

# SPRING 2024 UNDERSEA WARFARE CONFERENCE

UNDERSEA WARFARE: UNDERSEA WARFARE AND THE JOINT KILL WEB

UNDERSEA WARFARE DIVISION



**Mr. Jerry Ferguson**  
Deputy Commander  
Undersea Warfighting  
Development Center

## Navigating the Depths: Undersea Warfare and the Imperative for Integration in the Joint Kill Web

In the ever-evolving landscape of modern warfare, one arena that often escapes the limelight but is of paramount importance is undersea warfare. Beneath the vast expanses of the world’s oceans lie strategic challenges and opportunities that demand innovative solutions. We must delve into the imperative for further integration of our air, surface,

cyber, submarine and emerging unmanned forces into the Joint Kill Web to ensure an advantage gap, especially in the face of growing challenges from adversaries like China and Russia.

### Undersea Warfare: A Strategic Imperative

Undersea warfare encompasses activities from anti-submarine warfare to seabed warfare (including mine warfare), it is a multifaceted realm crucial to national security. In an era of technological evolution, where platforms are increasingly sophisticated, a holistic and adaptive strategy is imperative. Submarines, with their unique capabilities, ensure strategic deterrence by projecting power silently across vast maritime expanses, dissuading potential adversaries and bolstering a nation’s maritime influence. But undersea warfare is much more than submarines—Seamless integration of undersea combat power with the Joint Force is essential, fostering interoperability and coordination across all domains, thus becoming a force multiplier within the broader spectrum of military capabilities. Moreover, as conflicts unfold the Undersea Force must enable maneuver of the Joint Force through the battlespace. Embracing these concepts enables the Undersea Force to navigate the silent frontier of undersea warfare, ensuring an adaptive approach crucial for maintaining superiority in this strategically critical realm and contributing to the collective strength of the Joint Force in safeguarding global interests.

### Shaping the Future: Integration of Undersea Forces into the Joint Kill Web

One key avenue for maintaining and extending our advantage lies in the seamless integration of the Submarine Force into the Joint Kill Web. Submarines, with their unique capabilities for access, must be an integral part of the networked ecosystem that characterizes modern warfare. This necessitates a concerted effort to enhance communication systems, data-sharing protocols, and interoperability between submarines, aircraft and surface forces within the Joint Kill Web.

By ensuring that submarines are not isolated entities as they were during the Cold War, but rather active participants in a larger, interconnected network, we maximize their effectiveness and contribute to a more resilient and adaptive Undersea Force. This integration is not solely a technological hurdle; instead, it represents a strategic imperative that necessitates coordination, collaboration, and an approach grounded in innovative thinking.

## INSIDE THIS ISSUE

- Division Chair’s Message* . . . . . 2
- Fall 2023 NDIA Undersea Warfare Awards* . . . . . 2
- NDIA UWD 2024 Academic Speaker Award* . . . . . 6
- Project Overmatch: Find, Fix, Track, and Target (F2T2)* . . 7
- Kinetic and Non-Kinetic and Unconventional Effects* . . 8
- AI/ML as an enabler for Undersea Overmatch* . . . . . 9
- Conference Chair’s Message* . . . . . 11

### The Defense Department and Industry Nexus: Catalysts for Innovation

The relationship between the defense department and industry is a linchpin for innovation and progress in undersea warfare. Collaborative efforts drive the development of cutting-edge technologies, from advanced sonar systems to unmanned underwater vehicles, enabling our forces to stay ahead of emerging threats.

To counter the growing capabilities of potential adversaries, particularly China, it is imperative that this partnership is fortified and strategically leveraged. The defense industry must be supported in its quest for breakthrough technologies, fostering a synergy that propels our undersea warfare capabilities into the future.

### Looking Ahead: Future Frontiers in Undersea Warfare

As we navigate the depths of undersea warfare, it becomes clear that the Joint Kill Web is a force multiplier, reshaping the

way nations approach security in the maritime domain. The collaboration between the defense department and industry is not just a necessity but a catalyst for innovation and resilience.

In the coming years, we can expect to witness continued advancements in undersea warfare capabilities, driven by the seamless integration of cutting-edge technologies. The silent frontier beneath the waves will remain a critical battleground, and the Joint Kill Web will serve as the linchpin in securing maritime superiority.

In conclusion, the synergy between the defense department and industry is essential for staying ahead in the complex and dynamic world of undersea warfare. By fostering collaboration, embracing innovation, and harnessing the power of the Joint Kill Web, we along with our ally and partner nations can ensure security in the silent depths.

