US 19

ANTX

ADVANCED NAVAL TECHNOLOGY EXERCISE

2019

PREPARE FOR BATTLE: UNDERSEA SECURITY

NAVSEA WARFARE CENTERS NEWPORT

COMMANDER TASK GROUP 80.1

DISCOVER DEVELOP NR&DE TRANSITION

Directory

Naval Undersea Warfare Center Division Newport Celebrates 150 Years!

Undersea Superiority ★ Yesterday... Today and Tomorrow

19-NUWC/GRA0480

Distribution Statement "A" Approved for public release; Distribution is unlimited

NAVSEA WARFARE CENTERS NEWPORT

Table of Contents

Narragansett Bay Test Facility

Welcome Letter

Welcome to the 2019 Advanced Naval Technology Exercise (ANTX) -- “Prepare for Battle: Undersea Security” -- at the Naval Undersea Warfare Center Division Newport!

Division Newport and its partners have identified technologies and future concepts that explore and interact with the maritime domain, connecting assets from the seafloor to space and ensuring their security, in order to bring data home. These enablers include maritime assets with the ability to monitor, anticipate, recognize, and respond to change by interacting with systems from the seafloor to the ocean surface, and above. New to this year’s event is a separate classified theme and technologies, which are on display in the High Bay of the Narragansett Bay Test Facility (NBTF).

This is the 5th year that Division Newport is hosting ANTX, an event designed to promote innovation and collaboration across government, industry, and academia in an effort to evolve the state of the art for emerging Fleet technologies. The ultimate goal of ANTX is to get the best technology to the Fleet as fast as possible. Across the Naval Research and Development Enterprise, ANTX has introduced a new paradigm in rapid experimentation and is a catalyst for increasing collaboration, fostering innovation, providing a low-risk environment for experimentation, building relationships, and promoting feedback with the Navy and its technology providers

This year is notable as the Command celebrates its 150th anniversary. During ANTX the celebration will feature Division Newport’s contributions to the Navy since it began as a Torpedo Station in 1869. Make sure to stop by the Technology Exhibition to see the evolution of undersea warfare. ANTX also showcases the unique capabilities of the NBTF – its services, staff, range, equipment, and unparalleled knowledge of in-water naval test events.

For the second year, Division Newport has partnered with the Naval Meteorology and Oceanography Command and collaborated with the Southeastern New England Defense Industry Alliance. This strategic partnership increases operational participation in the exercises themselves and fosters collaboration by expanding our audience and potential partners. Following the principles of High Velocity Learning, ANTX seeks to bring together government, industry, and academia to focus on the defined theme. The sharing of information allows the naval community to see and swarm problems, share the solutions throughout the enterprise, and sustain the solutions and processes. ANTX events support this culture and our participants see opportunities to enhance Fleet support. The collaborative swarm of influence at ANTX adds value to these technologies and strengthens the Fleet’s voice in research and development of technologies.

We encourage you to take full advantage of this opportunity to learn about new technologies; meet the scientists, engineers, and technicians developing these projects; and share your ideas on how these technologies can best serve the Fleet.

Thank you for attending ANTX 2019!

CAPT Michael R. Coughlin
Commanding Officer

Ronald A. Vien, SES
Technical Director

Thursday August 29, 2019

Narragansett Bay Test Facility

In-Water Exercises - Distribution D	
0800-1130	**1- General Dynamics Mission Systems** **2- L3 Technologies** **3- Raytheon Integrated Defense Systems** **4- NUWC Sensors and Sonar Systems Department** **5- Sparton DeLeon Springs, LLC** **6- Harris Corporation**
Media Event – Distribution A	
1300-1700	**1- Aquabotix Technology Corporation** **2- BAE Systems Inc.**
1330-1430	**Guest Speakers**
1530-1545	**Partnership Intermediary Agreement Signing**
1640-1700	**Closing Ceremony**

Pier Layout

Displays

1. NUWC 150th Technology Exhibition & Welcome Center
2. Independent Exercise Showcase
3. ANTX Command Center
4. Food Tent
5. CNMOC Showcase
6. Rapid Engineering Evaluation Facility
7. L3 OceanServer, Inc.
8. Engineering Dive Support Unit
9. NUWC, Code 85 & MIT
10. ANTX Showcase
11. NUWC Code 15
12. NUWC, Code 40
13. ThayerMahan Inc. & Kraken Robotics US Inc.
14. NUWC, Code 85 & Code 15
15. Range Operations
16. Networking & Information Assurance
17. Sparton Deleon Springs, LLC
18. Booz Allen Hamilton
19. General Dynamics Mission Systems
20. Sonardyne, Inc.
21. BAE Systems
22. Aquabotix Technology Corporation
23. PowerDocks LLC & URI
24. Raytheon Company
25. NUWC, Code 25
26. Harris Corporation

