

# Navy STP Technology Guide



DEPARTMENT OF THE NAVY  
**FST**  
Forum For SBIR/STTR Transition  
a NAVY STP Event

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MARKETPLACE



# 2021-22 Navy STP Cohort

Navy STP Projects at Sea Air Space

# Navy FST Showcase Booth Main Exhibition Hall



## Navy FST Booth (537)



## ***Featured Technologies***

- Air Platforms
- Biomedical
- Engineered Resilient Systems
- Energy & Power Technologies
- Ground and Sea Platforms
- Materials & Manufacturing Processes
- Modeling and Simulation Technology
- Sustainment

# Air Platforms

## (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
Barron Associates, Inc.	N181-017	Onboard Turbulence Recognition System for Improved UAS Operator Situational Awareness	NAVAIR
Hydronalix, Inc	N201-X01	3D Printed Manufacturing Robots for disaster response	ONR
Oceanit Laboratories, Inc.	N16A-T008	Novel Separator Materials for Achieving High Energy/Power Density, Safe, Long-Lasting Lithium-ion Batteries for Navy Aircraft Applications	NAVAIR
OptiNav, Inc.	N102-128	Predictions of the Acoustic Nearfield on a Carrier Deck	NAVAIR
Texas High Energy Materials, LLC	N181-019	Innovative Material (and Application Method) for a Hydrophobic/Oleophobic Coating to an Aluminum-Bodied Heat Exchanger TxHiEnergy	NAVAIR

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR Public Release 2021-720

Topic # N181-017

Onboard Turbulence Recognition System for Improved UAS Operator Situational Awareness

Barron Associates, Inc.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-268

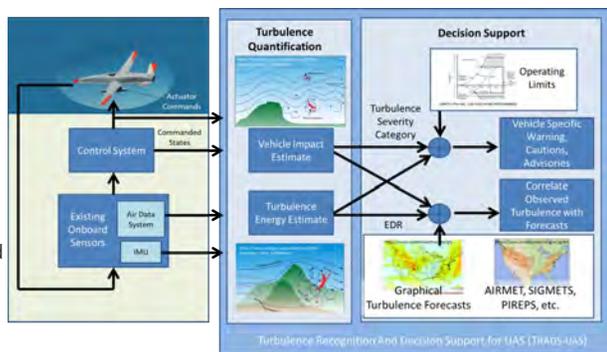
**Transition Target:** MQ-25

**TPOC:**

(301) 995-2038

**Other transition opportunities:** MQ-4C, RQ-21A, MQ-9A, RQ-4B, MQ-1C, RQ-7, RQ-11, RQ-20, MQ-27

**Notes:** The Turbulence Recognition and Decision Support for UAS (TRADS-UAS) System provides operators of unmanned vehicles with actionable information on the current turbulence environment, restoring important turbulence-related situational awareness that can be lost without an onboard pilot. It achieves this using only existing onboard flight control sensors, and with a low computational burden. Outputs of the system allow operators to readily understand the turbulence environment in the context of vehicle operating limits, and aviation weather products.



Courtesy of Barron Associates 2021

## WHAT

**Operational Need and Improvement:** Unmanned aircraft perform critical missions for the Navy and must manage turbulence to maintain safe operations, minimize maintenance costs, and maximize aircraft availability and lifetimes. Manned aircraft pilots manage turbulence effectively but situational awareness of turbulence is challenging for ground-based unmanned vehicles operators. While turbulence levels may be inferred through indirect clues like airspeed fluctuations, such approaches are unreliable and increase operator workload significantly. Automated systems are needed to accurately quantify turbulence levels and provide actionable information to ground-based operators. In the longer term, this information will be used by vehicle systems to autonomously respond to turbulence.

**Specifications Required:** Turbulence quantification systems must have minimal impact on size, weight, power consumption, and cost. Ideally, the systems will require no added sensor hardware and employ algorithms with low computational burdens. The systems must account for the characteristics of specific vehicles including vehicle configuration and loading and provide turbulence measures that can be related to the aircraft's operational limitations. The systems must provide turbulence measures correlated to standard aviation weather products.