Welcome to San Diego, and we look forward to the discussions!

## Division Chair's Message



**Alan Lytle, Ph.D.**  
Chairman Undersea  
Warfare Division

On behalf of the leadership team of the NDIA Undersea Warfare Division, it is my distinct pleasure and honor to welcome you all to the 2024 Spring Conference. We are glad to be back, and we are thankful you are back with us. This event would not have been possible without the strong collaboration and support from Commander Submarine Force (COMSUBFOR) and Undersea Warfighting Development Center (UWDC). I want to personally thank ADM Houston for his support in seeing

this conference restart, and the leadership of Geoff Moss and Jerry Ferguson for successful execution.

### Why did we change the theme?

We took this restart as an opportunity to rethink our conference approach. Instead of focusing on product-oriented technical sessions, we chose instead to frame discussions on undersea-enabled elements of the joint kill web embodied in the Find Fix Track Target Engage Assess (F2T2EA) construct. In his address at AFCEA WEST, ADM Paparo extolled the audience to provide "... assistance to harness American's unparalleled, innovative spirit. To unlock your creativity to develop systems that complement, extend, and bolster our current combat advantages."<sup>1</sup>

Let's carry that charge into our discussions during this conference, focused on the theme of *Undersea Warfare and the Joint Kill Web*.

Everyone in this room is well aware of the threats faced by our Navy, our allies, and our country. Our undersea dominance, operating from the deep and denying our adversaries sanctuary, is crucial to deterring and if called upon, destroying the threat.

I welcome our aviation, surface and undersea leaders in government, academia, and industry as together we heed ADM Paparo's direction to bolster our combat advantages.

On behalf of the Executive Board, the Advisory Council, and NDIA, thank you and your organizations for your continued support of the National Defense Industrial Association, the Undersea Warfare Division, our warfighters, and these conferences. A special thanks to all of our plenary speakers, program managers, and session presenters for taking the time to brief our USW community.

One final note of appreciation. My sincere thanks to Jim Gray for stepping up to the challenge of reconstituting this event. Jim had a great team, but his personal leadership was critical to make this conference happen. When you see Jim, please say thank you.

We hope you enjoy this Spring Conference. Thank you for attending. Thank you in advance for constructive feedback so we can keep improving your experience and the value this event brings.

<sup>1</sup> ADM Paparo speech to West 2023. Accessed [www.cpf.navy.mil/Newsroom/Speeches/Article/3298673/west-2023-keynote-address/](http://www.cpf.navy.mil/Newsroom/Speeches/Article/3298673/west-2023-keynote-address/) 27 FEB 2024.

## Fall 2023 NDIA Undersea Warfare Awards



**AWARDS COMMITTEE:**  
**PIERRE CORRIVEAU, Ph.D.;**  
*Chairman*

**CAPT TERRY HAID, USN (RET);**  
*Deputy Chair*

**DAN TUBBS;**  
*Committee Member*

**CHUCK FRALICK;**  
*Committee Member*

The Undersea Warfare Division (UWD) of the National Defense Industrial Association (NDIA) presents its Bronze Medal Award to recognize outstanding individual achievements in

either Science or Engineering in the field of Undersea Warfare. The Bronze Medal is awarded to deserving individuals in the principal Navy and University Laboratories engaged in Undersea Warfare related activities. By recognizing these individual achievements, the UWD seeks to:

- Reward achievement in the field of Undersea Warfare;
- Inspire accomplishment by other workers in the field;
- Increase public awareness of the field and its importance to Defense preparedness.

The NDIA UWD was pleased to continue this legacy by conferring the Bronze Medal Awards to the following individuals during the Plenary Session of the Fall 2023 USW Conference in Groton, CT.



**DR. WARREN WOOD**  
Naval Research Laboratory  
Ocean Sciences Division  
Washington, DC

Over a career spanning 30 years, Dr. Wood has distinguished himself as a technical leader in geophysical sciences specializing in sea bottom property observation, estimation,

and application to acoustic propagation. His research has brought significant new techniques for estimating sea bottom material composition and roughness which are now being incorporated into the Global Predictive Seabed Model.