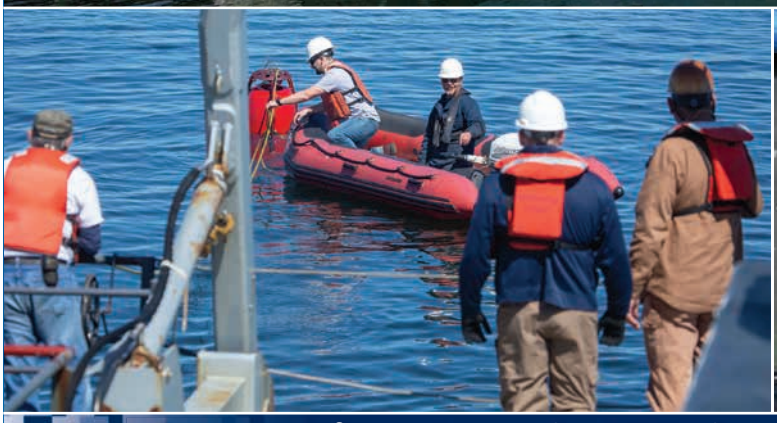
Narragansett Bay Test Facility

Workspace, equipment, and staff provide advantage to in-water testing, & data collection

The Narragansett Bay Test Facility (NBTF) is a world-class test and evaluation facility and in-water test range that supports research and development, and engineering and analysis of underwater, surface, and aerial vehicles and related technologies in a realistic, operational environment. It is a valuable resource that enables rapid prototyping and high velocity learning for not only government agencies, but for academia and private industry partners alike. The NBTF is the hub for Division Newport's deployment of Navy systems and has been the site of the Advanced Naval Technology Exercise for five years.

NBTF Overview:

- **Range Craft** – Torpedo Retriever (TWR-841) & Transporter Research Vessel both equipped with onboard cranes, large deck spaces, lab space and full amenities and accommodations for extended overnight operations. Other vessels range from small RHIBs to 35' work boats all outfitted with various equipment to support in water testing. All vessels are highly adaptable to any testing needs.
- **Inner/Outer in-water restricted water space Navy ranges** – 9-square-mile inner range located within the Narragansett Bay with depths varying from 20' to 130' and a 22-square-mile outer range south of Newport to Block Island with depths varying from 100' to 125'.
- **Unmanned Aerial System (UAS) testing area** with an approved FAA Certificate of Authorization to fly UAS to a 400' ceiling.
- **Shore Side Facility** - Heavy lift capability via Jib and Overhead Cranes and Forklift, High Bay, Dive Locker, three sheltered piers, Boat Ramp, Office Space, Support Equipment (generators, air compressor, etc.), R&D Prototyping Lab.
- **Engineering and Dive Support Unit (EDSU)** - A team of NUWC Navy civilian, mechanical, electrical, and ocean engineers, scientists and technicians who are all Navy qualified divers (SCUBA, MK20, MK21).



For more information on the NBTF, please contact Ryan Beatley at 401-832-2511 or ryan.beatley@navy.mil or Dillon Fournier at 401-832-6140 or dillon.fournier@navy.mil

