nuclear Propulsion Program in August 2015.

Caldwell's awards include the Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit, Meritorious Service Medal, Navy Commendation Medal, Navy and Marine Corps Achievement Medal, and the Naval Submarine League's Charles A. Lockwood Award for Submarine Professional Excellence.



RADM JEFFREY JABLON, USN

Commander
Submarine Force Pacific Fleet

Rear Adm. Jeffrey Jablon is a native of Frostburg, Maryland. He graduated from

Virginia Tech in 1987 with a degree in Mechanical Engineering. He also holds a Master of Business Administration from James Madison University.

His sea tours include a division officer assignment aboard USS L. Mendel Rivers (SSN 686), navigator and operations officer aboard USS Olympia (SSN 717) and executive officer aboard USS Key West (SSN 722). He commanded USS Philadelphia (SSN 690) in Groton, Connecticut, and was commodore of Submarine Development Squadron (DEVRON) Five in Bangor, Washington. Jablon was recognized by the

United States Naval Submarine League with the Jack Darby Award for Inspirational Leadership in 2007.

His staff assignments include: tours as assistant professor of naval science at Reserve Officer Training Corps Unit, University of Virginia; special projects officer on the Staff of the Commander, Submarine Force U.S. Pacific Fleet; naval warfare submarine strategist at U.S. Special Operations Command (USSOCOM); Commander, Submarine Development Squadron (COMSUBDEVRON) 12 deputy commander for training; Naval Submarine School prospective commanding officer instructor; division director of Submarine/ Nuclear Power Distribution (PERS-42).

As a flag officer, his tours include deputy director, plans and policies at U.S. Strategic Command (USSTRATCOM), commander, Submarine Group 10, director, military personnel plans and policy, OPNAV (N13) and is currently serving as commander, Submarine Force Pacific.

His awards include the Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit, Joint Meritorious Service Medal, Meritorious Service Medal, Navy-Marine Corps Commendation Medal, Navy-Marine Corps Achievement Medal and various unit and service awards.



RADM DAVID GOGGINS, USN

*Program Executive Officer
Attack Submarines*

Rear Adm. David Goggins is a native of Los Angeles.

He attended the University of California, Berkeley, and graduated in 1989 with a Bachelor of Science in Nuclear Engineering and Material Science Engineering. His graduate education includes a Master of Science in Operations Research from the Naval Postgraduate School, and a Master of Science in Mechanical Engineering from the Massachusetts Institute of Technology.

Goggins' career in the Navy began as a submariner aboard USS Tecumseh (SSBN 628) where he served as an electrical officer, reactor controls assistant, and assistant operations officer. He was then selected for lateral transfer to the Engineering Duty Officer Community and reported to the Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP) in Groton, Connecticut. At this command he was the lead ship

coordinator for PCU Connecticut (SSN 22) from initial hull erect to the initial stages of Post-Shakedown Availability planning.

Subsequent shore duty tours included serving as assistant repair officer at Naval Submarine Support Facility in New London, Connecticut; Seawolf class project officer and program manager's representative at SUPSHIP Groton; SSGN conversion project officer and program manager's representative at SUPSHIP Groton; Virginia class assistant program manager for new construction within PEO Submarines; and a staff assignment within the Office of Chief of Naval Operations, Undersea Warfare Division (N97).

Goggins also served as an individual augmentee participating in Operation Iraqi Freedom. While in Iraq, he supported the military's counter-IED effort and was responsible for fielding over 3,000 mission critical systems to counter the rapidly evolving IED threat.

Goggins served as major program manager of the Virginia Class Program and the Columbia Class Program. Under his leadership and guidance, the Virginia Program delivered three submarines to the fleet, started the initial design work on the Virginia Payload Module and Acoustic Superiority, and won the DoD Value Engineering Award and the David A. Packard Award for acquisition excellence. As the Columbia program manager, the program completed milestone B, awarded the Detail Design and Construction Readiness Contract, and started prototyping efforts.

Goggins became program executive officer for submarines in August 2018.

His awards include the Legion of Merit (two awards), the Meritorious Service Medal (two awards), the Navy Commendation Medal (two awards) and the Navy Achievement Medal (two awards).



RON VIEN

*Technical Director
Naval Undersea Warfare Center*

Ronald A. Vien, a member of the federal government's Senior Executive

Service (SES) since April 2018, serves as the Technical Director of the Naval Undersea Warfare Center (NUWC) Division Newport. In this role, he is responsible for providing research, development, test and evaluation, engineering, analysis and assessment, as well as Fleet support capabilities for submarines, autonomous underwater systems, and offensive and defensive undersea weapon systems, and stewards existing and emerging technologies to advance the state of the art in undersea warfare.

Mr. Vien concurrently serves as the Director, Undersea Warfare Systems Engineering, where he is responsible for oversight of 12 technical warrant holders to ensure that the Navy maintains its position as the foremost technical authority over a broad portfolio of undersea warfare systems.

Prior to assuming his current position, Mr. Vien led the Sensors and SONAR Systems Department at NUWC Division Newport. As a senior scientific technical manager (SSTM) he led a diversified team of over 600

government and 250 contractor scientists, engineers, and technicians engaged in a broad spectrum of Naval research, development, engineering, and acquisition in pursuit of advancing the state-of-the-art in sensor and sonar system designs.

Mr. Vien began his career in 1987 while attending the University of Massachusetts as a part-time employee. In 1989 he accepted a permanent position in the Submarine Combat Systems Department where he produced hardware prototypes for both the Los Angeles- and Virginia-class submarines.

In 1997, Mr. Vien transferred to the Surface Undersea Warfare Department to become the operations manager of the AN/SQQ-89 surface ship sonar system Land Based Integration Test Site (LBITS). In this role, he supervised 25 engineers and technicians, and managed a 15,000 square-foot laboratory containing all fleet variants of the AN/SQQ-89 sonar system along with over 100 computer workstations.

From 1998 to 2004, Mr. Vien served as head of the Operational Systems Engineering Branch, where he managed dual teams in the development, integration, and

deployment of surface ship sonar systems and the design and development of the SPARTAN unmanned surface vehicle.

From 2004 to 2014, Mr. Vien served as head of the Sensors and Arrays Division responsible for managing an annual budget of \$90 million and supervised a collaborative team of 125 government and 150 contractor scientists, engineers and technicians in all phases of sonar system wet-end design. Under his direction, the Sensors and Arrays Division provided comprehensive lifecycle system engineering, featuring expertise in the roles of Systems Acquisition, Technical Direction Agent, and In-Service Engineering.

Mr. Vien attended the University of Massachusetts, Dartmouth where he earned a bachelor's degree in electrical engineering technology in 1988 and a second bachelor's degree in electrical engineering the following year. He received his Master of Business Administration degree from Bryant University in Smithfield, Rhode Island in 1996.

Mr. Vien is a 2003 graduate of the Office of the Secretary Defense's Executive Leadership Development Program and is certified at DAWIA Program Management Level III.

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VADM WILLIAM HOUSTON, USN

*Commander, Naval Submarine Forces/Submarine Force
U.S. Atlantic Fleet/Allied Submarine Command*