Dr. Wood has been instrumental in obtaining specialized ocean bottom survey data and has collaborated with academia to develop new machine learning techniques to provide technical solutions to intractable problems affecting operational acoustics. He has published over 250 journal articles and conference proceedings focusing on the effects of cold-water seeps and expulsions from the sea floor, gas hydrate formations, biogenic methane production in marine sediments, geo-magnetics, sea floor slope instabilities from global to local scales, and sediment accumulation rates throughout the oceans. His research has shown that these are contributing physical properties affecting acoustic energy propagating through the ocean and the sea floor.

**Dr. Wood's innovation, unwavering dedication and accomplishments have significantly contributed to the success of the Naval Research Laboratory, the United States Navy, and the nation.**



**JESSICA MCELMAN**  
Naval Surface Warfare  
Center (NSWC)  
Carderock Division  
Carderock, Maryland

Over the course of her 20+ year career with the Naval Surface Warfare Center, Carderock Division, Ms. McElman has established a

reputation as a consummate professional and distinguished technical leader. She has accumulated a wealth of expertise in the field of Underwater Electromagnetics (UEM) to maintain the US advantage over current and emerging undersea and in-air threats. She is a nationally recognized expert in all aspects of submarine UEM and has shaped the development of advanced UEM stealth technologies for SEAWOLF, VIRGINIA, and COLUMBIA, as well as goal setting for the SSN(X). As Technical Design Agent and In-Service Engineering Agent for technology and procedures for all U.S. Navy Magnetic Silencing Facilities (MSFs), she leads signature measurements, and on-board UEM signature mitigation. Her design, specification, and measurement techniques of impressed current cathodic protection (ICCP) systems to mitigate UEM signatures have contributed significantly to warfighter operational stealth.

**Ms. McElman's unwavering dedication and accomplishments have significantly contributed to the success of the Naval Surface Warfare Center, the United States Navy, and the nation.**



**DR. THAD MICHAEL**  
Naval Surface Warfare  
Center (NSWC)  
Carderock Division  
Carderock, Maryland

As a Senior Naval Architect with more than 25 years of experience at the Carderock Division of the Naval Surface Warfare Center, Dr. Michael

is a subject matter expert in propulsor design and cavitation. He is deeply involved in the research, analysis, design, and development of propeller hydrodynamics and related technology for the United States Navy. To eliminate the costly experimental trial-and-error process associated with earlier tailcone designs, Dr. Michael evaluated new shapes for tailcones using computational and experimental flow visualizations. Using inputs from potential flow solvers and viscous computational fluid dynamics simulations to visualize the fluid flows, he invented a methodology to design tailcones that has significantly improved their performance metrics. Ultimately one of his new shapes was selected for the COLUMBIA class of submarines.

As a proven innovator and change leader, Dr. Michael revolutionized the Navy's submarine propulsor development timeline with his new methodology for submarine tailcone design. His work has saved time, money, and has had a direct impact on improving fleet performance and acoustic superiority.

**Dr. Michael's unwavering dedication and accomplishments have significantly contributed to the success of the Naval Surface Warfare Center, the United States Navy, and the nation.**



**LEE ROGERS**  
The Johns Hopkins University  
Applied Physics Laboratory  
Laurel, Maryland

In his 36-year career, Mr. Rogers has advanced undersea warfare through the development, test, and delivery of multiple novel acoustic sensing and communication systems. As

an SME and disciplined systems engineer, he has developed payloads for complex submarine missions. His expertise includes underwater acoustics, signal processing, underwater communications, and active & passive sonar design. His research has resulted in foundational insights in acoustic ocean phenomenologies and acoustic intercept receiver performance. He led a multi-organization phenomenology measurement and analysis project resulting in the exploitation of the ocean's vertical noise notch.

Recently, Mr. Rogers led an engineering effort to decouple design and fabrication of Virginia class submarine subsea and seabed warfare payloads from the overall Virginia class submarine design. The resulting VA-class interface specification enables new opportunities for industry innovation with significant cost savings.

Mr. Rogers has made major contributions to the undersea warfare community which enable the safe operation of SSBNs on patrol, improved sensing and mission payloads for SSNs, and the employment of low-frequency active sonar for anti-submarine warfare.