US 19

ANTX

ADVANCED NAVAL TECHNOLOGY EXERCISE

2019

PREPARE FOR BATTLE: UNDERSEA SECURITY

2 INDUSTRY CONSORTIUM PARTNERS

2 FOCUS AREAS
"PREPARE FOR BATTLE: UNDERSEA SECURITY" & CLASSIFIED THEME

2 DAYS
28 & 29 AUGUST

1 HACKATHON "HACK THE RANGE"

23 UNMANNED UNDERSEA VEHICLES

4 REMOTELY OPERATED VEHICLES

7 UNMANNED SURFACE VEHICLES

60 INDUSTRY, ACADEMIA, & GOVERNMENT ORGANIZATIONS PARTICIPATING

5 UNMANNED AERIAL SYSTEMS

2 MARITIME ENERGY SYSTEMS

1 MARITIME GLIDER

5 SWARMING TECHNOLOGIES

19 COMMAND & CONTROL STATIONS

1 UNMANNED GROUND VEHICLE

31 RETURNING ANTX PARTICIPANTS

19 COMMUNICATION NETWORKS

3 LIVE VIRTUAL CONSTRUCTIVE TECHNOLOGIES

25 MARITIME SENSORS

74 TECHNOLOGY EXERCISES

6 HARBOR SECURITY SYSTEMS

2 MARITIME LASER SYSTEMS

6 BUOY SYSTEMS

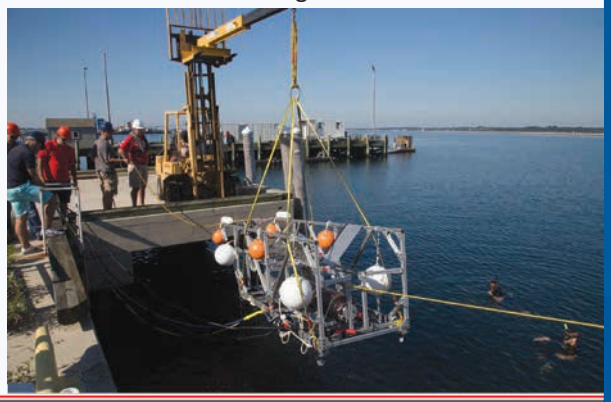
The Advanced Naval Technology Exercise (ANTX) 2019 is a collaborative event taking place at the Naval Undersea Warfare Center's Narragansett Bay Test Facility in Newport, RI, in collaboration with the Southeastern New England Defense Industry Alliance and partnership with the Commander, Naval Meteorology and Oceanography Command (CNMOC) in Stennis, Mississippi. ANTX demonstrates the future of Navy technologies in action today by providing a low-risk environment in which scientists and engineers may evaluate their technological innovations at the research and development level before their technologies become militarized and integrated at the operational level. For more information, go to: http://www.navsea.navy.mil/Home/Warfare-Centers/NUWC-Newport/What-We-Do/ANTX-2019/

ANTX... So What?

One question we often hear about the Advanced Naval Technology Exercise (ANTX) is "So what?" or "What's the return on investment?" It's true that the Navy, Division Newport, and our partners invest considerable resources to conduct ANTX every year and it's important to document the results of these efforts. Here are just a few success stories:

First ANTX Results in $74 Million Program

In 2015, NUWC Division Newport collaborated with Naval Surface Warfare Center (NSWC) Carderock and SPAWAR Systems Center Pacific (SSC PAC) in an effort to work across system commands to exercise an advanced concept for undersea infrastructure aimed to support a future fleet of unmanned undersea vehicles (UUVs). This collaboration led to the first Advanced Naval Technology Exercise (ANTX), which has since proliferated across the Naval Research and Development Establishment. SSC PAC developed technology for acoustic and optical wireless data transfer; the NSWC Carderock team investigated underwater wireless energy transfer approaches; and the Division Newport team manufactured a docking station, provided the Mid-Sized Autonomous Reconfigurable Vehicle, and served as test director and host of the first ANTX. The government team successfully developed and integrated the technology to allow the UUV to exchange data with and accept power from a docking station wirelessly underwater. The exercise was also a precursor to an Office of Naval Research investment known as the Forward Deployed Energy and Communications Outpost, Innovative Naval Prototype (INP). This resultant $74M INP program became part of the overall ONR INP portfolio, which comprises potentially game-changing or disruptive technologies intended to significantly alter the way our naval forces fight.



Proton Exchange Membrane Fuel Cell Powers UUV at ANTX

ANTX has facilitated the development of fuel cells in unmanned underwater vehicles. At ANTX 2016, a NUWC diver who is also a research engineer recovered Riptide's A-sized vehicle. He saw they were using an alkaline battery for power and thought they could do better. They opened up the vehicle at their ANTX booth and collaborated with NUWC's power and energy team. A year later, they successfully ran the first proton exchange membrane (PEM) fuel cell-powered UUV. ANTX 2018 featured more fuel cell technology from Teledyne Energy as well as the Department of Energy, which brought the terrestrial application of the PEM fuel cell.

ANTX Collaboration Tests Thermophone Inside UUV

A collaboration began between NUWC Division Newport and the University of Texas on a device that created sound from heat using carbon nanotube fibers. NUWC engineers developed housing that would work underwater and a novel thermophone was developed. Placed inside of an A-sized unmanned underwater vehicle, the technology essentially becomes a non-mechanical transducer that can produce sounds at a low frequency. Potential applications continued to be explored for this technology, which the 2018 Fleet Feedback Team rated as the #1 innovation at ANTX.