**Technology Developed:** TRADS-UAS employs a two-pronged approach to turbulence quantification: a vehicle independent turbulence quantification component and a vehicle impact estimation component. The vehicle independent component focuses on quantifying turbulent energy in the atmosphere, provides outputs that correlate to standard aviation weather products, and facilitates effective information sharing across the fleet. The vehicle impact component is focused on how turbulence is affecting the vehicle. This component accounts for the fact that turbulence impacts vary based on vehicle size, speed, wing loading, operating limits, etc., and the same turbulence environment may be safe for one vehicle but exceed the limits of others. TRADS-UAS fuses information from these two components and provides human operators with warnings, cautions, and advisories that reflect the operating limits of that vehicle.

**Warfighter Value:** TRADS-UAS enhances the safety of UAS operations, reduces maintenance costs and extends aircraft lifetimes. It will support operations with ground-based operators and future operations with higher automation levels. For MQ-25, it will enable the vehicle to reliably be in a suitable turbulence environment before receiver aircraft arrive, enhancing safety and efficiency of refueling operations.

## WHEN

**Contract Number:** N68335-19-C-0407 **Ending on:** June 5, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Simulation-based testing of TRADS-UAS	Low	Accurate estimation of known turbulence levels	4	November 2020
Flight tests on general aviation aircraft	High	Accurate turbulence estimates validated by onboard pilot/engineers and ground-based sensors	5	October 2021
Flight test on business jet	Med	Accurate estimates of high altitude turbulence validated by onboard pilots/engineer	5	June 2022
Demonstration in conjunction with MQ-25 flight tests	Med	Accurate turbulence estimates validated against forecast and chase aircraft reports	7	May 2023

## HOW

**Projected Business Model:** Barron Associates intends to license the patent pending technology to air vehicle manufacturers to incorporate either as an onboard capability (allowing system outputs to be used either by vehicle automation systems or by ground-based operators) or as a ground-based capability (typically providing information to ground based vehicle operators and/or flight test engineers). Barron will also license the technology to end users of vehicles (including the Navy), who are expected to employ ground-based implementations. Barron will support TRADS-UAS deployment on new vehicles with Engineering Services to assist with initial integration and customization.

**Company Objectives:** Barron will transition TRADS-UAS to the Navy to support MQ-25 flight test and transition the technology to the operational fleet with Boeing as part of a Phase III effort, in collaboration with PMA and RT&E groups. Barron will seek to incorporate the technology into a broad range of military UAS through collaborations with additional prime contractors. By working with prime contractors to integrate the technology into unmanned vehicles as an onboard capability, it will be positioned to support future operations with higher levels of autonomy in which outputs of the TRADS-UAS system are used directly by vehicle automation systems. Barron Associates will seek licensing agreements and engineering support contracts to transition the technology to new vehicles. After initial transition to military applications, Barron's objective is to expand into civilian applications as potential growth margins have dramatically increased with the development of Advanced Air Mobility vehicles including cargo carrying vehicles and passenger vehicles.

**Potential Commercial Applications:** TRADS-UAS is applicable to all fixed-wing unmanned air vehicles, as well as emerging designs (e.g., eVTOL aircraft) with wing-borne flight modes. Barron is adapting the technology to thrust-borne flight modes seen in many emerging eVTOL aircraft designs. At high levels, turbulence poses safety hazards to air vehicles due to structural failure and loss of control. At lower levels turbulence contributes to excess wear and hence increased maintenance costs and reduced aircraft availability. In addition to numerous military applications, a broad range of civilian applications exist, particularly for emerging Advanced Air Mobility vehicles.

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# Department of the Navy SBIR/STTR Transition Program

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ONR Approval #43-8689-21

Topic # N201-X01

3D Printed Manufacturing Robots for disaster response

Hydronalix, Inc

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** ONR Code 33 Marine Expeditionary Warfare

**Transition Target:** USMC AFRICOM and EUROCOM, USMC 1st Marine Logistics Group, LEON/EOD, USMC Combat Logistics Battalion 6 (CLB6), Naval Expeditionary Combat Command (NECC), Mobile Diving Salvage Unit 2.