**Mr. Rogers' unwavering dedication and accomplishments have significantly contributed to the success of the Applied Physics Laboratory, the United States Navy, and the nation.**



**DR. FLETCHER BLACKMON**

Naval Undersea Warfare Center (NUWC)  
Newport Division  
Newport, Rhode Island

In his 34+ year career, Dr. Blackmon has advanced the fields of underwater acoustic communication,

laser-based opto-acoustic communication, and acousto-optic communication systems. As an internationally and nationally recognized research pioneer, Dr. Blackmon has demonstrated unique abilities to conceptualize, develop, test, and assess exploratory sensor and signal processing technologies for future military systems. He has served as ONR Maritime Sensing Deputy Program Manager leading the D&I portfolios for Acoustic Transduction, Magnetics, and Non-Acoustics. Dr. Blackmon has been a prolific publisher leading to increasing scientific knowledge. He has published in prominent journals and national conferences. He has 19 patents primarily in the areas of signal processing and sensor development. As head of the S&T Division within NUWC's Sensors and Sonar Systems Department, Dr. Blackmon was responsible for the leadership, performance, and mentoring of the department's most talented scientists.

Dr. Blackmon has made major contributions to the undersea sensing community and through his innovation will contribute to our acoustic superiority and allow for the safe operation of undersea warfighters.

**Dr. Blackmon's unwavering dedication and accomplishments have significantly contributed to the success of the Naval Undersea Warfare Center, the United States Navy, and the nation.**



**ANTHONY PAOLERO**

Naval Undersea Warfare Center (NUWC)  
Newport Division  
Newport, Rhode Island

In his 33+ year civil service career, Mr. Paolero's reputation as a national leader across the undersea sonar and acoustics

enterprise is well known. Mr. Paolero began his career with the NRL Underwater Sound Reference Division (USRD) and later joined the Naval Undersea Warfare Center when USRD moved to Newport. The USRD serves as the Designated Institute for underwater acoustic measurements and is the Nation's primary activity for underwater acoustic calibration, test, and evaluation measurements. Mr. Paolero has stewarded this national responsibility with distinction. He has served as the US Representative to the International Bureau of Weights and Measures as the SME in the area of acoustic metrology.

Mr. Paolero has provided technical oversight, guidance, and sustained support for critical Navy sonar programs, serving as Technical Design Agent for both Towed and Hull Sensor Systems. His specialized understanding of the Acoustic Augmentation Program allows our submariners to maintain safe operations while preserving their acoustic advantage.

**Mr. Paolero's unwavering dedication and accomplishments have significantly contributed to the success of the Naval Undersea Warfare Center Division Newport, the United States Navy, and the nation.**

**NDIA UWD is honored to recognize these significant contributions to the Undersea Warfare community through our awards program.**

**Congratulations to the Awardees!**



## NDIA UWD 2024 Academic Speaker Award



**DR. MICAH CLARK, CHAIR**  
Academic Fellowship  
Committee

The NDIA Undersea Warfare Division (UWD) established the Academic Fellowship Program in 1990 to provide financial aid to Ph.D. candidates at universities closely associated with the Navy's undersea warfare community. The objective is to encourage outstanding science and engineering students specializing in fields pertinent to undersea warfare to present



**SCOTT TILDEN,  
CO-CHAIR**  
Academic Fellowship  
Committee

their research at our conferences. The student candidate pool is derived from the Navy's University Affiliated Research Centers (UARCs), the Naval Postgraduate School (NPS), and other academic institutions. This spring, we are pleased to host one academic research contributor from these organizations presenting the topic described below.



### **SCHOLARSHIP AWARD WINNER**

**Ben Marsan** is a Graduate Research Assistant at the Applied Research Laboratories, University of Texas at Austin. Mr. Marsan is also a first-year master's student studying Electrical and Computer Engineering

at the University of Texas at Austin. His presentation will discuss the development and tactical applications of low-cost expendable unmanned underwater vehicles (UUVs). Advanced UUVs are transforming Undersea Warfare but many current UUVs are characterized by high cost and limited endurance due to the constraints of recovery and reuse. New low-cost expendable or semi-expendable UUVs combined with lower-cost advanced sensors can enable new and more cost-effective tactical capabilities for the U.S. Navy.

# Project Overmatch: Find, Fix, Track, and Target (F2T2)

## SESSION CHAIRS:



**Joe Cuschieri**



**Paul Rosbolt**



**Shelby Sullivan**

Project Overmatch is part of the Pentagon's Joint all domain command and control vision to sharpen the focus on developing modern warfighting tools. The concept would incorporate secure ways to communicate between differed domain platforms to provide a coordinated integral environment to securely share data and information. Communication (robust and secure) is the back bone of this part of the modernization of warfighting tools and in concept will support all domain operations, bringing together sensors, communication, data display, weapons, etc. that meet the find, fix, track, and target (F2T2) to support in this case Undersea Overmatch. The concept shifts from individual sensors, or data processing or weapons solutions to a more complete project Overmatch solution. The push is to consider the various surface and undersea platforms as one united endeavor. The concept vision does not stop with US platforms but extends to non-US allied platforms. The Overmatch concept is important to the Navy as it has increased its budget for the Overmatch project in the last year to achieve the objective.