ANTX Leads to EPA Between NUWC, & University of Southern Mississippi

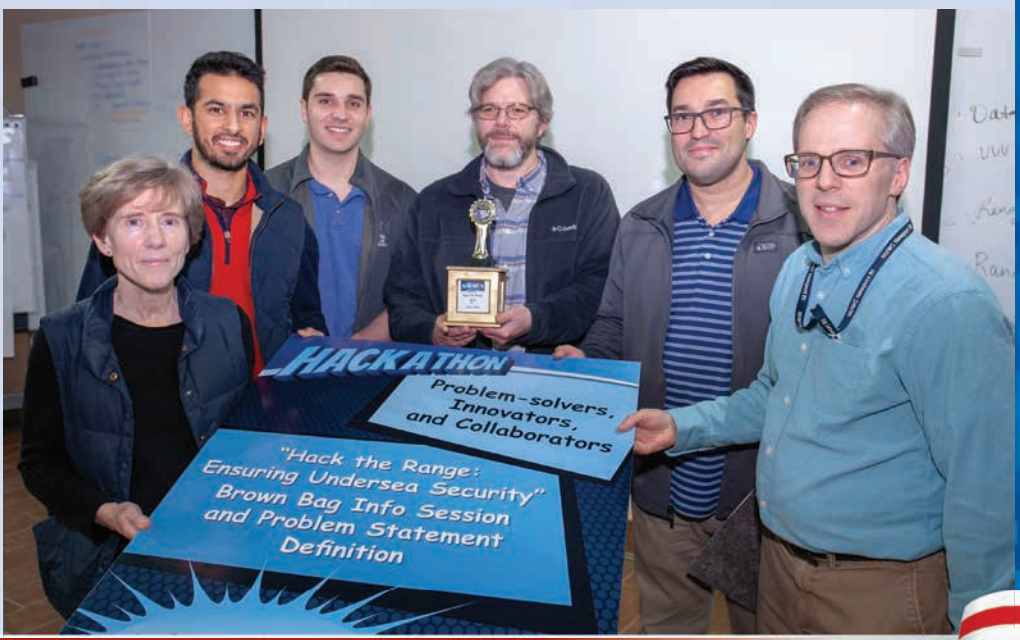
In January 2019, an Education Partnership Agreement (EPA) was signed between the University of Southern Mississippi (USM) and NUWC Division Newport. USM's Marine Research Center served as a forward operating base during ANTX 2018 for several exercises conducted by Commander, Navy Meteorology and Oceanography Command (CNMOC). As a result of this successful collaboration, USM and Division Newport entered into an agreement to foster further collaboration, as well as curriculum development for courses in unmanned systems. USM has also garnered more interest in working with the Navy and has since joined the Undersea Technology Innovation Consortium in support of Division Newport's other transactional authority.

ANTX Expands the Workforce

As part of the University of Rhode Island (URI) Mechanical Engineering Department's Senior Capstone project, personnel from NUWC and PowerDocks LLC, a small business based in Newport, RI, mentored a team of four students in an optimization study of a buoy designed for analytics remote monitoring. The students created a full-scale prototype and demonstrated it in water as part of an ANTX 2019 exercise. The Department of Defense has interest in the architecture and enabling technologies for unmanned sensors to monitor conditions of the ocean, while commercial applications would include aquatic health management. Based on their experience, two of the students accepted offers to work for NUWC Division Newport. Further, PowerDocks LLC is pursuing an Innovation Voucher directly with URI through the Rhode Island Commerce Department to continue the collaborative development of the product.

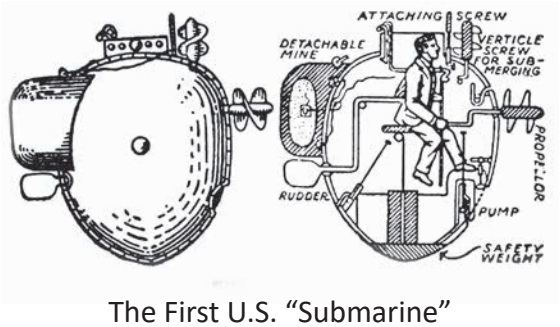
Hackathon Winner Exercises Range Security Solution at ANTX 2019

In December 2018, Division Newport hosted an innovation event as part of ANTX 2019 called "Hack the Range" with 50 participants, facilitators, subject matter experts, and judges from all departments generating ideas for securing Navy test ranges. The winning team was given the opportunity to develop a prototype and demonstrate their idea as part of ANTX 2019. The winning team, "Range Anomaly Detection Demonstration," or RADD, successfully developed and coordinated an exercise in May 2019, just six months from ideation.



Technology Timeline

1869 - 1899



The First U.S. "Submarine"

