



NDIA

2024

UNDERSEA WARFARE

SPRING CONFERENCE

Undersea Warfare and The Joint Kill Web

March 18 – 20, 2024 | San Diego, CA | [NDIA.org/USWSpring24](https://ndia.org/USWSpring24)

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Who We Are

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

Schedule at a Glance

Monday, March 18

Registration

Courtyard Marriott - Liberty Station
4:00 – 6:30 pm

Networking Reception

Courtyard Marriott - Liberty Station
5:00 – 6:30 pm

Tuesday, March 19

Registration

Admiral Kidd Conference Center
7:00 am – 5:00 pm

General Session

Admiral Kidd Conference Center
8:00 am – 4:45 pm

Networking Reception

Admiral Kidd Conference Center - Lawn
4:45 – 6:00 pm

Wednesday, March 20

Registration

Admiral Kidd Conference Center
7:00 am – 5:00 pm

Technical Sessions

Admiral Kidd Conference Center
8:00 am – 5:00 pm

Welcome to 2024 Undersea Warfare Spring Conference

After a four-year hiatus, the NDIA Undersea Warfare Spring Conference is back in its traditional home of San Diego. We are thrilled to be back in a Fleet concentration area. The location enables interaction and learning from surface, air, and subsea warfare operational leadership which in turn provides industry with information needed to understand gaps and provide future capabilities to support operational readiness and lethality. We are fortunate to have this classified forum where these leaders will share their thoughts on the state of Undersea Warfare and how we can work together to ensure our undersea advantage remains a credible deterrent and, if needed, a decisive edge in battle.

As our adversaries evolve, so too does the U.S. military to lead the threat. To keep pace, the NDIA USW Division decided to structure our 2024 conference around the kill chain model of

Find, Fix, Track, Target, Engage, and Assess (F2T2EA). Session topics were solicited focusing on F2T2, kinetic and non-kinetic weapons (Engage), and AI/ML as an enabler. The intent was to focus the discussion on the most relevant topics and provide the best value for conference attendees. We remain dedicated to broadly examining the USW community requirements including aviation, combat systems & warfighter performance, mine warfare, sensors, and uncrewed vehicles.

Our plenary speakers will discuss many facets of the complex issues and gaps associated with undersea warfare. They will cover current thinking about operations and planning in the Pacific, warfare development initiatives, Joint warfighting, readiness, acquisition, and requirements.

As the conference chair, I hope that all attendees have a productive, informative, and enjoyable conference.

CAPT James Gray, USN (Ret)

Chair, Undersea Warfare Division Spring Conference,
L3 Harris

Get Involved

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



Undersea Warfare Division

Who We Are

NDIA's Undersea Warfare Division fosters both 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 Division also supports both government and industry by providing advice on undersea warfare policies and acquisition planning.

Leadership

Alan Lytle, PhD

Division Chair

Tom Callender

Division Deputy Chair

RADM Jim Shannon, USN (Ret)

Vice Chair

RADM John Tammen, USN (Ret)

Advisory Council Chair

CAPT James Gray, USN (Ret)

Chair, Undersea Warfare Division
Spring Conference

Event Information

Location

Conference Venue

Admiral Kidd Conference Center
33050 Acoustic Ave
San Diego, CA 92136

Headquarter Hotel

Courtyard Marriott - Liberty Station
62592 Laning Road
San Diego, CA 92106

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 Contacts

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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, March 19

6:30 – 10:45 am | Buses will shuttle (as filled) from the hotels (Courtyard Marriott - Liberty Station, and Holiday Inn San Diego Bayside) to the Admiral Kidd Conference Center.

3:30 – 7:30 pm | Buses will shuttle in a loop from the Admiral Kidd Conference Center to the hotels (Courtyard Marriott - Liberty Station, and Holiday Inn San Diego Bayside)

Wednesday, March 20

6:30 – 10:45 am | Buses will shuttle (as filled) from the hotels (Courtyard Marriott - Liberty Station, and Holiday Inn San Diego Bayside) to the Admiral Kidd Conference Center.

3:30 – 7:30 pm | Buses will shuttle in a loop from the Admiral Kidd Conference Center to the hotels (Courtyard Marriott - Liberty Station, and Holiday Inn San Diego Bayside) .

Agenda

Monday, March 18

4:00 – 6:30 pm

Registration

COURTYARD MARRIOTT - LIBERTY STATION

Sponsored by

GENERAL DYNAMICS
Mission Systems

5:00 – 6:30 pm

Networking Reception

COURTYARD MARRIOTT - LIBERTY STATION

Sponsored by

NORTHROP GRUMMAN

Tuesday, March 19

7:00 am – 5:00 pm

Registration

ADMIRAL KIDD CONFERENCE CENTER

Sponsored by

GENERAL DYNAMICS
Mission Systems

7:00 – 8:00 am

Networking Breakfast

ADMIRAL KIDD CONFERENCE CENTER LAWN

8:00 – 8:15 am

Welcome and Opening Comments

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

Alan Lytle, PhD

Chairman, Undersea Warfare Division, NDIA

Vice President, Strategy and Mission Solutions, Northrop Grumman Corporation

CAPT James Gray, USN (Ret)

Chairman, Undersea Warfare Division Spring Conference

Senior Principal, Strategy Development, Maritime Sector, L3 Harris

8:15 – 8:45 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

RADM Richard Seif, USN

Commander, Submarine Force, U.S. Pacific Fleet

8:45 – 9:15 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

David Adams

Director, Warfighting Effectiveness, Assessments, and Readiness (CPF N9WAR)

9:15 – 9:45 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

BGen Robert Weiler, USMC

Assistant Division Commander, 1st Marine Division

9:45 – 10:15 am

Networking Break

ADMIRAL KIDD CONFERENCE CENTER LAWN

10:15 – 10:45 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

RDML Wilson Marks, USN

Commander, Naval Surface and Mine Warfighting Development Center

10:45 – 11:15 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

Jerry Ferguson

Deputy Commander, Undersea Warfare Development Center

11:15 – 11:45 am

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

Gene Hackney

Director, Undersea Warfare, Naval Undersea Warfare Center - HQ

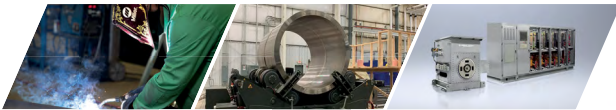
11:45 am – 12:05 pm

Awards Ceremony

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

Pierre Corriveau, PhD

Awards Chair, Undersea Warfare Division, NDIA



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 **GENERAL ATOMICS**
ELECTROMAGNETICS

12:05 – 1:30 pm

Networking Lunch

ADMIRAL KIDD CONFERENCE CENTER LAWN

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1:30 – 2:00 pm

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

VADM Michael Boyle, USN

Commander, U.S. Third Fleet

2:00 – 2:30 pm

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

RDML Thomas Dickinson, USN

Commander, Naval Surface and Undersea Warfare Centers

2:30 – 3:00 pm

Networking Break

ADMIRAL KIDD CONFERENCE CENTER LAWN

3:00 – 3:30 pm

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

Dr. Sam Taylor

Mine Warfare Senior Leader, Program Executive Office Unmanned and Small Combatants (PEO USC)

3:30 – 4:00 pm

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

RDML Todd Weeks, USN

Program Executive Officer, Undersea Warfare Systems

4:00 – 4:30 pm

Presentation

ADMIRAL KIDD CONFERENCE CENTER SKYLINE ROOM

RDML Mark Behning, USN

Director, Undersea Warfare Division, OPNAV N97

4:30 – 4:45 pm

Closing Remarks

Admiral Kidd Conference Center Skyline Room

CAPT James Gray, USN (Ret)

Chairman, Undersea Warfare Division Spring Conference
Senior Principal, Strategy Development, Maritime Sector, L3 Harris