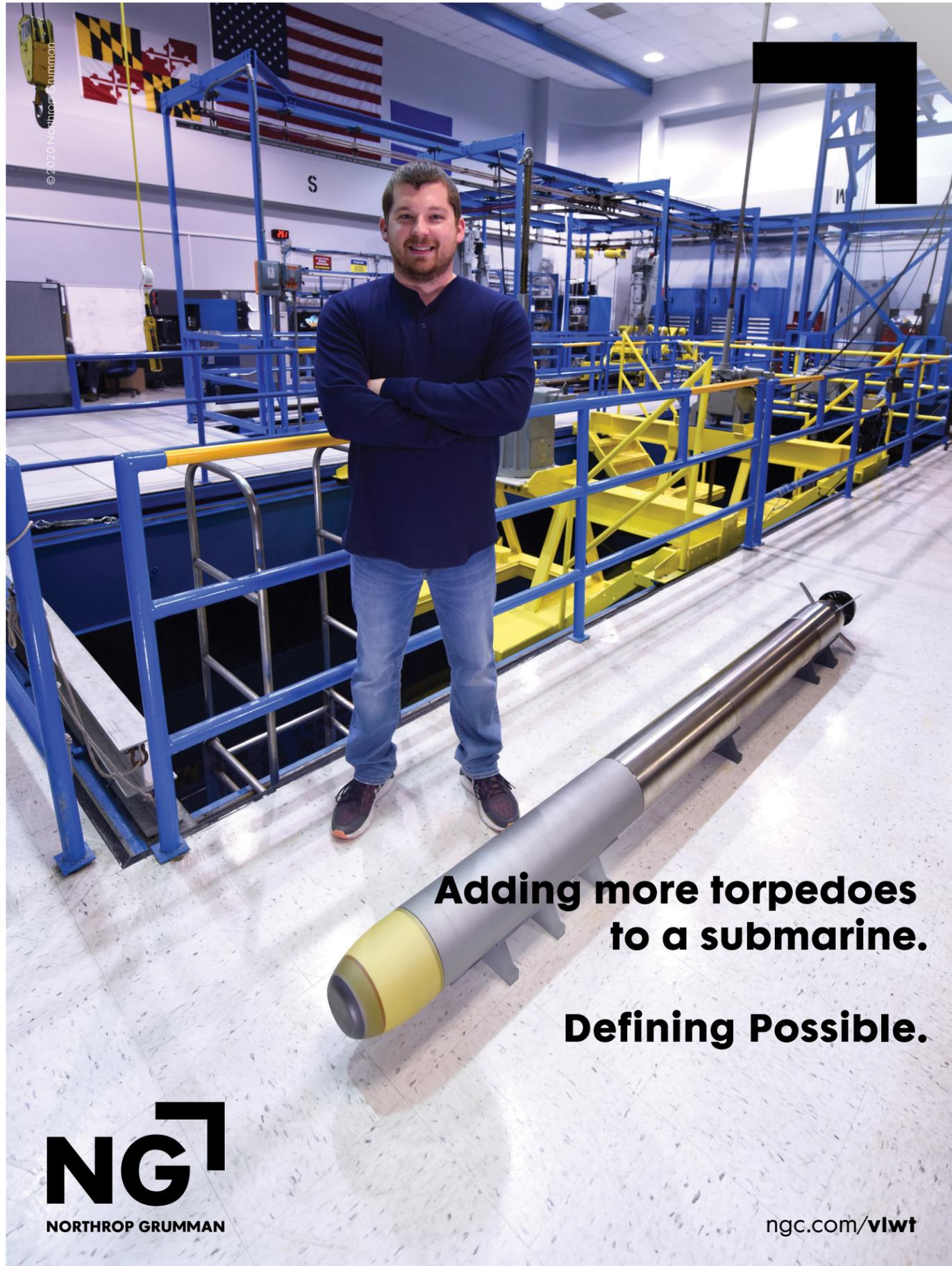
Rear Adm. Houston is a native of Buffalo, New York and graduated from the

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).



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RADM SCOTT PAPPANO, USN

*Program Executive Officer
Strategic Submarines*

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, strategic submarines in October 2021. His previous flag assignments include commander, Naval Undersea Warfare Center and Director, Comprehensive Test Facility and program executive officer, Columbia.

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



JAY DRYER

*Director
Office of the Secretary of Defense, Strategic Capabilities Office*

Mr. Jay Dryer is the Director of the Strategic Capabilities Office (SCO), whose

mission is to develop new and innovative ways to shape and counter emerging threats across all domains, bringing unexpected and game-changing capabilities to create strategic operational effects.

Prior to directing SCO, Mr. Dryer was Deputy Associate Administrator for Programs at NASA Aeronautics Mission Directorate (ARMD). He was responsible for translating ARMD's research portfolio requirements and program balance into specific, actionable programs. He was also responsible for integrating the programs with an eye to risk management and implementing best practices across the programs, as well as overseeing and tracking inter-program requirements changes and their impact to the budget.

Previously as Director of the Advanced Air Vehicles Program, Dryer was responsible for the overall planning, management and evaluation of the directorate's efforts to

develop tools, technologies, and concepts that enable new generations of civil aircraft that are safer, more energy efficient, and have a smaller environmental footprint. The program worked to achieve major leaps in the performance of subsonic fixed and rotary wing aircraft to meet growing long-term civil aviation needs, in the concept of low-boom supersonic flight, and in sustaining hypersonic competency for national needs.

Prior to that, he supported the ARMD associate administrator in a broad range of mission directorate activities, including strategic and program planning; budget development; program review and evaluation; and external coordination. He also served as Director of the former Fundamental Aeronautics Program Office, and as Senior Technical Advisor for ARMD, which involved oversight of all ARMD programs and projects in terms of architecture, requirements and budgets, technical reviews and research activities. He also managed the directorate's extensive NASA Research Announcement process.

Before joining NASA, Dryer worked with Arion Systems and SRA International providing technical support to the Defense Advanced Research Projects Agency (DARPA). His work included research in rotorcraft for the DARPA Helicopter Quieting Program, which included significant planning for the 2004 DARPA Grand Challenge program, an innovative autonomous vehicle race in the desert.

During the 1990s, Dryer served in the U.S. Navy's Nuclear Submarine Force, the Deep Submergence Unit, and Development Squadron Five, specializing in development and operation of unmanned aerial and submersible vehicles. He directed the unmanned submersible vehicle that located the wreck of the U.S.S. Yorktown from World War II, and he also commanded the last survey missions to the sites of the lost U.S.S. Thresher and U.S.S. Scorpion submarines.

Dryer holds a Bachelor of Science degree in systems engineering from the U.S. Naval Academy and a Master's of Science degree in ocean engineering from Massachusetts Institute of Technology.

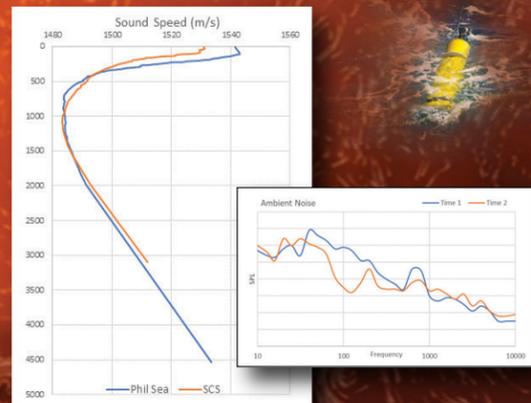
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RDML EDWARD ANDERSON, USN

Program Executive Office
 Undersea Warfare Systems

Rear Adm. Edward L. Anderson is a native of Glendora, California, and a 1990

graduate of United States Naval Academy with a Bachelor of Science in Systems Engineering. He holds a Master of Business Administration with honors from Indiana University and is a graduate of the Aspen Institute seminar on Global Leadership.

His sea tours include division officer, USS Newport News (SSN 750); strategic weapons officer, USS Ohio (SSBN 726) (Blue); and executive officer, USS Jefferson City (SSN 759). Four years after departing his executive officer tour, Anderson assumed command of Jefferson City in July

2008. He also is qualified for command in UK submarines following completion of "Perisher" in October 2007.

Ashore, Anderson has served as space control officer in Cheyenne Mountain, U.S. Space Command; submarine operations officer, Commander, Allied Naval Forces South, Naples, Italy; submarine operations and anti-submarine warfare training officer, Commander, Strike Force Training Pacific; deputy director, Navy Programs and Congressional liaison, Undersea Warfare and Strategic Programs, Navy's Office of Legislative Affairs; assistant program manager, Common Submarine Radio Room; Major program manager, Undersea Integration (PMW 770).

Anderson was selected for flag officer in March 2017 and was then selected to serve as deputy commander, Fleet Readiness director, Space and Naval Warfare Systems Command in May 2017. He assumed his duties as deputy commander for Undersea Warfare in June 2019.

Anderson' decorations include the Legion of Merit, Defense Meritorious Service Medal, Meritorious Service Medal (three awards), Joint Commendation Medal, Navy and Marine Corps Commendation Medal (two awards), Joint Achievement Medal, Navy and Marine Corps Achievement Medal (four Awards) and various campaign, unit and service awards.



ANDREW RICHARDSON

Deputy Commander
 Office of Naval Intelligence

Mr. Andrew G. Richardson was appointed to the position of deputy

commander, Office of Naval Intelligence (ONI), and to the Defense Intelligence Senior Executive Service in March 2018. In this position he is responsible for managing and overseeing all aspects of the ONI Enterprise. Immediately prior to assuming his current position, Mr. Richardson served as the assistant deputy director of Naval Intelligence, N2N6I, and the assistant director of the Naval Intelligence Activity (NIA), beginning in November 2015. In that position he was responsible for assisting the deputy director of Naval Intelligence in providing intelligence support to Department of Navy senior leaders, oversight and management of Navy intelligence programs and initiatives, and the day-to-day management of the NIA.