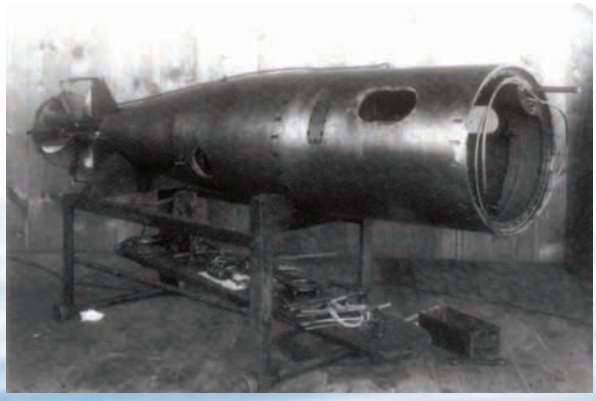
1900 - 1909

German Schwartzkopff Torpedo

1910 - 1919

OV1 Tow Body

1920 - 1929

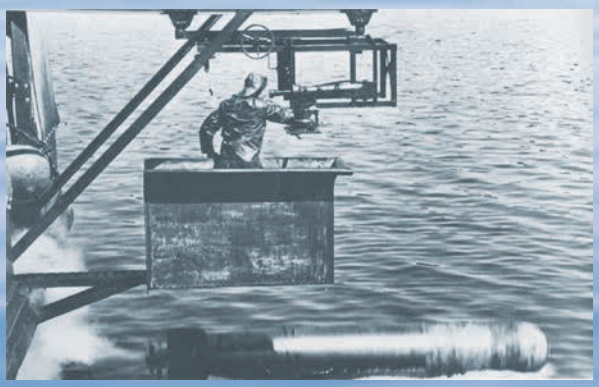


Hammond Electrically Controlled Torpedo

1930 - 1939

Mark 13 Torpedo Air Launch

1940 - 1949



Launcher Device

Technology Timeline

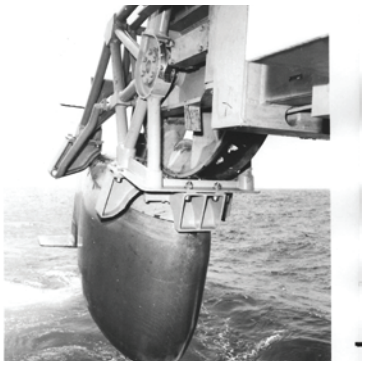
1950 - 1959

Submarine Sonar Bow Sphere

1960 - 1969

Mark 309 Fire Control Panel

1970 - 1979



Mark 35 Variable Depth Sonar

1980 - 1989

ADCAP Torpedo

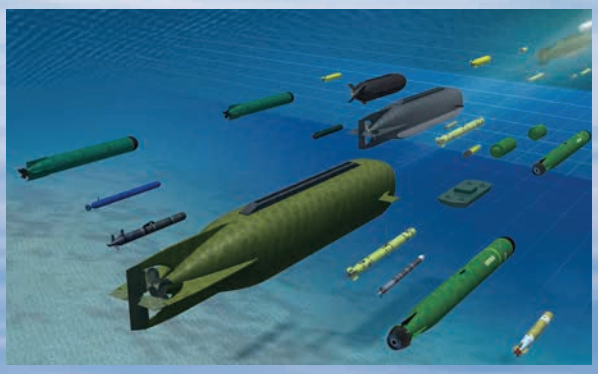
1990 - 1999

Manta Test Vehicle

2000 - 2009

SPARTAN
Torpedo Launch from Unmanned Surface Vehicle

2010 - 2019



Unmanned Underwater Vehicles & Payloads

NUWC Division Newport Participants

BlueIsles™ Sea to Air (S2A) Remote Multi-Domain Monitoring Buoy
PowerDocks LLC & University of Rhode Island
Anthony Baro • abaro@power-docks.com • 401-489-2273

"Beehive" Flexible Payloads on Small UUVs with Swarming Behavior
Charles Stark Draper Laboratory, White River Technologies Inc. & BAE Systems (Riptide Class Vehicle)
Joel Parry • jparry@draper.com • 617-258-2961

Active and Passive Intruder Detection Sonar for Protection of Ships and Fixed Harbor Assets from Underwater Threats
Sonardyne Inc.
Dan Zatezalo • dan.zatezalo@sonardyne.com • 281-890-2120

Kraken Man Portable SAS Integration to the REMUS 100
Kraken Robotics US Inc. & NUWC Code 85
Jeff Bartkowski • jbartkowski@krakenrobotics.com • 518-915-3429

Low Temperature Undersea Dive Persistence - High Performance Wetsuits for Navy Divers
Massachusetts Institute of Technology & NUWC Engineering and Diving Support Unit
Christian Schumacher • christian.schumacher@navy.mil • 401-832-2455

Range Anomaly Detection Demonstration (RADD)
NUWC Code 15
Nicholas Savage • nicholas.k.savage@navy.mil • 401-832-4367

Persistent Object Dominance System (PODS)
Booz Allen Hamilton
Scott Quigley • quigley_scott@bah.com • 508-389-5964

Autonomous Distributed Undersea Threat Identification
General Dynamics Mission Systems & SeaTrac Systems Inc.
Christopher Montferret • chris.montferret@gd-ms.com • 413-494-2849

Mine Countermeasures Single Sortie Detect to Engage
Raytheon Company
David Chapman • david_w_chapman@raytheon.com • 401-842-3490

Cross-Domain Command, Control, and Communications for Networked Systems
NUWC Code 25, L3HARRIS, University of Hawaii ARL, ONR & University of Porto
Michael Incze • michael.l.incze@navy.mil • 401-832-3436

NUWC Division Newport Participants

Hammerhead Communications Canister (HHCC) – Cross-Domain Communications
Sparton DeLeon Springs LLC
Robert Kundinger • bkundinger@sparton.com • 386-985-4631

Collecting Data in Near-Shore Environments
Aquabotix Technology
Whitney Million • whitney.million@aquabotix.com • 508-306-9503 ext. 401

Intelligence Preparation of the Environment
BAE Systems
Ronald Carvalho • ronald.carvalho@baesystems.com • 603-885-7614

Long Ingress/Egress Ex-MCM UUV
L3HARRIS
Jeffrey Snyder • jeffrey.snyder@l3harris.com • 508-678-0550

Perception-Coupled Undersea Manipulation
L3HARRIS
Eric Tarbox • eric.tarbox@l3harris.com • 321-729-2539