4:45 – 6:00 pm

Networking Reception

ADMIRAL KIDD CONFERENCE CENTER LAWN

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Technical Sessions


Wednesday, March 20

7:00 am **Registration**
ADMIRAL KIDD CONFERENCE CENTER

SPONSORED BY
GENERAL DYNAMICS
Mission Systems

7:00 am **Networking Breakfast**
ADMIRAL KIDD CENTER LAWN

	Artificial Intelligence & Machine Learning Session Chair: Glen Sharpe	Find, Fix, Track, Target (F2T2) Session Chair: Joe Cuschieri	Find, Fix, Track, Target (F2T2) 2 Session Chair: Paul Rosbolt	Kinetic/Non-Kinetic Session Chair: Chuck Fralick
	Point Loma	Skyline A	Skyline B	Nimitz
8:00 – 8:25 am	IWS 5.0 AI/ML Investments: Lessons Learned and Future Initiatives Margaret Stout NAVSEA PEO IWS 5.0 Undersea Warfare Systems Chad Hawes JHU/APL	Learning from the Classics for the Future Fight Jeffrey Cares Alidade Incorporated	UxV Presentation ONI	Future Torpedo Efforts Christopher Polk Undersea Weapons Program Office (PMS 404)
8:30 - 8:55 am	Project Harbinger: Artificial Intelligence for Acoustic Applications James McGee UWDC Jeff Anderson SUBFOR	UxV Threats/ Deployments Vic Leung PMS 495		U.S. Navy Subsea and Seabed Warfare (SSW) Strategy and Mission Packages Dr. Eric Hendricks NIWC Pacific Dr. Cherry Wakayama NIWC Pacific
9:00 - 9:25 am	Context- and AI-Based Reasoning for Identification onBoard UxVs (CARIBOU) Jamie Winterton Boston Fusion Corporation Rob Ceres Boston Fusion Corporation	IWS 5.0 Program Status & Plans Glenda Leon Program Executive Office, Integrated Warfare Systems (IWS 5.0)	General Atomics Blended Wing Glider Scott Mahar General Atomics	The 4th Generation UUV: Designing for Adaptability and Scale Kevin Sloan DARPA

	Artificial Intelligence & Machine Learning Session Chair: Glen Sharpe	Find, Fix, Track, Target (F2T2) Session Chair: Joe Cuschieri	Find, Fix, Track, Target (F2T2) 2 Session Chair: Paul Rosbolt	Kinetic/Non-Kinetic Session Chair: Chuck Fralick
	Point Loma	Skyline A	Skyline B	Nimitz
9:30 - 9:55 am	Owning Project OVERMATCH Enabling Electronic Systems Designs and Supply Chain Ezra Hall Aerospace and Defense Steven Carlson Aerospace and Defense	Undersea Fixed Surveillance Systems - Future Systems Plans, Concepts, and Advanced Capabilities Robert Barton IUSS Fixed Surveillance Systems, PMS 485	Joint Autonomous Remote Vehicle Integration System (JARVIS) Abstract Richard Byers Naval Surface Warfare Center Panama City Division	Overview of the Naval Mines Portfolio: The Need for a Wide Range of Platforms or Systems Capable of Delivering In-service and New Mines Eric Gonzalez PMS 495
10:00 am	NETWORKING BREAK ADMIRAL KIDD CENTER LAWN			
10:30 - 10:55 am	Assessing Ocean Floor Morphology with AUVs Joshua Miner Naval Postgraduate School	Potential Adversary Sub Ops / Deployments ONI	Intelligent Navigation Manager Michael Ricard C. S. Draper Laboratory Katherine Levinson C. S. Draper Laboratory	PMS 406 Kinetic and Non-Kinetic Effects from UUVs CDR David Ferris, USN PMS 406
11:00 - 11:25 am	Advancing MIW & SSW ATR through Project AMMO David Barsic Johns Hopkins University / Applied Physics Laboratory	PMS 485 Deployable Surveillance Systems Update Susan LaShomb Deployable Surveillance Systems, Maritime Surveillance Systems Program Office	Capable and Reliable Autonomous Under Water Vehicles for the Great Power Competition Era Lance Page Draper Meredith Pitchon Draper	Sub-launched UAS Study Bryan Clark Hudson Institute
11:30 - 11:55 am	Supporting Commanders' Operational Planning and Decision-Making for Submarine Security Using Bayesian-Based Artificial Intelligence and Data Fusion Jeremy Werner DOT&E	Non-Traditional Signature Susceptibility Characterization Thomas Miller Division 74, Naval Surface Warfare Center, Carderock Anne Fullerton Department 70, Naval Surface Warfare Center, Carderock	Undersea Communications and Integration Program Office CAPT David Kuhn, USN PMW 770	Deep Sea Expeditionary with No Decompression (DSEND) Dive Suit- Extending the Reach of Navy Divers Chad Klinesteker Johns Hopkins Applied Physics Lab
12:00 pm	NETWORKING LUNCH ADMIRAL KIDD CENTER LAWN			Sponsored by 

	Artificial Intelligence & Machine Learning Session Chair: Glen Sharpe	Find, Fix, Track, Target (F2T2) Session Chair: Joe Cuschieri	Find, Fix, Track, Target (F2T2) 2 Session Chair: Paul Rosbolt	Kinetic/Non-Kinetic Session Chair: Chuck Fralick
	Point Loma	Skyline A	Skyline B	Nimitz
1:00 - 1:25 pm	Deep Dive: Leveraging AI in Subaquatic Strategies for Underwater Warfare Excellence Jonathan Hard H2L Solutions, Inc.	Vector Sensor Based System for ASW, cUUV, and Oceanographic Research Applications Mark Paulus NUWC Keyport		Naval Postgraduate School Naval Mining Research Projects Rick Williams Naval Post Graduate School
1:30 - 1:55 pm	Leveraging Reinforcement Learning to Emulate OPFOR in Operational Wargames Connor Ahern Booz Allen Hamilton Kaimi Kahihikolo Booz Allen Hamilton	Laser Transduction for Underwater Communications Megan Driggers Naval Undersea Warfare Center- Division Newport	Accelerating the Kill Chain Jim Pietrocini KBR	USW Weapons Update ONI
2:00 - 2:25 pm	Semantic Segmentation of Sub-bottom Profiling Data for Subseafloor Sediment Classification Justin Diamond University of Washington	Expanding Undersea Overmatch with Attributable Payloads Jeffery Hoyle Elbit America	Expendable Unmanned Underwater Vehicles for Tactical Navy Applications Ben Marsan Applied Research Laboratories, The University of Texas at Austin	Potential Adversary Tactics Updates ONI
2:30 - 2:55 pm	AI/ML in Undersea Warfare: Myths, Realities, and Solutions for Human-AI/ML Integration Maia Cook Pacific Science & Engineering Group, Inc. (PSE)	Revolutionary Flexibility in Airborne Acoustic ASW Shrinks Kill Chain Danny Willis Boeing	Self Assessment for Active Terrain Aided Navigation Amanda Marie Agustin Naval Postgraduate School	Unmanned ASW: Find Fix, Track, Target, and Engage and Assess AGILE SHARK Mark Kenny Ultra Maritime
3:00 pm	NETWORKING BREAK ADMIRAL KIDD CENTER LAWN			

	Artificial Intelligence & Machine Learning Session Chair: Glen Sharpe	Find, Fix, Track, Target (F2T2) Session Chair: Joe Cuschieri	Find, Fix, Track, Target (F2T2) 2 Session Chair: Paul Rosbolt	Kinetic/Non-Kinetic Session Chair: Chuck Fralick
	Point Loma	Skyline A	Skyline B	Nimitz
3:30 - 3:55 pm	Threats to Industry ONI	Acoustic Signal Sensing Using Fiber Optics in Air Launched Passive Sonobuoys Brian Kenney Battelle Memorial Institute Nicholas Romano Battelle International	Using In-house Commercial Digital Electronics Systems Engineering Capabilities To Develop, Sustain, and Modernize "At the Speed of Relevance" The Enabling Electronics Systems For Project OVERMATCH James Chew Cadence Design Systems Jeff Sanders Cadence Design Systems	Non-Kinetic and Unconventional Effectors Matthew Searle Oceanetics, LLC
4:00 - 4:25 pm			Safe, Pressure-Tolerant Subsea Batteries Extend Endurance for Improved Underwater Find, Fix, Track, Target Leon Adams Southwest Electronic Energy	Applications of Increased Autonomy in Acoustic Air ASW Bradley Riddle Signal Systems
4:30 - 4:55 pm	Computing at the Wet Edge CAPT Jonathan Hasse, USN Expeditionary Missions Program Office (PMS 408) CDR Peter Walker, USN, Ph.D. Defense Health Agency (DHA)		Revolutionizing Underwater Warfare: The Impact of American Lithium Energy's Advanced Battery Technology on Unmanned Underwater Systems William Hadala American Lithium Energy Corporation	Undersea Acoustic Risk Analysis Decision Aid for Anti-Submarine Warfare Steve Psaras Marine Acoustics, Inc.