Where do components of F2T2 Project Overmatch fit within our community? Take for example undersea sensors, the Project Overmatch approach brings together a holistic system of sensors approach from the point of view that the use and integration of sensor data is just as critical as the sensor technology. High technology sensors that produce great data must have a great application to go with that data and to create a sensor data manipulation and processing solution that meets and addresses the modern undersea community needs.

This may not be an entirely new concept to focus on the holistic solution of sensors and data manipulation and processing and to bring together the multi-domain aspect of the solution. When designing and developing sensors, the sensors technology would be focused on producing data and data processing techniques that will meet the overmatch requirements. A key element in bringing together the components that form this holistic system of sensors approach in sensor technology and sensor data processing is secure communications that will integrate the sensors and data processing solutions with the combat systems and weapons.

As these solutions become integrated, these solutions will have to be software focused, which would allow and require continued updates. Continued updates will keep adversaries guessing on the capabilities and will help in dealing with the highly dynamic environment. The updates can happen every few months or multiple times a day which would require that the updates be delivered over the "air". A robust software delivery is therefore part of the Project. Testing is thus critical to verify and validate the over the "air" software updates.

Project Overmatch is not only about sensors and data, but it also brings in unmanned platforms and systems. The contribution of unmanned systems whether as remote sensor platforms, intelligence gathering nodes or to provide valuable data on target tracking is an essential element of Project Overmatch. In this case as well the critical component is communications, as the unmanned platforms communicate the information to shore command centers and to other surface or subsurface platforms. Like the sensors, the environment in which the unmanned platform will be operating is a dynamic environment which can be assumed to be constantly changing and therefore it is imperative to be able to update the unmanned system mission and behavior over the "air" with robust and reliable communication solutions.

There is still lots of work to be done to make this concept Overmatch a reality, but it is already in progress and the expectation is to see more evolution of the concept as the project matures through tests and exercises.

# Kinetic and Non-Kinetic and Unconventional Effects



**Chuck Fralick**  
*Session Chair*

Undersea warfare is changing at a pace unprecedented in recent times, reflecting a new paradigm in how we define dominance and recognizing the importance of the Undersea Joint Kill Web. Over hundreds of years, naval superiority was based upon which nation could project power with the most effective mix of trained, professional sailors, capable platforms, lethal weapons and

robust command and control. Yes, numbers mattered to a point, but superior quality in the other factors often outweighed superior numbers as, time and again, smaller, better navies defeated larger adversaries.

Today, with the advent of machine learning and artificial intelligence, new enablers are constantly emerging that stand to profoundly change naval warfare. These enablers include a mix of kinetic and non-kinetic effects. Examples include weapons that can adapt to subtle and significant variations in contact signatures and behave in unexpected ways, and sensors that have far better ability to detect and discriminate friend from foe, and threat from non-threat. Furthermore, future weapons will collaborate in real time during the mission to communicate the weapon's environment or receive updated information from the host platform. Smart decoys and countermeasures can effectively thwart enemy weapons systems and sensor capabilities in the endgame. We also appear to have finally gotten past the notion that underwater vehicles (UUVs) are still "developmental," and have started to develop increasingly sophisticated behaviors-- often AI/ML enabled-- that dramatically enhance their capabilities. In other words, the UUV or "bus" is now approaching mainstream, and the payloads are where rapid innovation is rightly focused to improve combat capability. Vehicles are emerging that can self-organize, and develop their own sortie plans, or adjust them on the fly, based on internal factors like vehicle health or external factors like changing environmental conditions.

Such remarkable new technology can help to at least partially mitigate the persistent challenges we have always faced in the undersea domain – energy and communications-- by enhancing performance, including reliability of sensors and vehicles. These emerging technologies can also provide the

warfighter with unprecedented knowledge of the battlespace in near- to real-time. Ultimately these new technologies, combined with advances in materials, energy, and all other enabling technologies, mean that we now have the ability to be more lethal than ever in the undersea domain—provided we can develop, adopt, and integrate them. But, as we have seen so often, the technologies are not the obstacle.