From October 2006 through February 2018, Mr. Richardson was an employee of the Office of the Director of National Intelligence (ODNI) and was appointed to the Senior National Intelligence Service (SNIS) in August 2008. From November 2011 to November 2015, he was the deputy director of the Office of Legislative Affairs, responsible for advising the director of National Intelligence and other ODNI senior officers on strategic-level interactions with the U.S. Congress. Mr. Richardson also served as the director of policy and programs for the associate director of National Intelligence for Human Capital, where he was responsible for developing and coordinating strategic human capital policies for application to the Intelligence Community.

Prior to joining the ODNI staff, Mr. Richardson worked for more than 11 years in the U.S. Congress. From April 1999 to September 2006, he worked for a subcommittee of the Senate Committee on Homeland Security and Governmental

Affairs, and in March 2001, he became the staff director of the subcommittee. Prior to his Senate employment, Mr. Richardson worked for more than four years in the U.S. House of Representatives.

Mr. Richardson received a commission as a reserve intelligence officer in the U.S. Navy in February 2000. In February 2010 he was mobilized to active duty and served in Basra, Iraq, in support of special operations forces and the U.S. Army. He retired at the rank of commander on June 1, 2020.

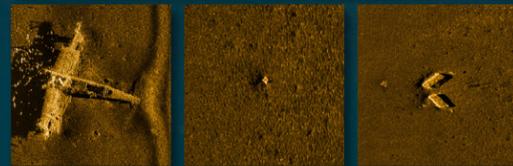
Mr. Richardson holds a Master of Science degree in strategic intelligence from the National Defense Intelligence College (now National Intelligence University), Washington, D.C., and a Bachelor of Arts degree in history from Connecticut College, New London, Conn.

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DR. WILLIAM BURNETT

Technical Director to the Commander
Naval Meteorology and Oceanography Command

Dr. William Burnett is the Technical Director to the Commander, Naval Meteorology and Oceanography Command/ Task Group 80.7. In this role, he provides technical responsibility and oversight for a fleet of six survey ships, 2,000 civilian and military personnel and a budget over \$300 Million. Dr. Burnett also serves as a Computational Technology Area Leader in Climate, Weather and Ocean for the Department of Defense's High Performance Computing Modernization Program.

Prior to being promoted to the Senior Executive Service in January 2012, Dr. Burnett worked at the National Data Buoy

Center, recognized as a world leader in providing operational, real-time marine observations by being named the world's first Regional Marine Instrumentation Center. Dr. Burnett also served on the International Tsunami Commission and as the U.S. National Representative to the World Meteorological Organization's and Intergovernmental Oceanographic Commission's Data Buoy Cooperation Panel.

Before joining the National Weather Service in 2004, Dr. Burnett was the Plans and Programs Division Head at the Naval Meteorology and Oceanography Command. In 1992, he joined the staff of the Naval European Meteorology and Oceanography Center in Rota, Spain, and served as the

Oceanographic Services Officer where he developed a new data exchange system that provided products and observations to the Fleet during Operation Provide Promise/Deny Flight. Dr. Burnett joined the Naval Oceanographic Office in 1988 as a meteorologist at the Operational Oceanography Center. Dr. Burnett began his career in 1985 as a physical science aide and storm chaser with the Storm Electricity Group at the National Severe Storms Laboratory in Norman, Okla.

He received a bachelor's of science in meteorology from the University of Oklahoma in 1988. He received masters and doctoral degrees in marine science from the University of Southern Mississippi.



CAPT PETE SMALL, USN

Unmanned Maritime Systems (PMS 406)

CAPT Pete Small was commissioned in 1995 from the NROTC at the University of Virginia where he earned a Bachelor of Science Degree in Mechanical Engineering. He has also earned a Master of Science Degree in Operations Research in 2002 from Columbia University and a Master of Science Degree in Mechanical Engineering and a Naval Engineer Degree in 2005 from the Massachusetts Institute of Technology. He is a licensed Professional Engineer in the Commonwealth of Virginia.

Upon completion of Navy nuclear propulsion training in 1996, CAPT Small reported to USS L. MENDEL RIVERS (SSN 686) where he conducted dry-deck shelter operations on two deployments to the Mediterranean Sea and Arabian Gulf. He then served as Assistant Professor of Naval Science at the State University of New York (SUNY) Maritime College and Fordham University

NROTC. In 2005, CAPT Small reported to the Supervisor of Shipbuilding Newport News, Virginia where he was the Assistant Project Officer for VIRGINIA Class submarine new construction and two LOS ANGELES Class submarine repair availabilities and completed an Individual Augmentation deployment to HQUSEUCOM in Stuttgart, Germany. From 2008 to 2010 he served as Deputy Ship Design Manager and Aft Project Officer in the OHIO Replacement submarine program office (PMS397.)

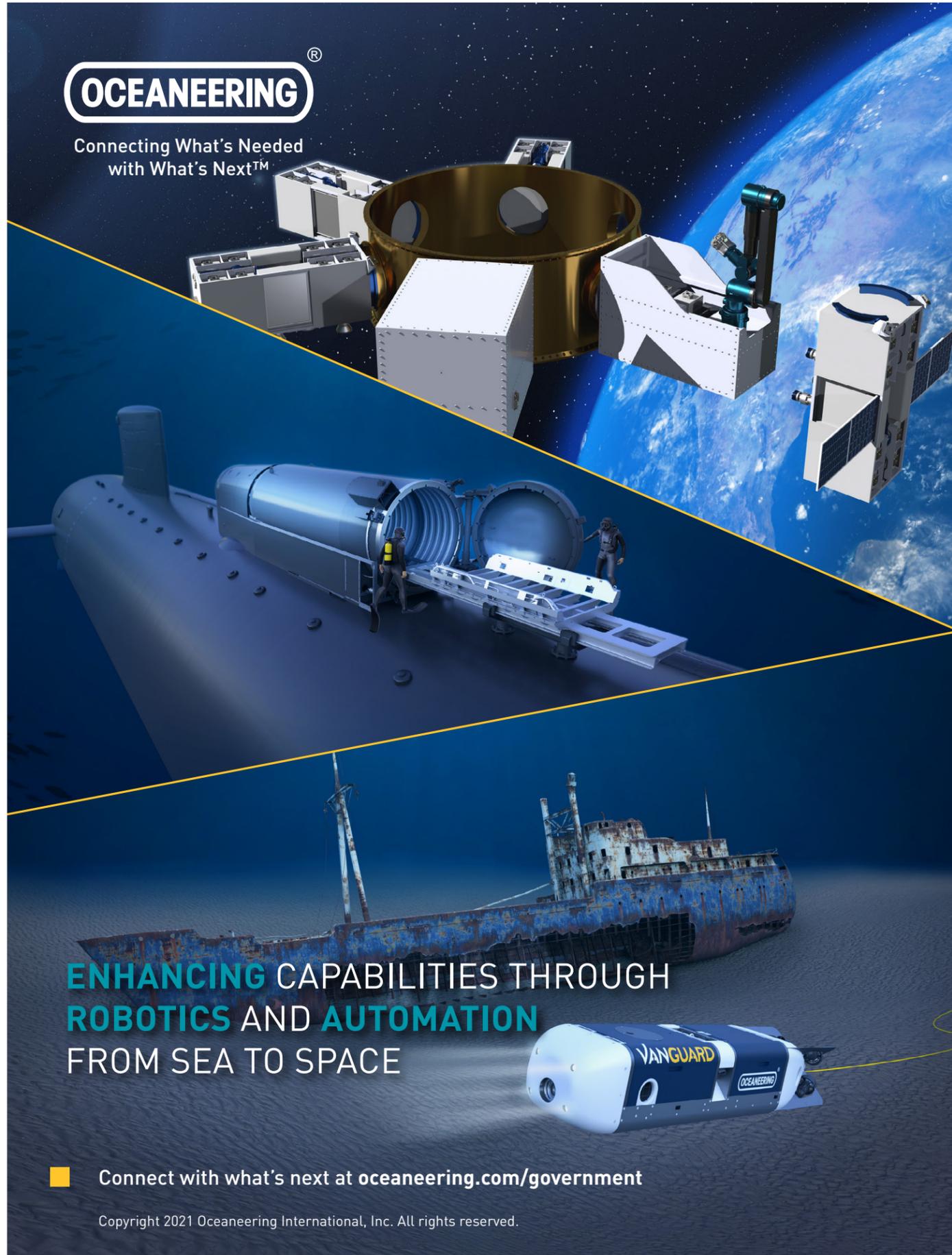
In 2010 CAPT Small was appointed Associate Professor of the Practice in the Mechanical Engineering Department at the Massachusetts Institute of Technology and served as the Academic Officer of the graduate Naval Construction and Engineering (Course 2N) curriculum. From 2012-2015 he served as the PMS450 Program Manager's Representative for VIRGINIA Class submarine construction at Supervisor of Shipbuilding Groton, Connecticut and delivered USS NORTH

DAKOTA (SSN784) to the Navy. From 2015-2017 he served as the Assistant Program Manager for Acquisition in the Advanced Undersea Systems Program Office (PMS394) and successfully attained Milestone C and Initial Operational Capability for a Major Defense Acquisition Program. In May of 2017 he reported as the Construction Manager for the COLUMBIA Class Submarine Program Office (PMS397.) In June of 2018 he relieved as Major Program Manager of the Unmanned Maritime Systems Program Office (PMS 406) in PEO Unmanned and Small Combatants. He continues to teach Submarine Concept Design in the MIT Professional Summer program.