Automated Seabed Security Classification Techniques Using Synthetic Aperture Sonar
ThayerMahan Inc.
Steve Link • slink@thayermahan.com • 860-785-9994

SeaWatch – Autonomous, Long-Endurance RF Signal Intercept System
ThayerMahan Inc.
John Russ • jruss@thayermahan.com • 860-937-6416

RPG of the Sea
NUWC Code 85
Chris Hillenbrand • chris.hillenbrand@navy.mil • 401-832-2650

STINGRAY UUV/Diver Interceptor Net
Maritime Arresting Technologies LLC
Shawn Spilde • ss@boatstop.us • 727-215-8185

Simultaneous Full Duplex Acoustic Communications between Divers and At-Sea Command Post
QINETIQ North America
Howard Goldman • howard.goldman@qinetiq-na.com • 781-227-4783

NUWC Division Newport Participants

Saft America Individual Pressure Tolerant Pouch Cells
Saft America Inc.
Stanley DeGeus • stanley.degeus@saftamerica.com • 443-846-9084

Undersea Networks and Communications Live Virtual Constructive Environment
Scalable Network Technologies
Jeff Hoyle • jhoyle@scalable-networks.com • 858-750-5008

Resident Subsea Change Detection
Teledyne Benthos
Robert Melvin • bob.melvin@teledyne.com • 508-563-1537

SeaTrac Unmanned Surface Vessel (USV)
SeaTrac Systems Inc.
Marvin Duncan • bduncan@seatrac.com • 617-285-8433

Reshaping Underwater Operations
Hydroid Inc.
Justin Reid • jreid@hydroid.com • 508-564-8427

Submarine-friendly Off-board Vehicles
General Dynamics Electric Boat Corporation
Jack Chapman • jchapman@gdeb.com • 860-433-7517

Sea Scan Ranger - Synthetic Aperture Sonar for Small AUVs
ATLAS North America LLC
Mark Rios • mark.rios@na-atlas.com • 757-463-0670

Geophysical Seabed Monitoring System
ION
Dave Gentle • dave.gentle@iongeo.com • 713-448-0851

NUWC Economic Impact
NUWC Code 01
Adam Macksoud • adam.macksoud@navy.mil • 401-832-1940

Marine Mammal Monitoring
NUWC Code 10
Tara Moll • tara.moll@navy.mil • 401-832-8116

NUWC Division Newport Participants

Small Payload Deployer
NUWC Code 40
Angelo DiBiasio • angelo.dibiasio@navy.mil • 401-832-4802

Naval Engineering Education Consortium
NUWC Division Newport
Elizabeth Magliula • elizabeth.magliula@navy.mil • 401-832-7696

Naval Innovation Process Adoption (NIPA)
Office of Naval Research
Andrew Hulton • andrew.hulton@navy.mil • 401-832-6830

Fuel Cell Power for High-Performance Naval Systems
NUWC Code 85 & Alaka'i
Louis Carreiro • louis.carreiro@navy.mil • 401-832-5097

Ranges, Engineering, and Analysis
NUWC Code 70
Shawn Dury • shawn.dury@navy.mil • 401-832-5769

Rapid Engineering Experimentation Facility (REEF)
NUWC Code 70
Ryan Beatley • ryan.beatley@navy.mil • 401- 832-2511

Multi-Phenomenological Harbor Defense
NUWC Code 15
Christopher Carbone • christopher.carbone@navy.mil • 401-832-4444

Super Swarm MVP (Minimum Viable Prototype)
NSWC Panama City Division & NUWC Code 15
Lonnie Parker • lonnie.t.parker@navy.mil • 401-832-6936

Keep Summer Safe
NSWC Dahlgren Division, NUWC Code 15 & NSWC Carderock Division
Benjamin Wheeler • benjamin.wheeler@navy.mil • 540-653-6030

Platform and Payload Integration Technology
NUWC Code 40
James LeBlanc • james.m.leblanc@navy.mil • 401-832-7920

UxV Carriage Stowage, Handling, Launch, Recovery, Tendering & Transport for Navy Ships
NUWC Code 85 & NUWC Code 40
Scott Osterman • scott.osterman@navy.mil • 401-832-3863

Commander, Naval Meteorology and Oceanography Command Participants

ARGUS Waterside Security
NUWC Code 70
Sarah Blackstock • sarah.blackstock@navy.mil • 401-832-4898

Pushbroom Imaging LIDAR for Littoral Surveillance (PILLS)
Areté Associates
Steven Anderson • spanderson@arete.com • 703-413-0290

Enterprise Level Operations Management and Wave-Propelled USV with Environmental Sensing Capability
ION
David Gentle • dave.gentle@iongeo.com • 713-448-0851

Additively Manufactured Sensors for Undersea Surveillance
Naval Research Laboratory
Gary Miller • gary.miller@nrl.navy.mil • 202-767-9510

Persistent Environmental Monitoring AUV (PEM-AUV)
BAE Systems (Riptide Class Vehicle)
Jeff Smith • jeffrey.m.smith@baesystems.com • 774-343-9028