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

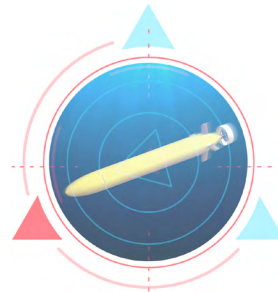


Artificial Intelligence & Machine Learning

Glen Sharpe
Advanced Acoustic Concepts

Artificial Intelligence (AI) and Machine Learning (ML) are enablers of undersea warfare decision superiority. This session

will explore how AI/ML can enhance our ability to maintain undersea overmatch. Where possible, the presenter should provide thoughts on how the proposed effects will change options available to planners and operators.



Kinetic/Non-Kinetic

Chuck Fralick
Leidos

New or evolved kinetic effectors can enable more targeting and planning options. This session will explore new kinetic effects that are available now or projected

to be operational within the next five years. Of equal interest are kinetic effects enabled by new uses of or combinations of existing capabilities. Where possible, the presenter should provide thoughts on how the proposed effects will change options available to planners and operators.



Find, Fix, Track, Target (FT2T)

Joe Cuschieri
Lockheed Martin Corporation

CAPT Paul Rosbolt (Ret)
Systems Planning and Analysis, Inc.

Capabilities, CONOPS, and technologies that can be employed

to Find, Fix, Track, and Target (F2T2) in support of Undersea Overmatch. Of particular interest are emerging technologies that can be rapidly fielded or existing capabilities that can be used in new and novel ways

Non-kinetic and unconventional effects provide planners more options when preparing for or responding to geopolitical events. This session will explore new and emerging technologies and how these capabilities can be employed. Of equal interest are non-kinetic and unconventional effects enabled by new uses of or combinations of existing capabilities. Where possible, the presenter should provide thoughts on how the proposed effects will change options available to planners and operators.

Abstract Descriptions

Artificial Intelligence & Machine Learning

IWS 5.0 AI/ML Investments: Lessons Learned and Future Initiatives

Margaret Stout, Chad Hawes

IWS 5.0 has been developing and transitioning machine learning capabilities over the past decade. Meg Stout (IWS 5.0 S&T Lead) and Chad Hawes (AI/ML Working Group Chair for IWS 5.0) share IWS 5.0 AI/ML lessons learned, development status, and future initiatives.

Project Harbinger: Artificial Intelligence for Acoustic Applications

James McGee, Jeff Anderson

This presentation will provide an update on Project Harbinger Lines of Effort. Established by the Undersea Enterprise in conjunction with the Under Secretary of Defense for Intelligence and Security (USD(I&S)), Chief Digital Artificial Office (CDAO), and USN's Digital Warfare Office (DWO), Project Harbinger has developed a scalable AI/ML pipeline that enables all aspects of Machine Learning (ML) operations from data collection at the edge to the performance of data aggregation, data engineering and labeling, algorithm development, testing and

evaluation in a secure cloud environment. Additionally, the team will discuss lessons learned on project integration and deployment of algorithms onto edge devices supporting the end-user platform and operational assessment.

Context- and AI-Based Reasoning for Identification onBOARD UxVs (CARIBOU)

Jamie Winterton, Rob Ceres

Context- and AI-Based Reasoning for Identification onBOARD UxVs (CARIBOU) is a comprehensive, AI-based automatic target recognition (ATR) agent paired with a novel reasoning engine and a state-of-the-art sonar simulator. CARIBOU provides accurate, robust target recognition capabilities that are not easily fooled by novel classes, dim signals, or attempts to deceive, without requiring a human-in-the-loop or burdensome size, weight, and power (SWaP) requirements.

Owning Project OVERMATCH Enabling Electronic Systems Designs and Supply Chain

Ezra Hall, Steven Carlson

Presents the Benefits to OVERMATCH by using The Companies on The Congressionally Endorsed Defense Microelectronics Agency Trusted Supplier List to Develop On Schedule On Budget, First Pass Success, Future Proofed Digital Electronic Systems Engineering That Are Affordable to Sustain and Modernize "At The Speed Of Relevance". Using these capabilities will prevent the enabling Project OVERMATCH electronic systems to be held hostage to commercial supply chains, allowing OVERMATCH to turn inside the adversary's capability OODA loop.

Assessing Ocean Floor Morphology with AUVs

Joshua Miner

Gaining access to beaches by military forces requires an understanding of the nearshore environment, a dynamic region where bathymetry is affected by sediment transport and other forces. This work focuses on creating a framework that utilizes an autonomous underwater vehicle capable of building a stochastic map onboard and then navigating using information the map contains.

Advancing MIW & SSW ATR through Project AMMO

David Barsic

This is in the progress of being approved for Dist A Release

Supporting Commanders' Operational Planning and Decision-Making for Submarine Security Using Bayesian-Based Artificial Intelligence and Data Fusion

Jeremy Werner

Both strategic deterrence and our Nation's ability to covertly penetrate contested waters depend upon the stealth of our submarine force, but how can this stealth be rigorously characterized to support Commanders' planning and decision-making related to force-level operations in an objective, data-backed way? This work will describe a model for doing so using Bayesian-based Artificial Intelligence and data fusion. Extensions to the model to support Commanders' in other warfighting domains will also be discussed.

Deep Dive: Leveraging AI in Subaquatic Strategies for Underwater Warfare Excellence

Jonathan Hard

Advancements in artificial intelligence (AI) have spurred a revolution in underwater warfare, transforming naval operations beneath the ocean's surface. This presentation explores the cutting-edge applications of AI in subaquatic scenarios, shedding light on its pivotal role in optimizing communication, navigation, and surveillance systems for underwater vehicles.

Leveraging Reinforcement Learning to Emulate OPFOR in Operational Wargames

Connor Ahern, Kaimi Kahihikolo

In partnership with Commander Submarine Pacific, we designed a novel approach, leveraging Reinforcement Learning (RL), to emulate and automate OPFOR behaviors in war gaming simulations. This presentation will showcase our M&S engine integration, highlight the state-of-the-art Reinforcement Learning techniques leveraged, and discuss ongoing/future investigations.

Semantic Segmentation of Sub-bottom Profiling Data for Subseafloor Sediment Classification

Justin Diamond

A sub-bottom profiler (SBP) is a sonar system used to survey subseafloor sediment layers by emitting and analyzing acoustic waves. Despite collecting significant data during surveys, current algorithms focus on the top sediment layer, leaving detailed analysis of subsurface geology incomplete. The proposed solution involves utilizing deep learning algorithms, such as convolutional neural networks and vision transformers, for semantic segmentation of SBP data, aiming to categorize sediment types beneath the seafloor, which can enhance understanding of the subseafloor environment and aid in applications like detecting buried objects and surveying disaster areas.

AI/ML in Undersea Warfare: Myths, Realities, and Solutions for Human-AI/ML Integration

Maia Cook

Artificial Intelligence (AI) and Machine Learning (ML) capabilities offer great potential for achieving undersea warfare superiority, but their effectiveness depends on successfully teaming with human operators and decision makers. This presentation describes how past failures in neglecting the human element in automation and autonomy design apply to AI-/ML-enabled systems. It provides solutions for how to apply expertise in human-AI/ML integration in the design and development of AI/ML undersea warfare capabilities, and how this expertise is critical in circumventing pitfalls unique to human-AI/ML interaction and harnessing the potential of AI/ML for undersea warfare.

Computing at the Wet Edge

CAPT Jonathan Hasse, USN, CDR Peter Walker, USN, Ph.D.

In the rapidly evolving landscape of edge computing, a multitude of literature reviews and surveys have explored its applications and implications across various domains. However, within the realm of underwater environments, where challenges and complexities abound, a noticeable gap exists in the form of a systematic literature review. This study addresses this void by offering a comprehensive exploration of the applications and architectures of edge computing for underwater unmanned vehicles (UUVs), illuminating a domain that has remained relatively uncharted in the current literature.