CAPT Small's personal decorations include the Legion of Merit, Meritorious Service Medal (three awards), Joint Service Commendation Medal, Navy Commendation Medal (four awards), and the Navy and Marine Corps Achievement Medal (four awards.)

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CAPT DAN PAPP, USN

Program Executive Officer
Air Anti-Submarine Warfare (PMA 264)

Capt. Daniel Papp is a native of Chicago, Illinois. He graduated with honors from

Northern Illinois University with a Bachelor of Science degree in Technology. Following two years of enlisted Naval service, he received his commission through the Officer Candidate School and was designated a Naval Flight Officer (NFO) in February 1998.

Operationally, he served in Patrol Squadron FORTY (VP-40) at Naval Air Station (NAS) Whidbey Island, WA from 1998 to 2002, where he completed one SEVENTH Fleet and two FIFTH Fleet deployments and served as the Aviation and Armament Division Officer, NFO Training Officer, P-3C Mission Commander and Instructor NFO.

Following his first sea tour, he served with the P-3C Fleet Replacement Squadron as the Weapons and Tactics Unit Intelligence, Surveillance, and Reconnaissance Subject (ISR) Matter Expert, AGM-84H (Standoff Land Attack Missile Expanded Response) Fleet Introduction Team Lead and achieved designation as an Air Combat Training Continuum Level V Orion Weapons and Tactics Instructor.

In April 2004, he reported to USS DWIGHT D. EISENHOWER, where he served as a Catapult and Arresting Gear Officer and V-3 Division Officer.



RADM DOUG PERRY, USN

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

Rear Adm. Douglas Perry is a 1989 graduate of the U.S. Naval

Academy. As a Flag Officer, Admiral Perry commanded Submarine Group Nine and Task Group 114.3, and served as director, Joint and Fleet Operations, U.S. Fleet Forces Command.

He served at sea as division officer and Navy diver aboard USS Pittsburgh (SSN 720); executive officer/operations officer aboard Submarine NR-1 and executive officer of USS Maine (SSBN 741). His deployment experiences span the Caribbean and

In October 2005, he reported to Naval Personnel Command, where he served as the Patrol Squadron (VP) Shore Detailer. During this tour, he deployed as an Individual Augmentee and flew as an Airborne ISR Systems Officer in support of a Joint Special Operations Taskforce.

In June 2007, he reported to the United States Air Force Air Command and Staff College, where he received his Master of Science degree in Military Operations and completed Joint Professional Military Education Phase I.

In September 2008, he reported to Special Projects Patrol Squadron TWO (VPU-2), where he served as the Tactics Officer, Training Officer, Operations Officer and Detachment Officer-in-Charge. Additionally, he served as an Instructor Sensor Coordinator and Mission Commander.

In December 2010, he reported to Naval Air Systems Command (NAVAIR), the Naval Aviation Training Systems Program Office (PMA-205), where he served as the P-8A Poseidon Assistant Program Manager (Training Systems) and successfully led the effort to stand up the P-8A Integrated Training Center at NAS Jacksonville, FL.

In September 2012, he departed NAVAIR for transition training in the P-8A Poseidon and in May 2014, assumed command of Patrol

Squadron SIXTEEN (VP-16) where his WAR EAGLES successfully completed the first P-8A deployment and received the Captain Arnold Jay Isbell Trophy for Anti-Submarine Warfare (ASW) Excellence.

Following his command tour, he returned to NAVAIR to the Maritime Patrol and Reconnaissance Aircraft Program Office (PMA-290), where he served as the P-8A Current Development and Modification Team Lead.

In March 2016, he reported to the Persistent Maritime Unmanned Aircraft Systems Program Office (PMA-262), where he served as the MQ-4C Triton Integrated Product Team Lead, leading the team through Milestone C, Low-Rate Initial Production, first fleet aircraft delivery, Triton Multi-Intelligence Critical Design Review and preparations for Triton Early Operational Capability.

Papp reported to Air ASW Systems Program Office (PMA-264) as the Program Manager in July 2019.

He holds Level III Acquisition Certification in Program Management. Awards include, Bronze Star, Meritorious Service Medal (2), Air Medal (10 Strike/Flight), Navy Commendation Medal (4), Joint Service Achievement Medal and other Unit Awards.

Mediterranean, Gulf of Mexico, Atlantic and Pacific. As commanding officer of USS Pasadena (SSN 752), he led the ship on highly successful deployments to the Eastern and Western Pacific.

Perry served as, commander, Submarine Development Squadron Five where he led Submarine Force development of unmanned systems tactics and employment, and commanded the Navy's squadron of Seawolf-Class Fast Attack submarines.

Ashore, he served as Submarine Force Atlantic chief of staff, a branch chief for Director Undersea Warfare, on the Joint

Staff as combatant commander Joint Exercise Engagement division chief and subsequent chief of staff for the Director of Joint Force Development; executive assistant to Commander, Submarine Forces Pacific Fleet; deputy commander, Submarine Squadron 7; congressional liaison in the Navy Office of Legislative Affairs and Naval Reserve Officers Training Corps instructor at Marquette University.

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

ABSTRACT DESCRIPTIONS

COMBAT SYSTEMS & WARFIGHTER PERFORMANCE

23984
PEO IWS 5.0 Program Status and Plans
Cesari, J
 Advanced Development Programs, Surface Ship USW Combat Systems, USW Command and Control Systems and USW Systems Engineering make up the Integrated Warfare Systems, Undersea Systems (IWS) 5.0 office. The focus for this conference is the Multi-Function Towed Array (MFTA) and efforts to increase operational availability (Ao); AN/SQQ-89A(V)15 Surface Ship ASW Combat System training developments; and capability delivery for the Undersea Warfare Decision Support System (USW DSS).

24127
IWS 5.0 Combat Systems Update
Scala, P
 Mr. Scala will provide an update on current PEO IWS 5 advanced development combat system, machine learning and related software.

24104
Future State for Submarine Computing: Progress Report
Moniz, D
 In the undersea domain, PEO-SUB has initiated a concerted effort to transform the Combat System Enterprise, with a vision of moving to a seamless system-of-systems (SoS) software factory. This brief will present prominent transformation results.

24132
The Submarine Track Picture – Bringing a Cop to the Edge
Roman, W | Fleming, M
 This brief will discuss the current status and roadmap to implementing a Common Operational Picture (COP) onboard submarines, the challenges to be overcome, associated Navy enterprise efforts and opportunities, and recommendations.

24101
Mitigation of Software Bloat in Integrated Builds
Drozdenko, B
 This presentation proposes a framework for software de-bloat, hardening, and verification as to whether a software transformation has maintained its original designed functionality for Naval systems' source code, binary executables, operating systems, UEFI firmware, and Docker containers. We describe how the ONR total platform cyber protection (TPCP) tool suite can be used for this purpose.

24147
Continuous Integration and Continuous Delivery to Modernize Combat Systems Capability
Jones, K
 Leveraging the practices and built-in security of Continuous Integration and Continuous Deliver (CI/CD) used by code developers as part of a closed -loop automation and recovery strategy, the U.S. Navy can deliver capabilities faster, ensure rapid detection and remediation of security vulnerabilities, and maintain consistent baselines of the architecture. As CI/CD processes are automated, these processes can reduce training and manpower required to keep systems updated at sea.