The dominant and persistent issue with all navies is the inability to afford the numbers of platforms and weapons needed to support sustained combat operations. One way to offset the lack of numbers is through a combination of cheap, high-volume sensors and platforms, and through the exploitation of non-kinetic effects in the preparations leading up to and during armed conflict. Non-kinetic effects are the focus of a new section in NDIA USW for the spring conference and it is expansive in scope – including everything from vehicles performing Intelligence Preparation of the Operational Environment (IPOE), to decoys, to other "influencing" effects that can deter, confuse, or disable our adversaries' ability to detect and engage. The potential warfighting value of these new combined capabilities, both kinetic and non-kinetic, has prompted the Navy to establish the subsea/seabed warfare (SSW) discipline area in OPNAV N97. The recognition that non-kinetic effects can have such a profound impact on our warfighters' success in the undersea battlespace is the motivation behind the change to the "Non-Kinetics" title for one NDIA section this spring and points to an unprecedented future pace of change throughout the Navy and defense industry. Kinetic effects, not to be outdone, is evolving through development of low-cost, high-volume weapons systems, weapons with greater range and autonomy, and enhanced intelligence via the exploitation of AI/ML and edge processing.

Finally, both kinetic and non-kinetic systems are being connected in unprecedented ways via the Undersea Kill Web with innovative communications approaches, to finally realize a truly networked battlespace. Solid connectivity between non-kinetic and kinetic assets promises greatly enhanced situational awareness, optimized combat capability, and maximized lethality. We in the defense industry, working closely with the Navy's undersea warfighters, and platforms like NDIA, need to ensure it happens at the pace and scale our country and allies are depending upon.



# AI/ML as an enabler for Undersea Overmatch



**Glen Sharpe**  
 Session Chair

Let me start by welcoming everyone who is new to NDIA UWD and those who have been long term members currently contributing to the undersea warfare battlespace back to San Diego! It's been far too long since we have gathered with our west coast brethren. Our domain is rapidly changing and there is much to share across the Undersea Warfare community.

The NDIA UWD has established focused technical tracks for this conference. I'm honored to chair the inaugural "Artificial Intelligence (AI)/Machin Learning (ML) as an enabler for Undersea Overmatch" technical track. We have a full session of diverse experts from government, industry and academia who will share their expertise, plans and results of their efforts. You can expect to hear about and network with those who have acquired, researched, developed and adopted Artificial Intelligence/Machine Learning (AI/ML) and how doing so has made and is making an impact to achieving decision superiority in support of Undersea Overmatch.

I want to thank you for your supporting this important leading-edge AI/ML committee and look forward to the relationships we will build together and improved capabilities we can assist each other with in support of our sailors. Below are some public domain articles that cover some of what is going on within the AI/ML domain.

*From drones to sonobuoys, AUKUS partners betting on AI (c4isrnet.com)*

WASHINGTON — The Australian, U.K. and U.S. trilateral security partnership known as AUKUS, often associated with the construction of nuclear-powered submarines, is also beginning to bear fruit in the fields of artificial intelligence and autonomy.

While the first pillar of the AUKUS agreement seeks to furnish Canberra with stealthy undersea vessels, the second, less talked-about pillar aims to foster leaps in all things digital: robotics, intelligence sharing, advanced computing and more.

"We've spent a lot of time, actually, over the last year or so, thinking about what AI cooperation with some of our closest allies and partners looks like," Deputy Assistant Secretary of Defense for Force Development and Emerging Capabilities Michael Horowitz said Jan. 9 at an event hosed by the Center for Strategic and International Studies think tank. "Software is not, inherently, a barrier to cooperation with allies and partners."

A handful of Blue Bear drones are seen in a field during artificial intelligence and autonomy testing among AUKUS partners in April 2023.

Among the AUKUS Pillar 2 advancements made thus far are the successful interplay of air and ground vehicles, including Blue Bear Ghost drones, Challenger 2 main battle tanks and a commercially hired FV433 Abbot self-propelled artillery gun,

and the development of software that enables the sharing of submarine-hunting information over a vast region such as the Indo-Pacific.

"All three countries have P-8s. All three countries have sonobuoys," Horowitz said, referencing the Boeing-made maritime patrol aircraft as well as sound sensors that float in the water to collect and relay data. "So our teams are working together on an algorithm that will let us gather data from U.K. and Australian sonobuoys, and vice-versa, that we can all roll out on our P-8s."

The U.S. Defense Department years ago identified AI as a game-changer; the technology, officials say, can quickly parse otherwise overwhelming amounts of information, augment a commander's decision-making process, and help reallocate precious manpower. The department in fiscal 2024 requested \$1.8 billion for AI while juggling hundreds of related projects, including some tied to major weapons systems.