While the terrestrial applications of edge computing have been extensively documented, the unique underwater context introduces a myriad of challenges that necessitate a specialized examination. The importance of automated systems below the ocean's surface is underscored by their potential in diverse sectors, including military operations, environmental monitoring, and scientific research. The need for

real-time decision-making and data processing in subaquatic environments is increasingly crucial, and the utilization of edge computing emerges as a transformative solution to address these imperatives.

Underwater environments present distinctive limitations that amplify the significance of edge computing. Challenges such as limited power supply, obscured visibility, and the unpredictability of underwater conditions necessitate innovative solutions. The hardness of contact in these environments, coupled with the imperative to operate autonomously, highlights the critical role of edge computing in enhancing the efficiency and autonomy of UUVs.

Find, Fix, Track Target (F2T2) 1

Learning from the Classics for the Future Fight

Jeffrey Cares

The Undersea Warfighting Development Center (UWDC) Tactical Analysis Group (TAG) is re-examining the classic approaches to USW with an eye toward re-tooling methods and techniques to support a more modern decision set. About five times a year, the TAG's Submarine Operations Research Group (SORG) has produced short, focused technical papers for distribution to fleet planners and analysts.

This presentation will discuss the content contained in the "SORG Memos" as well as lessons learned from their application to analysis of current real world and exercise analyses.

Reducing the MCM Operations Timeline Through Innovative Ideas, Efficient Material Solutions and Automation

Vic Leung

IWS 5.0 Program Status & Plans

Leroy Mitchell

Overview of IWS 5.0 programs and their current status.

Undersea Fixed Surveillance Systems - Future Systems Plans, Concepts, and Advanced Capabilities

Robert Barton

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. In this presentation, the recapitalization vision and plans of the IUSS FSS program will be illustrated, including support for maturing the Navy's Subsea and Seabed Warfare concepts and capabilities.

PMS 485 Deployable Surveillance Systems Update

Susan LaShomb

The brief outlines the incremental development of Deployable Surveillance Systems capabilities using the Middle Tier of Acquisition pathway, including updates on Deep Water Passive operational testing, Deep Water Active technology transition, and upcoming opportunities for Industry engagement.

Non-Traditional Signature Susceptibility Characterization

Thomas Miller, Anne Fullerton

Many of the U.S. Navy's undersea vehicles operate at or near the free surface in order to execute Find, Fix, Track, and Target (F2T2) against adversary platforms. During near surface operations the undersea vehicle's antennas (communications), masts (visualization), and other systems may be exposed in support of F2T2. This gives the adversary an opportunity to counter-F2T2 against the U.S. Navy undersea vehicle, setting up a potential information exchange Return on Investment (ROI) problem for Ship's Force to solve. As near surface operations are common and essential, it is important to comprehensively understand undersea vehicle susceptibility to counter-F2T2. This proposed presentation will detail the measurement and modeling efforts, as well as key insights that can benefit current and future undersea platforms. This susceptibility program will continue in out years, with ultimate intentions of a lifecycle measurement capability.

Vector Sensor Based System for ASW, cUUV, and Oceanographic Research Applications

Mark Paulus

Naval Undersea Warfare Center Keyport Division has been developing novel vector sensor based systems for threat detection and tracking, as well as for oceanographic research in collaboration with several universities. The combination of research and practical application has resulted in low power miniaturized vector sensor payloads capable of meeting a wide range of requirements for integration in both mobile unmanned and stationary persistent platforms. The work has also resulted in unique calibration and data processing solutions to increase the applicable scope of vector sensors.

Laser Transduction for Underwater Communications

Megan Driggers

The Laser Transduction Laboratory (LTL) at the Naval Undersea Warfare Center (NUWC) is developing new laser-based technologies applied to underwater sound and communications. Promising operationally significant results are presented, and future development plans will be discussed with potential for rapid deployment. These technologies have significant advantages for Find, Fix, Track, Target (F2T2) CONOPS because it promotes joint military operations in a way that has never been done before.

Expanding Undersea Overmatch with Attributable Payloads

Jeffery Hoyle

Covert undersea deployment of large numbers of attributable payloads able to collaborate with one another could overwhelm or otherwise evade enemy defenses and countermeasures while transforming potentially vulnerable "kill chains" into a more resilient "kill web" which can maintain its integrity even when multiple individual elements fail or are rendered ineffective by adversary attacks. Developing and deploying a large force of highly capable, attributable payloads to generate desired effects in the most demanding maritime warfighting scenarios builds upon early successes in extending Undersea Overmatch by operationally employing existing payloads such as the Submarine-Launched Unmanned Aerial System (SLUAS), communications buoys and acoustic countermeasures, and it is supported by ongoing research, development and prototyping efforts at the Office of Naval Research, Defense Advanced Research Projects Agency, Project Overmatch and the Naval Sea Systems Command.

Revolutionary Flexibility in Airborne Acoustic ASW Shrinks Kill Chain

Danny Willis

The latest enhancements to the P-8A Poseidon Acoustic Processing shorten the kill chain by providing operators with near zero latency access to the most optimal configuration for responding to target mode changes or when transitioning to localization and tracking from search. This paper describes those new features.

Acoustic Signal Sensing Using Fiber Optics in Air Launched Passive Sonobuoys

Brian Kenney, Nicholas Romano

This abstract discusses the use of fiber optical cable in place of traditional hydrophones in air launched sonobuoys to sample at multiple depths and reduce its dependence upon a fixed propagation environment amid a dynamic thermohaline profile. It also offers an opportunity to apply array processing methods to boost SNR and facilitate dynamic tracking through depth changes.

Find, Fix, Track Target (F2T2) 2

General Atomics Blended Wing Glider

Scott Mahar

General Atomics Electromagnetic Systems (GA-EMS) is developing and testing a novel unmanned underwater vehicle (UUV): a large, blended wing glider, optimized for stealth with extended transit and operations with zero surface expression. Results from the at-sea testing of a subscale vehicle in 2023, as well as the planned at-sea testing in 2024 will be discussed in this talk.

Joint Autonomous Remote Vehicle Integration System (JARVIS) Abstract

Richard Byers

Unmanned systems are the next step into modern warfare and they will reside in all domains (air, underwater, ground, and on the water surface). The requirements for them to function in an orchestrated fashion within a contested environment are

evolving constantly. How does the Commander trust his unmanned system assets without real-time secure intelligence and communications?

Intelligent Navigation Manager

Michael Ricard, Katherin Levinson

The ability for undersea assets to accurately navigate in non-permissive, contested, poorly mapped environments is critical for the execution of Find, Fix, Track, Target (F2T2) missions in support of Undersea Overmatch. Draper is developing the Intelligent Navigation Manager (INM) to optimally manage various sensing modalities and provide a continuous and accurate navigation solution. The INM brings us closer to assured position, navigation and timing (PNT) for underwater missions by creating a navigation system that can quantify its own accuracy in advance of a mission and adapt during a mission to meet accuracy requirements.

Capable and Reliable Autonomous Under Water Vehicles for the Great Power Competition Era

Lance Page, Meredith Pitchon

Draper is building and fielding reliable, capable, flexible undersea autonomy software. Maritime Open Architecture Autonomy (MOAA) is developed and tested in conjunction with physics-based 6-DOF simulation, DSIM. MOAA's flexibility means that it is easily extended to new missions and easily adapted to new platforms. As a result of the software's testability, the autonomy behavior is predictable, and customers get a vehicle that shows up when and where they expect during in-water testing.

Undersea Communications and Integration Program Office, PMW 770

CAPT David Kuhn, USN

Accelerating Undersea Shore and Afloat Communications

Accelerating the Kill Chain

Jim Pietrocini

The purpose of the research to be presented in a panel session is to introduce the USW community to the broader Naval work on battle management, accelerating the kill chain with artificial intelligence and machine learning, and future integration of large language models (LLMs).

Expendable Unmanned Underwater Vehicles for Tactical Navy Applications

Ben Marsan

Undersea Warfare is being transformed by the use of advanced Unmanned Underwater Vehicles (UUVs) to reduce risk to manned platforms and to extend their reach. Many of these UUVs are designed to be reusable and recoverable, but are characterized by high cost and limited endurance due to constraints of recovery and reuse. The University of Texas, Applied Research Laboratories is working on a UUV testbed platform that could fill the role of an expendable, or semi-expendable UUV that combined with lower-cost advanced sensors, these low-cost expendable UUVs can enable new and more cost-effective tactical capabilities for the Navy.