24090
Modern Warfighter
Sadeck, J

The digital training paradigm needs to support the requirements of Ready Relevant Learning, High Velocity Learning, and must consistently factor in warfighter performance, quality of training content, budgets, utilization trends, return on investment metrics, and delivery mechanisms in a secure and cyber-security compliant environment. In 2020, the Naval Undersea Warfare Center Division Newport (NUWCDIVNPT) has worked to address these requirements through the upcoming release of Seaware 2.0 to the Navy. A massive code and feature refactor, Seaware 2.0 can be rapidly reconfigured for the specific CONOPs, use cases, and training requirements of any command.

24095
Titan Underway
Julius, C
 The Titan Underway tactical wargame examined both tactical and system level requirements for unmanned undersea vehicle operations in the Arctic. The research, related to Warfighter Performance and C4ISR sessions, focused on improving analytical game design to accelerate the cycle of analysis in undersea capabilities.

Titan Underway highlighted critical C4ISR capabilities needed to effectively employ unmanned systems in the Arctic. Many of the operational challenges identified by Titan Underway focused on issues associated with C2 of unmanned systems, data flow and latency to enable operations, as well as logistical challenges unique to the Arctic.

24116
75 Years of Excellence at the Naval Submarine Medical Research Laboratory (NSMRL)
Lawson, B
 Interested conference attendees will meet Dr. Lawson in front of Dealey Center, for a guided tour of the Naval Submarine Medical Research Laboratory (NSMRL), located within easy walking distance. The tour will include brief standing presentations and demonstrations of important knowledge and material products that laboratory develops to support submariners and divers.

24102
Adaptive Under-Ice Autonomy
DeLange, J | Howard, B
 To meet new challenges in under-ice Autonomous Underwater Vehicle (AUV) operations, MIT's Laboratory for Autonomous Marine Sensing Systems (LAMSS) and the Woods Hole Oceanographic Institution (WHOI) collaborated with General Dynamics Mission Systems (GDMS) to participate in the research component of the US Navy's ICEx20 exercise on the Arctic Beaufort Sea ice field. During the exercise, a General Dynamics Bluefin®-21 medium-class AUV, was deployed beneath the ice within a new Integrated Communication & Navigation Network (ICNN) which combines continuous environmental awareness on the under-ice platforms, onboard performance evaluation, advanced modem technology, and environmentally adaptive autonomy for maintaining underwater connectivity. The experiment resulted in a robust communication environment able to provide the AUV with GPS-grade navigation performance.

24114
The Role of AI/ML in Large-Scale Heterogeneous Human-Machine Teaming
Stimpson, A
 The current push for Distributed Maritime Operations (DMO), enabled in part by AI/ML algorithms has allowed for the analysis of large and varied data from disparate sensors and platforms, improvements to AI-at-the-edge capabilities, and AI/ML-based autonomous vehicles.

To fully realize DMO, human-machine teaming architectures are needed that allow decision and action independence while providing appropriate mission context. The panel discussion will focus on human-machine teaming architectures in heterogeneous large scale operations such as DMO, the role of AI/ML for realizing these architectures, and provide an overview of how AI/ML can particularly address adaptive teaming, trust, and temporal decision support.

24091
Facilitating Undersea Decision-Making with Automated Mission Planning
Cooper, B
 Real-time automated mission planning allows human planners to focus on the big picture, react more quickly to unplanned events in complex environments, and

maintain mission effectiveness. Translating existing automated mission planning for air platforms to the undersea will make a significant change in how humans evaluate mission options and make decisions.

24166
Virginia Class Evolution to Maintain Undersea Superiority
Ball, B
 Beginning with VIRGINIA Class Block V the focus has shifted to increasing the platform's capability. The lead ship of Block V adds a payload module that increases the vertical launch capacity. Block V continues to evolve with several planned payload insertions and technology upgrades. Following with the Tactical Submarine Evolution Plan, VIRGINIA Class will continue to bring new capability to the warfighter in a potential Block VII and ultimately transition to the next generation attack submarine.

UNDERSEA VEHICLES

24169
Enabling Undersea Technology
Montalvo, G
 This brief will provide an update on the advances made concerning the undersea domain specifically with unmanned undersea vehicles (UUV). The topics include the Velociraptor Waltz series, a large UUV which remotely delivers effects; RATTRAP, a torpedo tube launched and recovered UUV; RAZORBACK, the Submarine Force's first UUV Program of Record; and TETRA, a submarine launched remotely operated vehicle used to deliver effects.

24136
Robotic Submarine Sustainment and a Vision Towards Sustainment Operations at Sea: Extending Operational Lifecycle, Maximizing Operational Availability, and Automated Battle Damage Assessment
Shane, D
 In order to keep a submarine in the fight longer, assessment of maintenance need, maintenance itself, and confirmation of maintenance success should transfer to ships while in service, versus while in port. Boston Engineering is building a fleet of robotic vehicles, tools, and integrated software capabilities to help provide maintenance and battle damage assessment while underway, allowing for extended operational cycles and minimizing the need for returning to port.

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24137

The Dive-LD: A Transformational LDUUV for Advanced Subsea Applications

Buescher, J

Dive Technologies has recently completed initial development of a novel, commercially available Large Displacement Unmanned Underwater Vehicle (LDUUV) which includes large-format additive manufacturing and a scalable set of core vehicle subsystems, that allows the capabilities inherent in larger UUV platforms to become more broadly accessible. Dive has integrated and extensively tested a primary sensor suite incorporating a Synthetic Aperture Sonar (SAS). This payload integration effort has further informed both Dive Technologies and the payload developers regarding performance and stability benefits with LDUUV host platforms, and the DIVE-LD specifically.

24152

LDUUV Launch and Recovery on Submarine Host Platforms

Chapman, J

Near-surface wave induced forces cause large heave, pitch and roll excursions on both the host ship and large displacement unmanned undersea vehicle (LDUUV) during launch and recovery (L&R) operations. These surface wave induced motions can cause collisions between the LDUUV and the L&R tow body or cradle as well as overloading of tow body tethers. Approaches for mitigating these risks are presented along with preliminary in-water test results using a 1:4 scale model LDUUV and L&R cradle.

24145

Glider and Profiling Float Applications for Theater ASW

Furze, P

Understanding and using the ocean environment to tactical advantage is fundamental for successful conduct of Anti-Submarine Warfare (ASW). This presentation will address the unique application of gliders and profiling floats to inform the Theater ASW Commander (TASWC). Tailoring the depth and duration of glider and profiler missions to optimally characterize horizontal, vertical, and temporal variability in sound speed, along with recent advancements in sensors, C2, and the ability to now launch gliders from aircraft, these platforms now give the TASWC more capability and more options for employment than ever before.

23977

Autonomous Undersea and Surface Vessel (AUSV)

Williams, J

Ocean Aero has developed an environmentally powered autonomous marine vehicle that has the unique ability to operate as both an Autonomous Surface Vehicle (ASV) and an Autonomous Underwater Vehicle (AUV) resulting in a hybrid, dual-modality Autonomous Underwater and Surface Vehicle (AUSV) that offers a single platform that can self-deploy to a remote operational area and dive underwater to perform a variety of missions or simply avoid detection.

24089

Architectural Overview of Unmanned Maritime Autonomy Architecture (UMAA) Reference Implementation

Wheatman, M

This presentation covers the design and implementation of an Agent-based vehicle control system serving as the reference implementation of the Unmanned Maritime Autonomy Architecture (UMAA) standard. This presentation will also provide an overview of the goals of the UMAA standard.

24125

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

King, D

This session discusses the Data Distribution Service (DDS), the software connectivity framework that links UMAA services together and provides a data-centric view of the unmanned system. In addition, we'll explore how the modular services provided by UMAA connect together and how DDS tools can help visualize and capture the behavior of unmanned systems.

24142

Passive Propagation Resistant Li-Ion Batteries for Undersea Vehicles

Izzo, J

Li-ion batteries are a critical energy technology due to Navy mission requirements that mandate higher energy dense sources. Unmanned Undersea Vehicles provide key capabilities to the fleet and rely on high energy dense sources for persistence and enhanced capability. Safety is engineered into passive propagation resistant (PPR) battery designs to make them single cell fault tolerant to a cell that catastrophically fails in a thermal runaway. This work focuses on the development of propagation resistant architectures that provide the high energy density of Li-ion battery technology while minimizing risk to the platform and personnel.