AI is also a critical piece of the Defense Department's Combined Joint All-Domain Command and Control concept.

*DOD Increases AI Capacity Through Strategy, Alignment > U.S. Department of Defense > Defense Department News*

The Defense Department is making leaps when it comes to fielding cutting edge technologies, a senior Pentagon policy official said today.

Michael C. Horowitz, deputy assistant secretary of defense for force development and emerging capabilities, said key organizational and strategy updates have resulted in DOD's improved ability to effectively field new tactics and technologies — especially when it comes to artificial intelligence.

"If you imagine, essentially, a continuum of activities from science and technology investments all the way to fielding capabilities, this administration within the Department of Defense has launched new initiative at each place, essentially, in the continuum," he said during an AI policy discussion hosted by the Center for Strategic and International Studies in Washington, D.C.

Horowitz cited the creation of the Chief Digital and Artificial Intelligence Office, responsible for the departmentwide adoption of data. He also cited recent strategy updates aimed at aligning AI adoption with broader defense strategy.

In November, the DOD released its strategy to accelerate the adoption of advanced artificial intelligence capabilities to ensure U.S. warfighters maintain decision superiority on the battlefield for years to come.

The 2023 Data, Analytics and Artificial Intelligence Adoption Strategy, which was developed by the Chief Digital and AI Office, builds upon and supersedes previous strategies. The 2018 DOD AI Strategy and revised DOD Data Strategy, published in 2020, laid the groundwork for the department's approach to fielding AI-enabled capabilities.

## Spotlight: Science & Technology

Horowitz also cited DOD investments in research, development, test and evaluation, and new initiatives to speed up experimentation within the department.

"All across the waterfront, we've launched initiatives designed to improve our adoption capacity, and I think we're really starting to see them pay off," Horowitz said.

When it comes to the adoption of AI and autonomous systems, Horowitz said that DOD remains laser focused on ensuring trust and confidence in the technology. He added that the department also maintains its commitment to international humanitarian law as it applies to the technology.

Last year, the Defense Department updated a 2012 directive governing the responsible development of autonomous weapon systems to the standards aligned with the advances in artificial intelligence.

The U.S. has also introduced a political declaration on the responsible military use of artificial intelligence, which further seeks to codify norms for the responsible use of the technology.

Horowitz said 51 countries have signed on to the political declaration, reflecting U.S. leadership at a critical time in the global adoption of AI.

## Spotlight: Engineering in the DOD

"I think that there's a recognition that the sorts of norms we're trying to promote are things that all countries should be able to get behind," he said. "They include things like a commitment to international humanitarian law. They include appropriate testing and evaluation for systems," "They include lots of, I would say, good governance mechanisms of the sort that we flesh out in detail in Department of Defense policy," Horowitz said.

*DoD releases new AI adoption strategy building on industry advancements - Breaking Defense*

WASHINGTON — The Pentagon today released a new strategy to accelerate the department's adoption of artificial intelligence capabilities, one which accounts for industry advancements in federated environments, decentralized data management and generative AI tools like large language models.

But relying on commercial capabilities means the technologies available may not yet be compatible with the department's own ethical AI principles, Deputy Secretary of Defense Kathleen Hicks acknowledged to reporters at the Pentagon.

"Unlike some of our strategic competitors, we don't use AI to censor, constrain, repress or disempower people," Hicks said. "By putting our values first and playing to our strengths, the greatest of which is our people, we've taken a responsible approach to AI that will ensure America continues to come out ahead.

"Meanwhile, as commercial tech companies and others continue to push forward the frontiers of AI, we're making sure we stay at the cutting edge with foresight, responsibility and a deep understanding of the broader implications for our nation," she added.

The "2023 Data, Analytics, and AI Adoption Strategy" is the first update to DoD's AI Strategy since the 2018 edition. That older strategy designated the now-defunct Joint AI Center as the "focal point" for carrying out its vision. The JAIC was subsumed into the Chief Digital and AI Office (CDAO) — which was stood up last year as the Pentagon's central hub for all things AI — along with the Defense Digital Service and ADVANA teams.

"In 2018, the then-JAIC focused on building a centralized AI/ [machine learning] pipeline and that makes a lot of sense for 2018 because even industry hadn't yet figured out how to deliver that as a product to customers," Chief Digital and Artificial Intelligence Office head Craig Martell said in a briefing with reporters today.