**TPOC:**

Samantha Lawrence  
[samantha.lawrence@navy.mil](mailto:samantha.lawrence@navy.mil)

**Other transition opportunities:** Los Angeles County Fire Department  
Houston Fire Department  
Denver Fire Department  
Fire Department New York City  
Austin County Fire Department Red Team  
Arizona Fire and Aviation Program  
Hellenic Red Cross  
US Red Cross  
NOAA Disaster Relief Program  
FEMA  
Texas Task Force 2 (TX-TF2)



## WHAT

**Operational Need and Improvement:** There is a need for low-cost, disposable, small UAV Drone platforms to support humanitarian field operations. This need requires the development and demonstration of rapid, on-demand, small-scaled, domestic manufacturing of unmanned systems capable of supporting multiple payloads dependent on the situation. The Hydronalix ADAPT drone solution is a low-cost, disposable, highly manufacturable platform able to deliver essential supplies quickly and accurately.

**Specifications Required:** The platform is required to perform a 2 km flight path with a 1 L payload of bottled water (2 x 500 ml bottles). The vehicle must be programmable to multiple delivery targets. UAVs were demonstrated in a test event with 100 systems performing missions.

**Technology Developed:** The Hydronalix ADAPT drone is a waterproof platform with 2lb modular payload capacity and 4 km range. The UAV includes a next-generation body for rapid manufacturing, user-friendly smartphone control with TAK compatibility, and fully autonomous "Fire and Forget" operation. One hundred prototype platforms were manufactured with over 95% American-made components and successfully demonstrated at a test event.

**Warfighter Value:** The ADAPT UAS is a low-cost, easily mass-produced system with domestically sourced components. Modular payload capacity makes it highly adaptable for a variety of uses. Autonomous "Fire and Forget" operation is easy to learn and user friendly.

## WHEN

**Contract Number:** N68335-21-C-0193 **Ending on:** November 5, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design UAV	N/A	Verification of full system	3	2nd QTR FY21
Procure Supplies and Equipment	N/A	Acquisition of components	4	2nd QTR FY21
Establish Manufacturing Process	N/A	Manufactured 120 drones	5	2nd QTR FY21
Manufacture UAVs	N/A	Timely completion	6	2nd QTR FY21
Flight Demonstration	N/A	Mission success rate and target accuracy	7	3rd QTR FY21

## HOW

**Projected Business Model:** It is anticipated there will be large value in a low-cost, easily mass-produced UAS system with domestically sourced components. Hydronalix would manufacture these systems directly out of their facilities in Green Valley. Our estimate of the current market would be at least \$4 million/year, assuming a selling price of approximately \$1000 per drone and 4000 units per year.

**Company Objectives:** Successful transition of this technology will introduce Hydronalix to the drone market, both as a competitor and a supplier for US manufactured UAV components. Establishing an in-house manufacturing and production line positions Hydronalix as a competitive choice for domestically sourced drones and will add to the company's growing product line of high-tech unmanned systems.

**Potential Commercial Applications:** Hydronalix has established relationships with fire departments, search and rescue personnel, first responders as well as disaster relief organizations throughout the US and the world, all of whom are potential commercial customers for this new product.

**Contact:** Anthony C. Mulligan, Principal Investigator  
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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2021-950

Topic # N16A-T008

Novel Separator Materials for Achieving High Energy/Power Density, Safe, Long-Lasting Lithium-ion Batteries for Navy Aircraft Applications.

Oceanit Laboratories, Inc.

## WHO

**SYSCOM:** NAVAIR

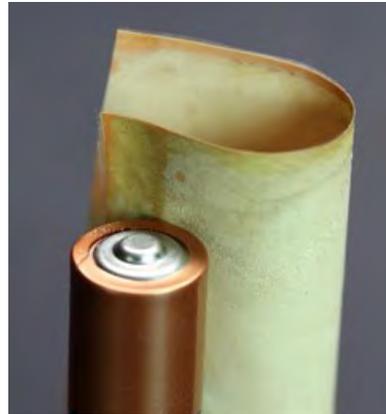
**Sponsoring Program:** Navy and Marine Corps Small Tactical Unmanned Aircraft Systems Program (PMA) 263

**Transition Target:** Unmanned Air Systems (UAS), F/A-18E/F Super Hornet, and F-35 Lightning II

**TPOC:**  
(607)346-0236

**Other transition opportunities:** Other military UAS platforms, MQ-8 Fire Scout Aircraft

**Notes:** The image shows Oceanit's nanostructured separator materials for high safety and performance of Lithium-ion batteries.