DriX Autonomous Unmanned Surface Vehicle
iXblue Defense Systems Inc.
Ted Curley • ted.curley@ixblue-us.com • 781-496-6019

360° Long Range Surveillance System (360-LRSS)
IEC Infrared Systems LLC
Rick Pettegrew • rick.pettegrew@iecinfrared.com • 440-382-1135

Combined Positioning and Telemetry
Sonardyne Inc.
Dan Zatezalo • dan.zatezalo@sonardyne.com • 281-890-2120

Long-Duration, Wind-Propelled and Solar-Propelled Platform for Ocean Sensing and Payload Delivery
SubSeaSail LLC
Sean Newsome • snewsome@subseasail.com • 619-279-3550

Integrated Environmental Sensor Systems
intelliSENSE Systems Inc.
Theodore Pea • tpea@intellisenseinc.com • 310-701-7615

Commander, Naval Meteorology and Oceanography Command Participants

Geospatial Intelligence of Littoral Zones using Platform Agnostic Topographic-Bathymetric LIDAR
ASTRALite Inc.
Gerald Thompson • contact@astralite.com • 303-478-1780

Autonomous, Amphibious Surf Zone Bottom Crawlers: Sea Otter / Sea Mule / Sea Ox
C-2 Innovations Inc.
Arnis Mangolds • amangolds@c-2iinc.com • 978-257-4820

Cerberus / SeaFox Maritime Force Protection System
ATLAS North America LLC
Robert Murphy • bob.murphy@na-atlas.com • 757-463-0670 ext. 216

Acoustic Tracking of Long Distance and Long Duration UUV Operations to Support Navigation Performance Evaluation
NUWC Code 85, CNMOC & iXblue Defense Systems Inc.
Thomas Merchant • thomas.a.merchant@navy.mil • 401-832-6070

Biodegradable Littoral Zone Reconnaissance
University of Houston
Aaron Becker • atbecker@uh.edu • 217-722-2058

Near Port Cueing and Localization
L3HARRIS
Scott Rauch • scott.rauch@l3harris.com • 757-376-9823

Swarmfare Swarm Visualization Tool
NSWC Dahlgren Division & NUWC Code 85
Brian Albin • brian.s.albin@navy.mil • 540-653-0784

Integrated Micro-AUV-Bio/Chemical Sensor Platform for Underwater Autonomous Sensing
Naval Research Laboratory
Paul Charles • paul.charles@nrl.navy.mil • 202-404-6064

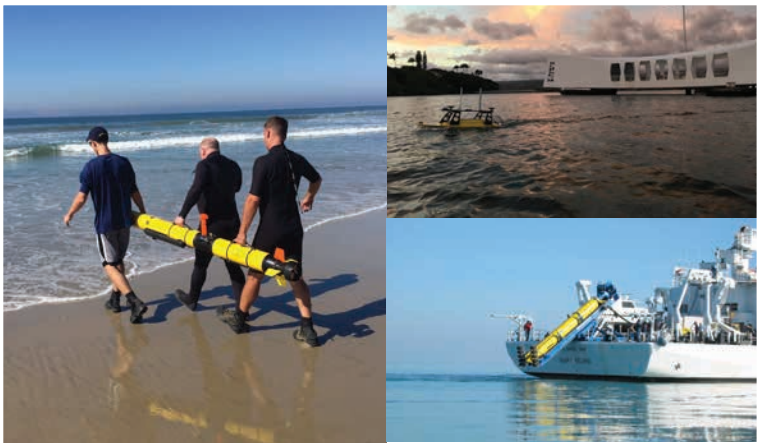
Unmanned Surface Vehicle for Environmental Sensing, Monitoring and Prediction
Naval Research Laboratory
Todd Holland • todd.holland@nrlssc.navy.mil • 228-688-5320

SeaDrone Inspector 3
Orobotix
Eduardo Moreno • emoreno@orobotix.com • 928-257-2826

Demonstrating the Digital Life Cycle
Huntington Ingalls Industries
Brian McKeon • brian.mckeon@hii-tsd.com • 850-249-2356

Naval Meteorology and Oceanography Command

Naval Oceanography impacts every Navy platform, afloat and ashore, and every Sailor and Marine around the globe. There is not an aircraft that flies, a ship or submarine that sails without the people of Naval Oceanography. America's Navy starts with us! Naval Oceanography has approximately 2,500 globally distributed military and civilian personnel, who collect, process and exploit environmental information to assist Fleet and Joint Commanders in all warfare areas to guarantee the U.S. Navy's freedom of action in the physical battlespace from the depths to the stars. Naval Oceanography has more than two decades of experience operating more than 20 different unmanned systems for more than 250,000 miles of ocean. Unmanned systems are highly dependent on meteorology and oceanography conditions for mission success, and predicting the environment and its effects on unmanned systems is our specialty. We currently own and operate over 130 ocean gliders and almost 50 other autonomous underwater vehicles supporting Navy operations around the world.