Self Assessment for Active Terrain Aided Navigation

Amanda Marie Agustin

An information theoretic, in-situ, self-assessment for undersea Active Terrain Aided Navigation. Because continual self-assessment emphasizes progress reports, self-reflection on past planning and supervisory communication, this new contribution is critical for developing robust SLAM approaches - especially in unknown environments. The paper will feature the self-assessment technique through a simulated AUV bathymetric survey.

Using In-house Commercial Digital Electronics Systems Engineering Capabilities To Develop, Sustain, and Modernize "At the Speed of Relevance" The Enabling Electronics Systems For Project OVERMATCH"

James Chew, Jeff Sanders

Congress is urging the DoD to apply proven methodologies to affordably sustain and agilely modernize, at the speed of relevance, DoD warfighting systems. A recent GAO report confirmed that commercial electronic companies use hardware accurate electronic system digital twins, using class leading emulation systems, to enable this capability. The DoD has obtained and is operating emulation systems from the only electronic design automation company that is a DoD Trusted Supplier, with one such system is operating at NAWCWD Pt. Mugu and is available for OVERMATCH Program Office use. This presentation will outline how this systems being used to develop, operationally diagnose, sustain, and modernize DoD electric systems.

Safe, Pressure-Tolerant Subsea Batteries Extend Endurance for Improved Underwater Find, Fix, Track, Target

Leon Adams

Subsea batteries are an essential source of mobile and remote electric power in subsea applications that utilize electronic sensors, guidance, propulsion, and communications systems. Much if not all of these functions run on battery power. As such, safe, pressure-tolerant Subsea Batteries extend endurance for improved Find, Fix, Track, and Target (F2T2) functions in the future of improved Underwater Warfare. This battery architecture and modular technology solutions will be discussed.

Revolutionizing Underwater Warfare: The Impact of American Lithium Energy's Advanced Battery Technology on Unmanned Underwater Systems

William Hadala

This abstract examines the transformative impact of American Lithium Energy's advanced lithium battery technology on unmanned underwater systems (UUS), highlighting its role in significantly enhancing mission duration, depth capabilities, and operational effectiveness in underwater warfare. By enabling more complex and extended-range missions, these technological advancements not only improve intelligence and surveillance operations but also reduce risks to human life in maritime defense strategies.

Kinetic/Non-Kinetic

Future Torpedo Efforts

Christopher Polk

Evolving torpedo missions have resulted in an expansion of performance requirements and the types of systems, subsystems and components needed to deliver advanced capabilities to the Fleet.

U.S. Navy Subsea and Seabed Warfare (SSW) Strategy and Mission Packages

Dr. Eric Hendricks, Dr. Cherry Wakayama

To advance warfighting concepts and build a shared understanding in the Subsea and Seabed Warfare (SSW) community, government and industry experts collaborated in a two-day Mission Packages Workshop at the Naval Information Warfare Center Pacific in January 2024. In this presentation, the Navy's SSW Strategy will be discussed to establish and strengthen strategic focus areas. The results of the SSW workshop will also be presented including identified opportunities, gaps, and proposed SSW mission packages.

The 4th Generation UUV: Designing for Adaptability and Scale

Kevin Sloan

Overview of the Naval Mines Portfolio: The Need for a Wide Range of Platforms or Systems Capable of Delivering In-service and New Mines

Eric Gonzalez

PMS 406 Kinetic and Non-Kinetic Effects from UUVs

CDR David Ferris, USN

PMS 406 is designing, building, and sustaining a range of Unmanned Underwater Vehicles to provide the Navy a mix of kinetic and non-kinetic effects from a variety of host platforms. Recent events such as Nord Stream Pipeline and Ukrainian USV operations have greatly increased the visibility and attention directly towards unmanned maritime systems. CDR David Ferris will present the current state of PMS 406 UUV platforms, share near term goals, as well as discuss the PMS 406 vision for the future of Kinetic and Non-Kinetic UUV missions.

Sub-launched UAS study

Bryan Clark

In support of the Office of Naval Research (ONR) Full Spectrum Undersea Warfare (FSUSW) Innovative Naval Prototype (INP) Project 4, Ventus Solutions and the Hudson Institute conducted a study to assess the potential utility of Medium Diameter (MD) Submarine-Launched Unmanned Aircraft Systems (SLUAS). With an approximately 7-inch diameter, MDSLUAAS could provide longer endurance, more payloads, and greater versatility compared to today's 3-inch diameter Blackwing SLUAS. The study was informed by two classified tabletop exercises with participants from Navy Undersea Warfare Center, Naval Sea Systems Command, the Undersea Warfighting Development Center, Submarine Squadron 11, the Chief of Naval Operations staff (N97), and industry. The exercises assessed the utility of different MDSLUAAS variants for sensing, electronic warfare (EW), and lethal attacks in relevant scenarios and used computer-based tools for mission planning and simulation.

The project concluded that MDSLUAAS could improve the ability of submarines and larger unmanned undersea vehicles to complete organic or third-party kill chains. Even though six MDSLUAAS would displace a Mk-48 torpedo, participants assessed the tradeoff was worthwhile. While SDSLUAS incorporates only an optical and infrared sensor and line-of-sight radios, MDSLUAAS could carry multiple sensors, EW systems, and satellite communications for twice the mission time. During the exercises, teams used MDSLUAAS for essential functions such as targeting and combat ID or to disrupt adversary defenses, improving the efficacy of organic and inorganic attacks. MDSLUAAS were also valuable contributors to long-range kill chains being led by fleet or maritime component commanders. Moreover, the study found MDSLUAAS may be one of the most important payloads of extra-large or large UUVs, and could provide persistent targeting and non-kinetic effects inside highly contested areas when the threat to submarine precludes launching or communicating with SLUAS.

Deep Sea Expeditionary with no Decompression (DSEND) Dive Suit- Extending the Reach of Navy Divers

Chad Klinesteker

Atmospheric Dive Suits (ADS) are form-fitting one-person submersibles that can be articulated to perform diving missions without the need for compression protocols. This allows for person-in-the-loop problem solving for extended duration at depth where ROV and conventional gas supplied diving are not adequate; unlocking new, unconventional warfighting capability. Until recent, ADS technology has been heavy and difficult to maneuver, which precludes them from being tactically relevant. Office of Naval Research 342 and Supervisor of Salvage Diving 00C3 have initiated the Deep Sea Expeditionary with No Decompression (DSEND) project to develop a versatile Navy diving asset that is highly flexible, lightweight and capable of accomplishing virtually all of the tasks conventionally performed by a "wet diver" without the lengthy decompression requirements. This brief will cover recent in-water prototype testing with navy divers as well as the technology development challenges that need further support; specifically, prehensors and bendable pressure vessels.

Naval Postgraduate School Naval Mining Research Projects

Rick Williams

The Naval Postgraduate School (NPS) Undersea Warfare (USW) and other Curricula, the Naval Warfare Studies Institute (NWSI), the Warfare Innovation Continuum (WIC), the Consortium for Robotics and Unmanned Systems Education and Research (CRUSER), the Naval Research Program (NRP), and other educational Curricula and research associates produce 800-1200 advanced level research theses and projects each year. With current and ongoing interest in Naval Mining and other associated USW topics, this presentation will discuss the NPS organizational support structure for USW research and with detailed discussion about several of these USW research efforts. Collaboration opportunities for Navy and commercial laboratories, industry, and other DOD agencies with NPS research efforts will be noted.

Unmanned ASW: Find Fix, Track, Target, and Engage and Assess AGILE SHARK

Mark Kenny

PACFLEET has identified ASW capacity and capability shortfalls in restricted HELLSCAPE scenarios. Manned platforms will be challenged to conduct ASW operations in the denied areas. OSD REPLICATOR, utilizing GARC small USV's and MQ-9, deploying sonobuoys, sensors and MK58 CRAW torpedoes, provides a rapid, low cost, low risk unmanned ASW solution in the denied areas.

Non-Kinetic and Unconventional Effectors

Matthew Searle

Oceanetics have collaborated with Navy warfare centers to develop unique counter UUV systems; this right hand end of the kill chain is a sparsely populated area. Oceanetics C-UUV systems have proven themselves effective at stopping this emerging threat.