Copyright, 2021, Oceanit

## WHAT

**Operational Need and Improvement:** Over the last two decades, lithium-ion batteries technology has been used in the defense sector for unmanned aerial systems and unmanned underwater vehicles applications. Due to recent improvements in density and cost, lithium-ion battery technology has become a viable technology across a new range of civil and defense applications. Fire safety is a major concern in emerging use cases of lithium-ion batteries, including the consumer electronics, automotive, aviation, and marine sectors. A safer lithium-ion battery made possible using new separator technology with higher thermal stability to prevent thermal-run-away reactions is critical for adopting lithium-ion batteries for military aviation platforms and portable wearable technologies.

**Specifications Required:** The battery developed with a nanofiber separator will meet the PMA263 unmanned aerial platforms requirements (28 volts and 10 ampere hour and all safety requirements of Naval Sea Systems Command (NAVSEA) S9310.

**Technology Developed:** Oceanit developed a new class of nanostructured polymer separators with controllable porosity, conductivity, and excellent thermal stability (up to 200 degree Celsius) for lithium-ion batteries. Oceanit is leveraging an in-house electrospinning manufacturing facility for producing nano-fiber non-woven polymer films. This manufacturing method results in a 50 percent increase in porosity and ionic conductivity. The nano-fiber polymer system has superior thermal stability (up to 200 degree Celsius) and durability than the state-of-the-art tri-layer polyolefin separator.

**Warfighter Value:** The technology enables safer lithium-ion batteries for various military applications. As the Department of Defense (DOD) modernizes the current force and prepared for multi-domain operations, the quantity and capabilities of soldier wearable technologies are expected to increase significantly. Lithium-ion batteries are the most common solutions for portable energy storage for these devices to operate. Lithium-ion batteries' high energy density and rechargeability at low cost make them very attractive for portable applications. Advanced separator technology can solve the final problem – safety – in lithium-ion batteries and usher in a new wave of Lithium-ion Battery technology for the military.

## WHEN

**Contract Number:** N68335-18-C-0164 **Ending on:** December 3, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Cell Fabrication & Testing	Low	Quality control, capacity and cycleability of cells	6	TBD
Module Fabrication & Testing	Med	Module meet electrical, thermal and safety requirements for packing	6	TBD
Prototype Assembly and Quality Control	Med	Prototype battery module meet and quality NAVSEA S9310 and Military Performance (MIL-PRF) standards	6	TBD
Battery Testing per NAVSEA 9010	Med	Successful completion of testing and validation testing at Naval Surface Warfare Center (NSWC)	7	TBD

## HOW

**Projected Business Model:** Oceanit's primary business model establishes corporate co-development agreements with major industry partners using its process referred to as FAST (Facilitated collaboration, Assess value-proposition, Scale-up and Transfer). Using this process, Oceanit significantly de-risks technology by working directly with industry stakeholders that comprise significant market share. Once mature, Oceanit then licenses the technology to interested stakeholders in a mutually beneficial partnership.

**Company Objectives:** We anticipate the Navy Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) Transition Program (STP) forum will facilitate connections with Government and industry decision-makers with needs for safer lithium-ion batteries. Our short-term objective is to secure the Phase 2.5 agreement with NAVAIR and at least one other DOD program office. The developed technology is a battery system component, so the long-term objective is to qualify the requirements and certifications so that it can be integrated into military applications.

**Potential Commercial Applications:** Oceanit's advanced separator technology provides a unique benefit to any application requiring a high degree of safety in the commercial sphere. Wearable electronics, tactical devices, unmanned aerial vehicles, and portable electronics are all avenues that Oceanit is exploring. At scale, Oceanit aims to become an industry leader in supplying safer lithium-ion batteries to consumer electronics and electronic vehicles.