"But in 2022, every one of the major vendors deliver[ed] a robust and industrial scale MLOps pipeline. So there's really no need for us to build that internally ... And so our view now is let's let any component use whichever MLOps pipeline they need as long as they're abiding by the patterns of behavior that we need them to abide by."

That will include things like how the AI/ML model is monitored and evaluated, and how data is labeled and made accessible, he added. According to the strategy, DoD will focus on several strategic efforts that support the "AI Hierarchy of Needs," which starts with quality data as its foundation, followed by analytics and metrics and responsible AI at the top. The pyramid will help assess DoD AI readiness.

## Artificial Intelligence Ethics

DoD last year unveiled its long-awaited Responsible AI (RAI) Strategy and Implementation Pathway, which acknowledged the Pentagon wouldn't be able to maintain a competitive advantage without transforming itself into an AI-ready and data-centric organization that holds RAI as a prominent feature. Prior to the RAI strategy and implementation pathway, DoD adopted five broad principles for the ethical use of AI: responsible, equitable, traceable, reliable and governable.

Hicks said today that DoD is "mindful of the potential risks and benefits offered by large language models and other generative AI tools," and that Task Force Lima, established in August, will aim to responsibly adopt and implement those technologies.

"Candidly, most commercially available systems enabled by large language models aren't yet technically mature enough to comply with our ethical AI principles, which is required for responsible operational use," she said. "But we have found over 180 instances where such generative AI tools could add value for us with oversight, like helping to debug and develop software faster, speeding analysis of battle damage assessments ... not all of these use cases are notional."

The Pentagon in 2021 stood up the AI and Data Acceleration initiative where operational data and AI flyaway teams of technical experts would be sent to the military's 11 combatant commands to help them better understand their data and create AI tools to streamline decision-making.

"All of this and more is helping realize Combined Joint All Domain Command and Control, CJADC2" Hicks said. "To be

clear, CJADC2 isn't a platform or single system we're buying. It's a whole set of concepts, technologies, policies and talent that are advancing a core US warfighting function – the ability to command and control forces."

The AI strategy will be followed by an implementation plan that will be released in the next couple of months and will not look like a "traditional" implementation plan, Martell said.

"Each of the services have wildly different needs," he said. "And they're at wildly different points in their journey and they have wildly different infrastructure. So we're going to insist on patterns of shareability, patterns of accessibility, patterns of discoverability and how those are implemented we're going to allow a lot of variance for."

Today's announcement follows Monday's executive order from the White House that was hailed by the Biden administration as one of the "most significant actions ever taken by any government to advance the field of AI safety" in order to "ensure

that America leads the way" in managing risks posed by the technology.

The executive order directed DoD to establish a pilot program to identify how AI can find vulnerabilities in critical software and networks and develop plans to attract more AI talent, among other things. Analysts have raised concerns on whether the executive order could potentially stifle DoD innovation as it directs "developers of the most powerful AI systems share their safety test results and other critical information with the U.S. government."

"I think the biggest implication for DoD is how this will impact acquisition because ... anybody who's developing AI models and wanting to do business with the DoD is going to have to adhere to these new standards," Klom Kitchen, the head of the global technology policy practice at Beacon Global Strategies, told Breaking Defense Monday.

## Conference Chair's Message



### CAPT JIM GRAY, USN (RET)

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 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. Plenary speakers include:

- VADM Michael Boyle, USN, Commander, U.S. Third Fleet
- RADM Richard Seif, USN, Commander, Submarine Forces, U.S. Pacific Fleet
- Mr. David Adams, Director, Warfighting Effectiveness, Assessments, and Readiness (CPF N9WAR)
- RDML Wilson Marks, USN, Commander, Naval Surface and Mine Warfighting Development Center
- Mr. Gene Hackney, Director of Undersea Warfare, Naval Undersea Warfare Center – HQ
- BGen Robert. S. Weiler, Assistant Division Commander, 1st Marine Division
- Mr. Jerry Ferguson, Deputy Commander, Undersea Warfighting Development Center
- RDML Thomas Dickinson, USN, Commander, Naval Surface and Undersea Warfare Centers
- Dr. Sam Taylor, PEO USC's Mine Warfare Senior Leader
- RDML Todd Weeks, USN, Program Executive Officer, Undersea Warfare Systems
- RDML Mark Behning, USN, Director, Undersea Warfare Division, OPNAV N97

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



# NDIA

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