Applications of Increased Autonomy in Acoustic Air ASW

Bradley Riddle

This talk discusses recent breakthroughs in Air ASW active sonar automation, specifically the Multistatic Active Coherent (MAC), family of systems and Directional Command Activated Sonobuoy System (DICASS). Recent demonstrations of Air ASW active sonar automation will be discussed. The presentation shows the Technology Readiness Levels of the various automation techniques, and discusses possible next steps for demonstrations and technology maturation.

Undersea Acoustic Risk Analysis Decision Aid for Anti-Submarine Warfare

Steve Psaras

As part of the N192-117 Phase II SBIR effort under PEO IWS-5, the Marine Acoustics Inc. (MAI) and L3Harris Team were able to demonstrate a Transition Readiness Level (TRL) 6 Prototype for both a Strike-Group ASW Risk Analysis (SARA) and a Theater ASW Risk Analysis (TARA) Tactical Decision Aid (TDA). These TDA's proved proof of concept integration with the L3Harris TACSIT Geo display, ASW planning tools, and larger Undersea Warfare Decision Support System (USW-DSS) architecture. These TDA's are designed to quantify risk to ASW Future Operations (FUOPS) planning based on threat detection and mitigation across threat postures. Such a capability is envisioned to serve as a tool for Course Of Action (COA) Development, Wargaming, and COA Decision in the Navy Planning Process, fully nesting within Navy Planning doctrine such as NWP-5.01. Further, such a capability is designed for intuitive presentability of plans, decision points, and risk to ASW Commanders.

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Biographies



David Adams

Director-N9 War, US Pacific Fleet

David Adams is the Director of Warfighting Effectiveness, Assessments, and Readiness (N9WAR)

for the U.S. Pacific Fleet. Adams retired from the Navy in 2016 after 31 years of service. The son of an Army Sergeant Major, he enlisted in 1985, earned a Bachelor's in Mechanical Engineering from the University of Texas at Austin in 1990, and was commissioned through the Nuclear Enlisted Commissioning Program in 1991.

Adams commanded the Joint Provincial Reconstruction Team Khost, Afghanistan that was recognized by the Secretary of Defense as "a model of counterinsurgency success." He then commanded USS Santa Fe (SSN 763), completing a highly successful Western Pacific Deployment for which the crew was recognized with a Navy Unit Commendation and received the highly-coveted 2011 Submarine Squadron Seven Battle Efficiency Award. Adams' last Navy command was USS Georgia (SSGN 729B) where he led the ship out of a major \$80 million overhaul.

Ashore he served on the Chief of Naval Operations Strategic Studies Group, as Aide to Deputy Commander, Fleet Forces Command, as Speechwriter to Chief of Naval Operations and as Director, Commander's Initiatives Group, U.S. Seventh Fleet. Throughout his career, Adams has been pivotal to catalyzing warfighting innovation by driving new models of strategic thinking to develop cutting-edge strategy, warfighting experimentation, exercise design and execution, assessments, and war gaming to help solve some of the Pacific's toughest security challenges.

After retirement and prior to rejoining the Navy as a federal civilian, Adams served as the Deputy Editor-in-Chief for the U.S. Naval Institute Proceedings & Naval History and Program Manager – Western Pacific for Oceanering International in Hawaii. Prior to joining Pacific Fleet, Adams served as Director – Navy Museums, Naval History and Heritage Command where he led the U.S. Navy's ten official museums, the maintenance of the USS Constitution and Historic Ship Nautilus. He successfully launched the U.S. Navy's \$450M program to build a new world-class

National Museum of the United States Navy and led the successful—unprecedented early and under budget—completion a 30-year dry docking availability of H.S. Nautilus. For these accomplishments, Adams was awarded two Distinguished Civilian Service Awards.

His articles and essays have merited numerous first-prize writing awards from the Naval Institute, the Naval Submarine League, and U.S. Navy League with the Alfred Thayer Mahan Award for Literary Achievement. In addition to his Government responsibilities, he is a Contributing Editor to the U.S. Naval Institute Proceedings.

Adams is a graduate of the Royal Navy's world renowned "Perisher" Submarine Command Course. He holds a Master's in Strategic Planning with highest honors from Naval Postgraduate School where he was awarded the Monterey Navy League Award for highest overall academic achievement. His decorations include the Legion of Merit, Bronze Star, Meritorious Service Medal (3) and Combat Action Ribbon.



RDML Mark Behning, USN

Director, Undersea Warfare Division, OPNAV N97

RDML Mark Behning is a native of Phoenix, AZ, and a 1990 graduate of the U.S. Naval Academy

with a Bachelor of Science in aerospace engineering. He also holds a Master of Arts in national security and strategic studies from the Naval War College and has completed the Massachusetts Institute of Technology Seminar XXI program.

His sea tours include division officer assignments aboard USS Philadelphia (SSN 690), engineer officer aboard USS Charlotte (SSN 766), executive officer aboard USS Alaska (SSBN 732). He commanded USS Nevada (SSBN 733) and USS Henry

M Jackson (SSBN 730) and also served as commodore of Submarine Squadron (SUBRON) 17 in Bangor, WA.

His shore tours included duty as the Tomahawk strike officer for commander, U.S. Naval Forces Europe; assistant force nuclear power officer for commander Submarine Forces Atlantic; deputy commander, Submarine Squadron 17; deputy for Strategic Forces, Nuclear Weapons, and Force Protection for commander, Submarine Force, U.S. Pacific Fleet; Sea Based Strategic Deterrence branch head for the director of Undersea Warfare (OPNAV N97); and deputy director and chief of staff for Strategic Systems Programs.

His flag assignments include duty as deputy director, Strategic Targeting and Nuclear Mission Planning, J5N, U.S. Strategic Command and he is currently serving as commander, Submarine Group 9 and commander Task Group 114.3.

He is responsible for the administrative control of assigned ships and submarine squadrons to man, train and equip Pacific ballistic and guided missile submarines, as well as exercising tactical control of assigned ballistic missile submarines conducting strategic nuclear deterrent patrols in the Indo-Pacific area of operations.

His personal decorations include the Defense Superior Service Medal, Legion of Merit, Navy and Marine Corps Meritorious Service Medal, as well as other unit and campaign awards.



VADM Michael Boyle, USN

Commander, U.S. Third Fleet

VADM Michael Boyle is a native of McLean, VA, and the son of a naval aviator. He is a 1987 graduate of

Jacksonville University, Jacksonville, FL with a Bachelor of Science in Business Management. He received his commission through the Navy Reserves Officer Training Corps program with a master's degree in foreign affairs from the Air Command and Staff College.

Boyle was designated a naval aviator in January of 1990. His operational tours include Strike Fighter Squadron 137 (VFA-137), USS Forrestal (CV 59) in support of Operation Provide Comfort and Operation Deny Flight in Northern Iraq; VFA-81, USS Saratoga (CV 60) in support of Operation Provide Promise and Operation Deny Flight over Bosnia-Herzegovina; VFA- 87, USS

Theodore Roosevelt (CVN 71) in support of Operation Noble Anvil, Operation Allied Force over Kosovo, and Operation Southern Watch over southern Iraq.

Ashore, Boyle's assignments include VFA-106 as an FA-18 instructor pilot; Naval Personnel Command as the FA-18 junior officer assignments officer; Office of the Secretary of Defense, Cost Assessment and Program Evaluation (OSD-CAPE) as the Navy TacAir analyst; U.S. Pacific Fleet as executive assistant to the Commander, where he served for Admiral Harry Harris and Admiral Scott Swift; Navy International Programs Office as U.S. Central Command and U.S. Pacific Command Security Cooperation director; Director, International Engagements, Office of the Chief of Naval Operations, N52; and Director of Maritime Operations at U.S. Pacific Fleet.

Command operational assignments include VFA-81 with Carrier Air Wing 17 (CVW-17) aboard USS John F. Kennedy (CV 67) in support of Operation Iraqi Freedom and USS George Washington (CVN 73) for the Partnership of the Americas deployment, before being reassigned to CVW-11 aboard USS Nimitz (CVN 68); forward deployed as CVW-5 aboard USS George Washington (CVN 73) for multiple Western Pacific patrols; Commander, Navy Region Korea and Commander, Naval Component, U.S. Forces Korea and United Nations Command, Korea; Commander, Carrier Strike Group-12 where he deployed with the USS Abraham Lincoln (CVN 72) Strike Group and assumed the first operational command of USS Gerald R. Ford (CVN 78).