24173

Undersea Battery Systems, Current and Future Technologies

Cleary, T

The Navy utilizes electric propulsion systems for many underwater vehicles. In the first part of this presentation, the author will present an overview of some undersea propulsion battery systems recently designed at the Penn State Applied Research Laboratory, and in the second part will review two ongoing science and technology projects focused on improved near-term battery technologies with the potential of increased safety and energy density. Third, a high energy, low power vehicle battery system based on lithium nickel cobalt aluminum oxide cells will be reviewed and results from testing presented.

24118

Use of Nickel Zinc Batteries in Undersea Application

Matson, M | Morris, R

Due to increased power and energy demands on large submarine platforms, future mission needs will be impacted by limitations of existing valve regulated lead acid battery technology. Recent improvements to Ni-Zn battery technology will supply significantly more energy than lead-acid in the same footprint while avoiding the safety issues associated with other energy dense battery technologies. This presentation will summarize recent efforts by Æsir Technologies, funded by ONR ManTech, to scale up Ni-Zn battery cell size to achieve a design appropriate for large platforms.

24119

Over the Horizon Targeting Using Autonomous Undersea Vehicles

Carvalho, Jr., R

The objective of this presentation is to present a payload architecture for general UUV employment based on research conducted under BAE System's TAUTOG Undersea ISR Program. The ability to detect, locate, classify and target threat vessels, and communicate that information back to "shooter" platforms at standoff distances is congruent with today's mission scenarios in denied operating areas.

24164

Virginia Class Improved Internal Countermeasure Launcher

Buckley, T

The VIRGINIA Class Submarine (VCS) Internal Countermeasure Launcher (ICL) provides a critical ocean interface supporting multiple missions. General Dynamics Electric Boat proposes improving the VCS ICL to provide significant, needed warfighting capability enhancements to the submarine fleet.

AVIATION SYSTEMS

PMA-264 Program

Papp, D

24140

Development of a Cable Pack for a Rap Depth Sonobuoy

Hammond, D

NASC in cooperation with ONR and NAVAIR has developed a unique RAP depth capable cable pack for use in A-size sonobuoys. This cable pack has demonstrated successful autonomous deployment and subsequent multiple day survival of the tether in several sea trials.

24162

Next-Generation Air ASW: Extended-Range DIFAR (ER-DIFAR) Development, Results, and Challenges

Rorick, T.

Quieter near-peer submarine threats necessitate the development of next generation sensors. The Extended Range – Directional Frequency and Recording (ER-DIFAR) sonobuoy being developed by ONR with PMA-264, Johns Hopkins University-Applied Physics Lab and Ultra Maritime brings new passive acoustic capability to Air ASW to counter this threat.

24163

Artificial Intelligence for Anti-Submarine Warfare Training: Jargon-Aware AI (JAWA)

Murray, T

Signal Systems Corporation (SSC) has developed an innovative Artificial Intelligence (AI) assistant for sonar operators that presents target/clutter classification recommendations and supporting rationale using the same language, or jargon, as Subject Matter Experts (SMEs).

This technology is applicable as both an operator trainer and as a tactical operator aid for both passive and active sonar systems.

UNDERSEA SENSORS

24135

Multi-Ship Sonar Bi-Static Automatic Active Localization

Bazow, T

Dr. Terence J. Bazow will explain the power and constraints of the automated capability and will demonstrate the capability using element-level at-sea data from multi-ship exercises.

24094

IWS 5.0 Sensors Update

Scala, P

Mr. Scala will provide an update of IWS 5.0 APB elements and advanced sensor development programs. IWS 5.0 continues to lead the charge in the development of robust ASW systems. Mr. Scala will provide an update to the ongoing development and testing of improvements for advanced sensors for tomorrow's forces.

24158

Maritime Surveillance Systems Program's (PMS-485) Role in the Undersea Domain

Adams, D

A review of the Maritime Surveillance Systems portfolio to include Fixed, Mobile and Deployable Surveillance Systems focusing on current state and near to mid-term

24112

Rapid Acquisition Sensor and Response (RASR): Drifting Passive and Coherent Tactical Surveillance

Edelson, G

Modern and next generation submarines that operate with significantly reduced radiated signature levels stress the kill chain and challenge current sonar detection and tracking sensor systems performance. The Rapid Acquisition Sensor and Response (RASR), a novel anti-submarine warfare (ASW) sensor concept that repurposes passive acoustic sonobuoys into a randomly-distributed, drifting, large aperture, very low frequency, coherent, sparse sensor array addresses this challenge. The RASR system is currently under prototype development with sponsorship from OSD's Rapid Innovation Fund office. BAE Systems leads the development team, which includes Ultra USSI and RDA Inc.

24159

Active Buoy Element Localization (ABEL) Sonobuoy for the Rapid Acquisition Sensor and Response (RASR) System

King, W

This presentation will provide a status update on the current ABEL sonobuoy rapid prototype development to support the RASR program. It will provide a top-level summary of the sonobuoy technology, system architecture, capabilities, and performance. This new sonobuoy is a key sensor supporting the RASR program that will provide the Air ASW community with improved detection performance.

24144

Hydrone Multi-Domain (Marine, Ground, Air) Vehicle

Kempshall, S

The HyDrone™ design is a hybrid Unmanned Vehicle that allows a single vehicle to operate in all mediums including air, water and land using a single set of drive motors. This single drive system can act as a ducted fan propeller in air or water, or engage the ducted shroud to serve as a wheeled vehicle on any surface. HyDrone™ provides a low-cost vehicle that can take on any mission that current UAV products can and far more, and is highly scalable.

efforts. Specific topics include Expeditionary SURTASS, future towed arrays and the maritime test bed.

24126

Next-Generation Surveillance Towed Array System with Open Architecture Telemetry Methodology

Minovich, N

Mr. Minovich will provide an update of the NG SURTASS development program. IWS 5.0 and PMS 485 continues to lead the charge in the development of robust surveillance systems. An update is provided on PMS 485's development and acquisition approach as well as an overview of the OAT framework and how its implementation supports ongoing development for advanced sensors.

24131

Managing IUSS Mobile Surveillance System Capabilities, The Transition from Today to Tomorrow

Ringel, D

This brief details the current PMS 485 Mobile Surveillance Systems, Surveillance Towed Array Sensor System (SURTASS) efforts and plans for future Mobile Surveillance System capabilities. SURTASS is currently fielded on one Expeditionary SURTASS and five T-AGOS platforms, and are programmed for seven T-AGOS(X), and five Expeditionary SURTASS (SURTASS-E).

24122

PMS 485 Deployable Surveillance Systems Update **LaShomb, S**

This brief details the current activities PMS 485 Deployable Surveillance Systems is managing and its plans for future Deployable Surveillance Systems to support rapid prototyping, production, and fielding of surveillance systems under Middle Tier Acquisition authority that are directly focused on meeting gaps in the Integrated Undersea Surveillance Systems (IUSS) Program and support the concepts of Undersea Constellation and Full Spectrum Undersea Warfare.

24093

IWS 5.0 Surface ASW Incorporation of Devsecops Principles **McNeal, R**

This will provide an update of the IWS 5.0 AN/SQQ-89A(V) USW sonar and combat system development, and ACB DevSecOps approach. IWS 5.0 continues to lead the charge in the development of robust Surface ASW systems.

24099

Expanding the Submarine’s Influence and Effectiveness **through the Use of Small Payloads**

Kundinger, R

Submarines, given their forward stealth positions in the battlespace, can influence the battlespace environment through the deployment of small payloads. This discussion focuses on the applied technologies and looks at some use-cases.

24088

14v19 Techdemo: ACB-19 Virtualization Sea Test **Andronowitz, K**

In February 2021, IWS5 conducted a technical demonstration (TECHDEMO) of the 14v19 virtual SONAR system on board USS William P. Lawrence (DDG-110). 14v19 consisted of commercially-available, Infrastructure-as-a-Service computing infrastructure integrated with the existing ships legacy AN/SQQ-89A(V)15 Technical Insertion (TI)-14 hardware to provide a virtual version of the latest Advanced Capabilities Build (ACB) to the ship. In a two-day temporary installation and integration period, the 14v19 team upgraded DDG-110 from ACB-13 (developed in 2013) to the latest, not-yet-fielded ACB-19. The ship successfully supported planned Navy exercises for eleven days with enhanced anti-submarine warfare (ASW) capabilities. 14v19 demonstrates a workable, conceptual approach to rapidly fielding the latest ACB to a ship with minimal hardware changes.