**Contact:** Bryce Davis, Senior Scientist  
bdavis@oceanit.com 8085313017

**WHO**

**SYSCOM:** NAVAIR

**Sponsoring Program:** NAWC-AD Propulsion and Power Engineering

**Transition Target:** Two planned ground tests

**TPOC:** (301)757-4180

**Other transition opportunities:** Future tactical aircraft ground tests. Provide key acoustic flight noise data for commercial Urban Air Mobility vehicles and drones.



<https://www.defense.gov/observe/photo-gallery/igphoto/2002758818/>  
Photo by: Seaman Gray Gibson

**WHAT**

**Operational Need and Improvement:** Flight measurement aircraft noise "sound spheres" using classical measurement approaches are too difficult and expensive to perform as often as needed. The Navy desires to develop a practical approach to defining the noise radiating properties of a supersonic jet so that it may be used as an equivalent source in commercial Boundary Element Analysis (BEA); Finite Element Analysis (FEA); or Statistical Energy Analysis (SEA) noise prediction models. Modern supersonic jets produce a high amplitude noise field with complicated characteristics that is not easily modeled using classical analytical approaches. Aircraft static ground noise tests to characterize jet exhaust noise need to be more robust in terms of limited number of microphones and handling test site obstructions.

**Specifications Required:** Demonstrate the ability to account for superposition of the jet noise field from multiple jets during simulated high activity carrier launch and retrieval operations as well as the noise reflecting characteristics of the aircraft, jet blast deflectors and other carrier deck features. Capable of predicting the frequency and angle dependent noise fields out to all practical distances.

**Technology Developed:** 1. Algorithms and software to improve jet ground test obstacle reflections and fill in missing microphones by mathematical/physical analysis. 2. Revolutionary technique for noise flight tests leading to much lower cost of facilities, personnel, and equipment and better accuracy. Effects of unknown wind and interfering noise are removed from the data.

**Warfighter Value:** Understanding aircraft noise supports engineering efforts to reduce noise. Both the understanding and possible reduction help to manage relations with communities around air bases and reduce pressure to curtail operations. Noise exposure can cause hearing loss among aircraft carrier flight deck crew members, so understanding and possible mitigation needs apply here as well. OptiNav's method for predicting community aircraft noise based on sophisticated analysis of microphone array data simplifies testing, lowers cost and improves results compared with traditional approaches.

**WHEN**

**Contract Number:** N68335-19-C-0528 **Ending on:** December 31, 1969

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Algorithms for ground test	N/A	Demonstrate the ability to reproduce existing (2014) test data	6	July 2021
Sound sphere software	Low	Demonstrate the ability to construct the sound spheres	5	August 2021
Transition ground tests	Low	Success: Data consistency	7	December 2021
Sound sphere target of opportunity tests	Med	Obtain Consistent results per aircraft model	7	September 2022

**HOW**

**Projected Business Model:** Contract/License processing static aircraft noise test data. Contract/License measurement and processing flight noise test to produce aircraft, configuration, and operation-specific "sound spheres". Production of sound spheres of uncooperating aircraft for competitive advantage and noise regulation.

**Company Objectives:** Meet the needs of the NAVAIR Propulsion and Power to support ground testing. Become the go-to source for sound spheres.

**Potential Commercial Applications:** Meet the important need for noise characterization of Urban Air Mobility vehicles and package delivery drones.

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2021-957

Topic # N181-019

Innovative Material (and Application Method) for a Hydrophobic/Oleophobic Coating to an Aluminum-Bodied Heat Exchanger TxHiEnergy  
Texas High Energy Materials, LLC

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA 275 V-22 Osprey

**Transition Target:** V-22 Osprey Nacelle Oil Cooler Assembly

**TPOC:**  
(301)342-0865

**Other transition opportunities:** This technology could be used for other platforms for the same type of application, but the material could also be useful for other fouling concerns. V-22 appears to be unique for the severity of heat exchanger fouling.

**Notes:** We will execute Flight Qualification Tests at end of Phase II, after which we will seek parties interested in our patented, environmentally benign, self-cleaning binary coating technology system.