Boyle assumed duties as Commander, THIRD Fleet in June 2022.



RDML Thomas Dickinson, USN

Commander, Naval Surface and Undersea Warfare Centers

RDML Tom Dickinson, a native of Whitehall, MI, graduated from the United States Naval Academy in

1995 with a Bachelor of Science degree in Economics. He also earned a Master of Business Administration degree in 2006 from the Naval Postgraduate School, in Monterey, CA, where he graduated with distinction as a Conrad Scholar.

He qualified as a Surface Warfare Officer aboard USS Chancellorsville (CG 62) in 1997. Additional operational assignments include Operations Officer aboard USS Champion (MCM 4); Weapons Officer and Combat Systems Officer aboard USS The Sullivans (DDG 68); and Executive Officer

and Commanding Officer aboard USS Barry (DDG 52). During his command tour, USS Barry completed a nine-month Ballistic Missile Defense deployment in the Eastern Mediterranean Sea and earned the Battle "E."

Ashore assignments include Surface Warfare Officer detailee for PERS-41 at the Navy Personnel Command; Major Defense Acquisition Program analyst in the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L); and instructor at the Naval Leadership and Ethics Command in Newport, RI.

Acquisition professional assignments include Principal Assistant Program Manager for Technology Insertion in the AEGIS Program Office; Fleet Introduction Program Manager for AEGIS Ashore; Maritime Theater Missile

Defense National Point of Contact; Major Program Manager for AEGIS Ballistic Missile Defense Weapon Systems; and Executive Assistant for the Assistant Secretary of the Navy for Research, Development and Acquisition. Prior to his current assignment, Rear Admiral Dickinson served as the Principal Military Deputy and Chief Operating Officer for the Director, Surface Ship Maintenance, Modernization and Sustainment (SEA-21) and the Commander, Navy Regional Maintenance Centers.

In 2014, Dickinson was awarded the Vice Admiral James Bond Stockdale Award for Inspirational Leadership. In 2020, he was the inaugural recipient of the Rear Admiral "Deak" Parsons Award for Program Management Excellence.



Jerry Ferguson

Deputy Commander, Undersea Warfighting Development Center

Jerry Ferguson is the Deputy Commander, Undersea Warfighting Development Center. UWDC's global mission

is to develop tactics, concepts and doctrine for undersea warfare (USW); access USW performance and warfighting readiness; train undersea platforms, Theater ASW/USW Commander and Carrier and Expeditionary

Strike Group ASW forces for integrated fleet operations; and advance undersea capability, wholeness and synchronization in order to enable decisive effects "from or in" the undersea domain.

Ferguson began his Navy Civil Service career on December 2004 when he was selected for the Senior Executive Service as the Deputy for the then-newly established Fleet

Antisubmarine Warfare Command. He led the development of the integrated antisubmarine warfare training continuum that remains in use for all Navy Strike Groups and Theater USW Commanders. His Fleet Integrated Prioritized Capability List, which delineates fleet requirements to the CNO, has become standard practice force wide.

In October, 2006 Fleet Antisubmarine Warfare Command merged with the Navy Mine Warfare Command to form the Naval Mine and Antisubmarine Warfare Command. As the Deputy, Ferguson shepherded the fleet introduction of the MK 18 series of unmanned underwater vehicles for MCM.

In September, 2015 the ASW team from Naval Mine and Antisubmarine Warfare Command shifted to become part of the new Undersea Warfighting Development Center. As the deputy, Ferguson has emphasized shaping UWDC to provide essential technical and tactical warfighting support necessary as the Submarine Force has refocused upon Great Power Competition.

Prior to joining the Civil Service, Ferguson served in a variety of afloat and staff billets as an active duty Naval Officer from June 1972 until June 2004. Afloat, he served as an OIC of several Direct Support Elements aboard U.S. Pacific Fleet Submarines. He commanded USS Harry W Hill, and served as Operations Officer for Commander, Cruiser Destroyer Group Three / Carl Vinson Battle Group. As Commander, Destroyer Squadron 15, Ferguson commanded the Yokosuka, Japan-based escorts for the Independence / Kitty Hawk Battle Groups. His shore staff assignments included Director, ASW Requirements Division (N74) for the Chief of Naval Operations. Ferguson concluded his active duty service as a Navy Captain (O-6)

serving as the Chief of Staff for Commander, Carrier Group One. ComCarGru 1 developed and implemented intermediate and advanced warfare training for all West Coast Carrier and Expeditionary Strike Groups.

Ferguson earned his Bachelor's Degree in Philosophy from Eckerd College in St. Petersburg, FL and a Master's Degree in National Security Affairs from Georgetown University in Washington, DC. His awards in the Executive Service including the Department of the Navy Superior Civilian Service Award (2012) and Meritorious Civilian Service Award (2008). His active duty decorations include the Legion of Merit (five awards) and the Meritorious Service Medal (four awards).



Gene Hackney

Director, Undersea Warfare, Naval Undersea Warfare Center - HQ

Gene Hackney is currently the Director, Undersea Warfare (DUSW). Appointed in April 2020 to Senior

Leader (SL) cadre of Senior Executives, he serves as the mission area director for USW across the NAVSEA Warfare Centers (WFC's) and resides within Naval Undersea Warfare Center, Headquarters. As the Director, Hackney provides leadership, guidance, and oversight of USW mission-level activities, leveraging the WFC's technical, operational and analytical capabilities. Prior to this appointed, he was on the DUSW staff focusing on future concepts and advanced capabilities with an emphasis in cross-domain ops, special programs, Command, Control & Comms (C3), EW/Cyber, advanced sensing and unmanned systems.

Hackney began his career working various Antisubmarine Warfare (ASW) programs in the areas of undersea warfare (USW) system development, test & evaluation and fleet introduction including AN/SQQ-89, IUSW Low Frequency Active (LFA) and Surface Ship sonar systems.

During the period of 2008 to 2011, Hackney was assigned to Navy Warfare Development Command initially as the ONR-Global Science Advisor and subsequently serving as Technical Director. From 2006 to 2008, he was assigned as the ONR-Global Science Advisor for United States Pacific Fleet (PACFLT). Prior to his PACFLT tour, Hackney was the USW FORCENet Mission Capability Manager at the Naval Undersea Warfare Center Division, Newport with responsibilities to include technical

management and end-to-end Systems Engineering to implement Theater ASW / C4 / FORCENet capabilities and concepts for the USW Mission Area and was assigned as the initial Integrated Undersea Warfare Technical Authority Warrant for NAVSEA. Hackney was twice detailed to Chief of Naval Operations office as an on-site technical advisor including the N61F FORCENet Requirements Branch and N863 Maritime Systems Branch.

Hackney holds a BS in Mechanical Engineering from University of Rhode Island and completed Naval Post Graduate School's Advanced Acquisition, Program Management & Leadership Program.

His decorations include three Superior Civilian Service Awards and two Meritorious Civilian Service Awards.



RDML Wilson Marks, USN

Commander, Naval Surface and Mine Warfighting Development Center

RDML Wilson Marks, a native of Lynchburg, VA, graduated from the U.S. Naval Academy in 1994 with a Bachelor

of Science degree in history. He has also earned a Master of Arts degree in national security affairs in strategic studies from the Naval War College and a Master of Science degree in national strategic studies from the National War College.

At sea, he served as Strike Warfare Officer aboard USS Deyo (DD 989), Assistant Operations Officer aboard USS Anzio (CG68), Operations Officer aboard USS Barry (DDG

52), Operations Officer aboard USS Vicksburg (CG 69), and forward deployed to Japan as Executive Officer of USS Mustin (DDG89).

Marks commanded USS Mason (DDG 87), USS Robert Smalls (CG 62) formerly named USS Chancellorsville, Provincial Reconstruction Team Ghazni Province, Afghanistan, and Naval Surface Group Western Pacific. While in command of USS Robert Smalls, his Sailors earned the Spokane Trophy as the most combat ready ship in the Pacific Fleet.

Ashore, he served as a Placement Officer and Assistant Captain Detailer at Naval Personnel Command, Executive Assistant to the commander of Naval Surface Force

Atlantic, the Deputy for Combat System and Warfighting Integration at the Office of the Chief of Naval Operations, and as the Executive Assistant to the commander of U.S. Pacific Fleet.