24156

The Mola Array, A Vertical Aperture Towed Array **Daily, J**

High-quality naval acoustic data from mobile vertical aperture arrays is invaluable for oceanographic research but is difficult to obtain. Greater access to this data would facilitate faster Naval and oceanographic research capability. The MOLA array is an exploratory research project to build a collapsible, vertical aperture array that is deployed from a surface asset. This array would be a mobile alternative to fixed vertical arrays and could extend the Navy’s research acoustic capability.

24165

The Future of Undersea Fixed Surveillance Systems **Barton, III, R**

Since the 1950s, the US Navy has exploited the long range, low frequency acoustic propagation phenomena in the deep ocean to detect and track Soviet and Russian submarines. Today, the legacy IUSS seabed acoustic systems are lacking in both capability and capacity against modern ultra-quiet submarines. In this presentation, the recapitalization vision and plans of the IUSS FSS program will be illustrated, including support for the Navy’s Undersea Constellation warfighting construct.

24174

Small Aperture Velocity Sensor (SAVS) Status Update **Mullison, J**

The Small Aperture Velocity Sensor (SAVS) can be considered a hybrid of a Correlation Velocity Log (CVL) and a Doppler Velocity Log (DVL) designed to measure speed over ground more accurately and at greater ranges from a given aperture size than either. Conceptually introduced at NDIA in Fall of 2019, this brief us on the technology’s capability progress of measurements at altitudes of more than 3200 fathoms.

24123

UUV Passive Acoustic Sensor

Sarma, A | Doodemote, J

This brief describes a framework useful for aiding the detection, classification, localization, and tracking of distant targets using underwater acoustics when constrained by sensor size, capability, or platform noise.

The core of this framework is a processing string that correlates the spatial structure of signal arrival wave-fronts with the temporal nature of unknown signals that can have tonal, broadband periodic, or noise-like characteristics while exhibiting varying stationarity (coherence) lengths. An exemplary implementation employing an acoustic vector sensor onboard a UUV will be reviewed along with results from an at-sea data collect against vessels of interest in a high shipping density environment. Furthermore, these results will be used to substantiate beyond line-of-sight, over-the-horizon performance for application to future ISR (Intelligence, Surveillance, and Reconnaissance) missions into forward and denied operating areas.

24097

Waveform Identification, Source Localization, and Fully-Automated Active Bistatic Processing

PirkI, R

Under Office of Naval Research funding, ARL:UT has developed novel automated waveform identification and transmitter kinematic state (i.e. position and velocity) estimation algorithms for Navy sonar systems. These technologies improve the situational awareness of sonar operators and enable additional downstream processing, automation, and analyses that support a variety of mission objectives, including sonar performance modeling and bistatic processing of non-cooperative off-board sources. This briefing will demonstrate the performance, utility, and applications of these technologies with at-sea datasets collected from relevant Navy sensors.

24065

A Machine Learning Model for Classification of Passive Sonar Signals, Opportunities, and Challenges

Pfau, A

A survey of deep learning methods applied to passive sonar signals. We use models for single and multi-label classification, Bayesian Deep Learning to understand model uncertainty, and explore the use of these models for active learning. This research shows promise for both manned and unmanned systems applications.

24107

Installation of Expeditionary Distributed Acoustic Sensor Systems Using Unmanned Surface Vessels

McLaughlin, S

Expeditionary Advanced Base outposts are likely nearshore and are potentially vulnerable to waterborne attacks by units in small boats; by swimmers or divers; by undersea manned or unmanned vessels; or by forces inserted from amphibious vessels offshore. Expeditionary Advanced Base outposts require a means of detecting and interdicting any such attacks. This paper describes a low-observable means for quickly and efficiently installing undersea sensor systems that can detect and classify these types of threats at advanced bases using non-dedicated assets.

24161

USV ASW Capabilitiy Results from UXS Integrated Battle Problem 21

Frizzell-Makowski, L

The Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vessel (MDUSV) program will present ASW-focused capability demonstration results during UxS Integrated Battle Problem 2021. The force-multiplying potential of multiple ASW mission-capable USVs that can maintain force-posture for long durations enable necessary situational awareness required for successful campaign execution. The use of multiple open ocean USVs supports CNO’s Design for Maintaining Maritime Superiority vision.

24171

The Maritime Testbed (MTB): An Enabling Navy Capability to Support Subsea & Seabed Warfare (SSW) Technology Development

Henson, J | Barton, R

The Maritime Surveillance Systems (PMS485) Maritime Test Bed (MTB), located on the San Clemente Island complex, is a unique seabed power for developing and testing future Naval undersea and seabed sensors and systems. The goals of the MTB include the development of an open, standardized, seabed architecture for supporting the future Undersea Constellation concept.

24096

Argus: An Expeditionary Maritime Defense System

Schumacher, C

Argus is an expeditionary, scalable, automated, waterside perimeter defense system capable of detecting and engaging surface and undersea threats. Deployable in hours, Argus provides effective protection of high-value assets (HVAs) and critical infrastructure against surface and subsurface threats.

24121

Undersea Array Localization and Passive Thermometry from Acoustic Ambient Noise

Doran, A

Acoustic noise interferometry allows characterization of the undersea environment through the exploitation of ambient noise recorded simultaneously by physically offset hydrophones. We apply this technique to data collected in shallow water off Hawaii to improve array element localization and estimate inter-station sound speed.

24098

Superfrazz(EL)

PirkI, R

We present an approach to solving the passive multi-target tracking problem based on power density over kinematics space, as realized by the power density hypothesis (PDH) filter. This brief will focus on a sensor-space implementation of the PDH filter that takes in beamformed power-vs-angle measurements at one or more frequencies (i.e., a “FRAZ”) to construct and refine a frequency-dependent power density over angle and angular-velocity (e.g., azimuth, elevation, azimuth-rate, and elevation-rate), called a “SuperFRAZ” due to the added angle-velocity dimension(s). This briefing will demonstrate the performance and utility of the fully-automated PDH filter and associated SuperFRAZ(EL) with at-sea datasets collected from relevant Navy sensors.

MINE WARFARE

24138

Agent-Based Simulation Modeling of Offensive Denial Mining

Beery, P

Through agent-based simulation modelling, this project explores the viability of

24160

Novel Additively Manufactured Piezoelctric Transducers for Enhanced Performance

Tufariello, J

Additive manufacturing (AM) of piezoelectric ceramic can be used to create novel acoustic transducer geometries that exhibit augmented sensitivity, bandwidth, and directionality. These properties are a function of the printed geometry of the transducer and are not possible with conventional manufacturing processes. Modeled and measured results confirm printed transducer performance and provide evidence that improvements in sensing and communication may be attainable with AM transducers for underwater acoustics.

24113

Textured Pieoelectrics at L3Harris Technologies

Fuoco-Castrejon, L

Textured materials are the next generation of piezoelectric materials, which exhibit extraordinary piezoelectric responses similar to single crystals and can be produced at a much higher yield, with greater compositional uniformity and at a more cost-effective technique than current commercially produced single crystals. TexCer™, L3Harris’s product line of textured piezoelectric shapes will be presented, and an update will be provided on L3Harris’s TexCer™ performance results and newly completed TexCer™ pilot production facility and the scale-up production of TexCer™ plates with lateral dimensions up to 3.8” x 3.8”.

Development of a Deep Depth Capable, Low-Frequency, Broadband Source – Test Results

Osborne, J

A DARPA STO program developed a deep-depth capable, active sonar solution that enables wide area coverage. This new source, identified as a Waveshell Flextensional does not require pressure compensation and can be operated to 4000m depth.

24154

Low-Frequency Wind-Generated Noise

Stockinger, C

This research explores low frequency wind-correlated noise and provides empirical models to predict ambient noise. The objective is to improve modeling practices and provide more accurate wind-generated source levels at low frequencies.

24105

Advancements in Nonlinear Acoustics at NUWC for Navy Applications

Katz, R | Hughes, D

This brief demonstrates potential enhancements in performance capabilities of undersea environmental sensing utilizing a nonlinear acoustics approach. In the analysis, we employ the most recent scientific advances in underwater acoustic signal processing and analysis methods. Current findings from the research include unique system responses and new information that has not been observed elsewhere.

unmanned underwater vehicles (UUVs) in offensive and protective mining as well as the relative effectiveness of alternative delivery platforms. A new offensive mining mindset, called offensive denial mining (ODM), is defined. This project utilizes a JAVA graphical user interfaces called the Modeling and Simulation Toolkit (MAST) that leverages the Orchestrated Simulation through Modeling (OSM) framework developed by the Naval Surface Warfare Center, Dahlgren Division.