For more information, contact CNMOC Public Affairs, 228-688-4384, CNMOC_STNS_PAOWEB@navy.mil

Oceans In Action Workshop: An Annual Gulf Coast Event Featuring New Technology Implementations and How They Improve Maritime Missions

Demonstration Lead: Marine Technology Society Gulf Coast Section and Mississippi Enterprise for Technology (MSET) CNMOC

The Oceans In Action (OIA) Workshop was created to highlight new and emerging technologies being applied to address, expedite, or enhance a maritime-related mission. Held in November, the event features presentations from federal, regional, state, academic, and private organizations, as well as "tech talks" on new products or services entering the market. Exhibit tables allow technology vendors to display their newest inventions. For 2019, the Commander, Naval Meteorology and Oceanography Command and OIA will continue their collaboration to provide pier-side demonstrations of systems deployed during the Advanced Naval Technology Exercise (ANTX) Gulf Coast. The results of customized vignettes addressing various Navy scenarios were demonstrated at the University of Southern Mississippi's new Marine Research Facility in Gulfport, MS. Additional details are available at www.mset.org.

marine technology SOCIETY
Opportunity runs deep™

MSET
MISSISSIPPI ENTERPRISE FOR TECHNOLOGY
STENNIS SPACE CENTER

For more information, contact OIA Event Coordinator Laurie Jugan, Laurie.Jugan@usm.edu

SENEDIA
The Southeastern New England Defense Industry Alliance

The Southeastern New England Defense Industry Alliance (SENEDIA)

is proud to be a collaborator with

NUWC Division Newport's
Advanced Naval Technology Exercise.

Information on our Defense Innovation Days event can be found at:

www.defenseinnovationdays.com

Save the Date: 2020 Defense Innovation Days - 31 August - 2 September - Newport, RI

UNDERSEA TECHNOLOGY INNOVATION CONSORTIUM UTIC

The Undersea Technology Innovation Consortium (UTIC) is proud to be the technology consortium for the NUWC Division Newport Other Transaction Agreement (OTA) for undersea and maritime innovation.

Unique opportunity to work collaboratively and leverage industry, academia and government capabilities to provide the needed undersea and maritime technical innovation.

For information on membership: undersea@underseatech.org

www.UNDERSEATECH.org

PREPARE FOR BATTLE: UNDERSEA SECURITY

NAVSEA WARFARE CENTERS NEWPORT

COMMANDER TASK GROUP 80.1

NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND

NAVSEA WARFARE CENTERS DAHLGREN

NAVSEA WARFARE CENTERS PANAMA CITY

NAVSEA WARFARE CENTERS CARDEROCK

DEPARTMENT OF THE NAVY ONR Science & Technology

NAVAL OCEANOGRAPHY OPERATIONS COMMAND

NAVAL OCEANOGRAPHIC OFFICE

NAVAL OCEANOGRAPHIC OFFICE

UUV LBS-UUV

FLEET SURVEY TEAM

U.S. NAVAL RESEARCH LABORATORY

10 CORPORATE OPERATIONS

SENSORS AND SONAR SYSTEMS 15

25

CODE 40 NUWC Division Newport

CODE 70

85

UNITED STATES FLEET FORCES COMMAND

NARRAGANSETT BAY TEST FACILITY

ARGUS

RPG OF THE SEA

NOAA

SENEDIA The Southeastern New England Defense Industry Alliance

UNDERSEA TECHNOLOGY INNOVATION CONSORTIUM UTIC

marine technology SOCIETY Opportunity runs deep™

MSET

US Army Corps of Engineers

MIT

Huntington Ingalls Industries

GENERAL DYNAMICS Electric Boat

GENERAL DYNAMICS Mission Systems

Sonardyne SOUND IN DEPTH

S&T SCIENCE TECHNOLOGY

POWER DOCKS

KRAKEN

SeaTrac

ASTRALite

MARITIME ARRESTING TECHNOLOGIES LLC

iXblue DEFENSE SYSTEMS

Booz | Allen | Hamilton

TELEDYNE MARINE Everywhereyoulook™

Raytheon

QINETIQ North America

ThayerMahan

BLUEFIN ROBOTICS

sparton

L3HARRIS

saft

DRAPER™

Orobotix

U.PORTO FEUP ENGENHARIA

ATLAS NORTH AMERICA A company of the ATLAS ELEKTRONIK Group

IntelliSENSE SYSTEMS

HYDROID A KONGSBERG COMPANY

AQUABOTIX

MARTAC Everywhere there is water

SCALABLE NETWORK TECHNOLOGIES

SubSeaSail

IEC INFRARED SYSTEMS

ion

AQUABOTIX

APPLIED RESEARCH LABORATORY UNIVERSITY OF HAWAI'I

white river technologies

BAE SYSTEMS

ALAKA'I TECHNOLOGIES

Distribution Statement "A"
Approved for public release; Distribution is unlimited