Marks assumed the role of Commander, Naval Surface and Mine Warfighting Development Center in May 2023.

His personal awards include the Legion of Merit (four awards), the Bronze Star, Meritorious Service Medal (four awards), the Navy and Marine Corps Commendation Medal (two awards), the Army Commendation Medal, and the Navy and Marine Corps Achievement Medal (five awards).



RADM Richard Seif, USN

Commander, Submarine Forces, U.S. Pacific Fleet

RADM Seif is a native of Pittsburgh, PA. He is a 1992 graduate of the U.S. Naval Academy with a Bachelor of Science in marine engineering. He also holds a master's degree in business administration from the College of William and Mary's Mason School of Business.

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

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

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

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

officer of the Fleet Forces Command Nuclear Propulsion Examining Board; and flag aide to Commander Submarine Force, U.S Atlantic Fleet/Submarine Allied Command Atlantic. Prior to his assignment as Commander, Submarine Forces, U.S. Pacific Fleet he served as Commander, Submarine Group Seven/Task Force 54/Task Force 74.

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



Dr. Sam Taylor

Mine Warfare Senior Leader, Program Executive Office Unmanned and Small Combatants (PEO USC)

Dr. Sam Taylor was selected to a Senior Level (SL) Executive position in 2017 as the Mine Warfare

Senior Leader for the Program Executive Office Unmanned and Small Combatants (USC). He is responsible for giving overarching leadership to the Mine Warfare and Unmanned system portfolio within the PEO and works to ensure the seamless delivery of capability to the Fleet.

He has been in federal service since 1997, and prior to joining PEO USC, Dr. Taylor served as the Deputy Department Head for the Littoral and Mine Warfare Systems Department at the Naval Surface Warfare Center Panama City Division. There he provided technical, supervisory and managerial leadership for the for a 475-person department that was responsible for the development, testing,

fielding, and life cycle support of littoral and mine warfare systems, including the LCS Mine Countermeasures Mission Package.

From 2011 to 2013, he was the Naval Surface Warfare Center Panama City Division Chief Technology Officer. As the Chief Technology Officer, Dr. Taylor was responsible for the development and implementation of a Science and Technology Strategic Plan for the command. This plan spanned all warfare areas at the command including littoral warfare, mine warfare, naval special warfare, diving and life support, expeditionary maneuver warfare, and unmanned systems.

Dr. Taylor has extensive experience in science and technology as a branch head in the Science, Technology, and Analysis Department at the Naval Surface Warfare Center Panama City Division. He has worked numerous projects for the Office of Naval Research and managed a Future Naval Capability

Product line that developed technology for the Littoral Combat Ship Mine Countermeasures Mission Package.

In 2003, he took a one-year assignment as the Assistant Technical Director at the Deputy Chief of Naval Operations, Expeditionary Warfare Division (N75). In this position, he was provided science and technology leadership and direction in the areas of Mine Warfare, Special Warfare, Explosive Ordnance Disposal, and Sea Basing to the Director.

Dr. Taylor received his doctorate degree in Engineering from the University of Memphis in 1994 where his major was electrical engineering. He had received his bachelor's degree and master of science degree in electrical engineering from the same institution in 1990 and 1991, respectively. His awards include the Navy Meritorious Civilian Service Award and Commanding Officer/ Technical Director Award for Engineering/ Testing/Operations.



RDML Todd Weeks, USN

Program Executive Officer, Undersea Warfare Systems (PEO UWS)

RDML Admiral Weeks graduated with Merit from the United States Naval Academy in May 1993 with a Bachelor of Science in Naval Architecture. In June 2006 he graduated Cum Laude from Norwich University with a Master of Arts in Diplomacy. He is also a graduate from the Naval Command and Staff College at the Naval War College.

A submarine officer; Weeks has served at-sea on USS SEAWOLF (SSN 21), as Engineer Officer onboard USS LOS ANGELES (SSN 688), Executive Officer onboard USS HELENA (SSN 725), culminating in command of USS ALEXANDRIA (SSN 757) from January 2011 until August 2013. He has deployed to the

North Atlantic, Mediterranean, the Western Pacific and the U.S. Southern Command area of operations.

Ashore, Weeks served as Flag Lieutenant to the combined Commander, Submarine Group 2 and Commander, Navy Region Northeast, Material Officer for Commander, Submarine Squadron 22 in La Maddalena, Italy, and at the Submarine Warfare Division on the staff of the Chief of Naval Operations. From July 2005 to May 2006, he was a Federal Executive Fellow at RAND Corporation in Santa Monica, CA. While at RAND, Weeks co-authored "Sustaining U.S. Nuclear Submarine Design Capabilities," a study analyzing the viability of the Submarine design base. Following command, Weeks was the

Director of the Nuclear Propulsion Examining Board on the staff of Commander, U.S. Fleet Forces Command.

An Acquisition Professional, Rear Admiral Weeks served as the Major Program Manager for Undersea Defensive Warfare (PMS 415), as the Major Program Manager for Advanced Undersea Systems (PMS 394), as the Executive Assistant and Senior Naval Aide to the Assistant Secretary of the Navy (Research Development, and Acquisition) and most recently as the Major Program Manager for VIRGINIA Class Submarines (PMS 450).

Currently, Weeks is the Program Executive Officer for Undersea Warfare Systems (PEO UWS) responsible for a portfolio of programs that include submarine combat, sonar and electronic warfare systems as well as undersea weapons.



BGen Robert S. Weiler, USMC

Assistant Division Commander, 1st Marine Division

BGen Rob Weiler enlisted in the Marine Corps Reserve in 1992, obtaining the rank of Corporal. He was commissioned a Marine Second Lieutenant in December of 1995 upon graduation from George Mason University in Virginia, his home state.

General Weiler graduated from The Basic School in September of 1995 and, subsequently, completed Infantry Officer Course, earning the MOS of 0302. He reported to 1st Battalion, 1st Marines and served as 1st Platoon Commander, Company A. He deployed with the 13th Marine Expeditionary Unit (MEU) as a Platoon Commander and with the 15th MEU as the Executive Officer of Company A.

In April of 2000, General Weiler reported to Officer Candidates School and served in billets including Assistant Operations Officer, Platoon commander, and Company Executive Officer. In January 2002, he reported to the United States Senate as a Military Legislative Fellow, assisting with Foreign Policy, Veteran's Affairs, and Defense issues with Senator Ben Nelson of Nebraska. Upon completion, General Weiler attended the Advanced Armor Captain's Career Course in Fort Knox, KY.

In June 2003, General Weiler reported for duty with 2d Battalion, 4th Marines, 1st Marine Division. He assumed command of Weapons Company and assisted with its transition to a Mobile Assault Company, preparing them for combat operations in Iraq. General Weiler led the Mobile Assault Company in support of Operation Iraqi Freedom II in Ar Ramadi, Iraq prior to being assigned as the Battalion Operations Officer in November 2005. As the BLT's Operations Officer, he deployed with the 31st MEU.

In January 2006, General Weiler reported to Weapons Company, 2d Battalion, 24th Marines as the Inspector-Instructor where he later assumed command of the company and deployed in support of Operation Iraqi Freedom.

In June 2008, General Weiler departed Iraq and reported to the Marine Corps Command and Staff College, followed by the School of Advanced Warfighting. Upon completion, he reported to 1st Marine Logistics Group, where he deployed to Afghanistan twice as an Operational Planner in support of Operation Enduring Freedom.

General Weiler assumed command of 2d Battalion, 4th Marines in June of 2012 and deployed with the 31st MEU. Following command, he graduated from the Marine Corps War College in 2015 and served in the Office of the Secretary of Defense, Strategy, and Force Development until 2018. Prior to assuming command of the 5th Marine Regiment in 2019, General Weiler served for the Inspector General of the Marine Corps' office for a short tenure.

Following command with the 5th Marine Regiment, General Weiler served as the Director of GCE Programs in the Capabilities Development Directorate and the Military Secretary to the Commandant of the Marine Corps. He is currently serving as the Assistant Division Commander for the 1st Marine Division.

His personal awards include the Silver Star, Purple Heart, Legion of Merit, Meritorious Service Medals, Navy-Marine Corps Commendation Medals with combat distinguishing device, Navy-Marine Corps Achievement Medals, and the Combat Action Ribbon.

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