The results for the primary MOE (Red Impact), legacy MOE (agent death), and secondary MOE (time to deploy) provided insight into the relative importance of blue force design characteristics. Analysis indicates that air delivery is most effective in terms of Red Impact and is considerably faster to deploy than either vessel or UUV delivery. This is particularly notable because the air delivery strategy results in the lowest performance in terms of red adversary death, indicating air delivery was well suited to influencing enemy behavior despite being less likely to inflict casualties.

24055

NSWC Panama City Division NISE Program Supporting MIW Commander, K

This presentation provides an overview of Mine Warfare (MIW) related projects funded by the Naval Innovative Science and Engineering (NISE) program at the Naval Surface Warfare Center Panama City Division (NSWC PCD) and from other Naval Research and Development Establishment (NR&DE) partners. The primary focus of the talk will be on accomplishments during FY21, although NISE projects proposed for FY22 will also be discussed.

OPNAV N952 Update

Egan, M

24175

Developments and Applications in Standoff Command and Control for Undersea Systems

Jones, A

This presentation will discuss NIWC-PAC’s development and testing of an

unmanned surface vessel to autonomously support and extend the standoff range for command and control of small remotely operated vehicles during expeditionary operations. Increasing standoff range and developing the required autonomy is expected to improve flexibility of employment of small remotely operated vehicles and support operations in contested environments.

ONR Mine Warfare Update

Medina, E

24128

Modular Undersea Effectors (MUSE)

Dudinsky, J

This presentation will provide an overview of the Modular Undersea Effector (MUSE) Program which was completed in August, 2021, and a summary of the technologies that were demonstrated during the course of the effort. Results of recent Kinetic Effector, encapsulation subsystem, and sensing and targeting system tests will be discussed.

ASTRAnet

Smith, B

PMS 408 Mine Warfare Update

Malatesta, D

PMS 420 Update

Saroch, G

C4I

24146

Sustaining The Undersea Advantage: Transforming Anti-Submarine Warfare Using Autonomous Systems

Clark, B

Current US and allied approaches to anti-submarine warfare (ASW) are expensive and cannot address the probable scale of undersea threats during a crisis or conflict against China or Russia. The US Navy and allied navies could regain an ASW advantage by adopting concepts that rely primarily on unmanned systems for finding, tracking, and suppressing enemy submarines. These approaches would still rely on manned submarines and aircraft to manage ASW operations and attack enemy submarines, but would be much less expensive and more scalable than today’s approaches.

24149

Autonomous Systems at Sea: Implications for Future Undersea Networking Trends

Forero, P

This presentation will discuss the fundamental shift in undersea networking requirements triggered by the vision of human and underwater-autonomous-vehicle teaming, and the current networking technology trends that have the potential to enable reliable and more effective undersea networking.

24092

Innovation at Speed Through Lab-As-A Service (LAAS)

Sprague, J | Rice, B

Innovation at speed will be critical for the Navy to stay ahead in the Great Power Competition (GPC). LaaS becomes a means to develop innovation at speed and capabilities that reduce the time it takes to evaluate multifaceted engineering and architecture solutions.

24150

Communications Architecture Trade Study

Craig, W

This talk presents the process and results of a recent trade study evaluating several potential undersea communications architectures.

24177

Undersea Communications

Kuhn, D

The Undersea Communication and Integration Program Office is working to accelerate delivery and modernization of undersea communications capabilities, that are affordable, integrated, and interoperable in order to support the increased use of the maritime domain, the rise of global information systems, and the increasing rate of technological creation and adoption. It is imperative to have a network of integrated capabilities that fosters continuous communication between the Submarine Force and shore infrastructures and manned, unmanned, and unattended sensors operating above and below the surface globally.

23962

Tactical Cybersecurity: Navigating Pitfalls throughout the System Lifecycle

Goan, I

Embarking on a contract for government tactical systems? Program pitfalls related to cybersecurity can waste millions of dollars and move finish lines continually to the right or bring them to a screeching halt altogether. This presentation compiles lessons learned from challenges posed by achieving government Risk Management Framework (RMF) compliance — a necessary but complex and lengthy requirement for fielding tactical systems in a DoD environment.

24100

Intelligent Cyber Threat Operational Planner For Under Sea (iCTOPUS)

Hoyle, J

Intelligent Cyber Threat Operational Planner for Under Sea (iCTOPUS) integrates cybersecurity into Theater Undersea Warfare mission planning, execution and post-mission analysis to assess vulnerabilities of the Undersea Warfare Decision Support System (USW DSS) network and mitigate potential cyber-attacks. Leveraging commercial network and cyber emulation, iCTOPUS creates a digital twin of the undersea warfare mission environment with high fidelity sensor, communication and network models that incorporate environmental factors, multi-domain communication waveforms, simulated cyberspace attacks and defenses, and live data feeds from USW-DSS components.

24115

Virginia/Columbia Cyber Security Early Developmental Test 2021 and Future Plans

Beatty, M

The Cybersecurity Early Developmental Test (EDT) program was formed as a result of the need to develop and execute an integrated and comprehensive Submarine Platform Cybersecurity Test and Evaluation (T&E) Strategy, that leads to a satisfactory Cybersecurity Survivability assessment from Commander, Operational Test and Evaluation Force (COMOPTEVFOR) for the COLUMBIA (CLB) and VIRGINIA BLOCK V (VA BLK V) Class Submarines. The EDT program conducts

annual cybersecurity test event(s) that evaluates the End-to-End cybersecurity state for the world’s most advanced submarine classes. The Cybersecurity EDT program uses a modified version of the industry standard MITRE Attack Framework, for penetration tests.

24151

Modern Security Architecture through the Lens of SCADA/IoT Sprague, J | Boyd, R

One of the Navy’s visions is to have an all connected Fleet of sensors, platforms, and weapons. A Cyber Security architecture is imperative to protect these assets and their data. What is Zero Trust and why is it a better Security architecture to stop cyber security threats? How does Zero Trust Architecture help the very sensitive Supervisor Control and Data Acquisition/Internet of Things (SCADA/IOT) elements for today and tomorrow’s warfighter?

24143

Network Switch Configuration Using Model-Based Systems Engineering (MBSE)

Ferrier, M

Sonalysts sponsored a Senior Design Project with the University of Connecticut Institute for Advanced Systems Engineering (IASE) to develop a Model Based Systems Engineering (MBSE) design of a network configuration used to create the files needed to provision the switches in the network.

BUS SCHEDULE

Due to heightened security measures, it is in your best interest to take the shuttle buses provided. The use of POV is strongly discouraged and may result in entry delays and the risk of not being allowed access.

TUESDAY, OCTOBER 26

6:30 – 9:00 am

Buses will shuttle (as filled) from the hotels (Mystic Marriott and Hilton Garden Inn) to the Dealey Center Auditorium.

10:00 am – 4:00 pm

Bus departs the Dealey Center Auditorium for the Hotels (Mystic Marriott and Hilton Garden Inn) every hour.

Bus departs Dealey Center Auditorium at:

10 am | 11 am | 12 pm | 1 pm | 2 pm | 3 pm | 4 pm

4:45 – 5:45 pm

Buses will shuttle in a loop from the Dealey Center Auditorium to the hotels (Mystic Marriott and Hilton Garden Inn).

5:45 – 7:00 pm

Buses will shuttle in a loop from the hotels (Mystic Marriott and Hilton Garden Inn) to the Clambake.

8:00 – 9:30 pm

Buses will shuttle from the Clambake to the hotels (Mystic Marriott and Hilton Garden Inn). Drop-offs only.

WEDNESDAY, OCTOBER 27

6:30 – 9:00 am

Buses will shuttle from the hotels (Mystic Marriott and Hilton Garden Inn) to the Dealey Center Auditorium.

10:00 am – 4:00 pm

Bus departs the Dealey Center Auditorium for the hotels (Mystic Marriott and Hilton Garden Inn) every hour.

Bus departs Dealey Center Auditorium at:

10 am | 11 am | 12 pm | 1 pm | 2 pm | 3 pm | 4 pm

5:00 – 6:30 pm

Buses will shuttle from the Dealey Center Auditorium to the hotels (Mystic Marriott and Hilton Garden Inn). Drop-offs only.



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