[https://cdn.dvidshub.net/media/thumbs/photos/1902/5080095/1000w\\_q95.j](https://cdn.dvidshub.net/media/thumbs/photos/1902/5080095/1000w_q95.j)  
<https://www.ametek.com/pressreleases/news/2014/november/hughes-treitler-awarded9-million-contract-for-v-22-osprey-nacelle-oil-cooler->

## WHAT

**Operational Need and Improvement:** The Navy occasionally faces issues with heat exchanger performance in mechanical systems due to the accumulation of dirt and debris on the thermal transfer surfaces. Developing a cost-effective, innovative technology for a coating material and application method, designed to reduce the build-up of organic material on the thermal transfer surfaces of the heat exchanger, would increase the available usage time of a mechanical system. This would result in a decrease in cost to the Government by removing the need to clean or remove components that have diminished heat-rejection capability.

**Specifications Required:** Heat Exchanger Requirements with Hydrophobic/Oleophobic Coating:

- Shed water, oils, hydraulic fluids, and other foulants
- Minimal loss of air flow, pressure drop, and heat rejection
- Durable enough to withstand sand and dust ingestion
- 10 hour extreme exposure (sandblast) endurance test
- Erosion resistant and durable for 840 hours
- Operating temperature range: -65°F to 420 °F
- Maximum operating pressure: 230 psig

**Technology Developed:** Through our novel Chemical Vapor Deposition process, Texas High Energy Materials deposits an ultra-thin, durable, self-cleaning, omniphobic coating onto complex parts utilized by combat aircraft. Our new coating technology has been evaluated for aluminum heat exchangers, found to completely eliminate debris build up in harsh environments without reducing heat exchanger cooling performance, and reduces costs by eliminating frequent depot-level maintenance.

**Warfighter Value:** A material (and application method) for a hydrophobic/oleophobic coating to an aluminum-bodied, air-cooled, fluid-managing heat exchanger, with the subject heat exchanger of the tube-and-fin configuration would result in a decrease in cost to the Government by removing the need to clean or remove components that have diminished heat-rejection capability.

## WHEN

**Contract Number:** N68335-20-C-0851 **Ending on:** August 21, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Development of a durable self-cleaning coating	Med	Coating retains self-cleaning performance after Navy prescribed endurance test	4	February 2022
Application on representative heat exchanger	Low	Complete uniform coating coverage	4	April 2022
Evaluation of self-cleaning coating on representative heat exchanger complete	Low	Coating performs as intended without reducing heat exchanger cooling performance	5	June 2022
Self-cleaning coating application onto actual V22 heat exchanger	Med	Complete uniform coating coverage	6	September 2022
Flight qualification demonstration	High	Successful completion of flight qualification demonstration	6	December 2022

## HOW

**Projected Business Model:** Texas High Energy Materials, LLC (THEM) develops innovative materials in a practical, collaborative approach for government and private industry applications. We transition our technological breakthroughs into commercial, state-of-the-art products for government and industrial applications. THEM will engineer and design coating equipment outfitted with the controls and loading fixtures as well as software programmed to make the system easy to use by Depot personnel in addition to developing and providing a comprehensive training program, users manual, and SOPs. THEM will work with commercial heat exchanger manufacturers to determine viability of licensing the process to an existing new-build manufacturer for future V22 heat exchanger installations (Ametek, BAE, Lockheed, etc.)

**Company Objectives:** Our new coating technology has been evaluated for aluminum heat exchangers, and found to completely eliminate debris build up in harsh environments. This translates directly to improved fleet readiness and mobility by maintaining optimum heat-transfer performance while reducing service and cleaning intervals. We seek parties interested in maximizing thermal transfer efficiency and operational lifetime through use of our patented, self-cleaning coating technology.

**Potential Commercial Applications:** Commercial applications for this technology include: oil refineries (crude pre-heater trains), waste-heat recovery systems used in power generation, naphtha hydrotreaters at petroleum refineries, and air pre-heaters at municipal solid waste incinerators. Other parties interested in licensing this product would include Off-Highway vehicles, mining equipment, and automotive applications intended for off-road use. Devices that use heat exchangers in austere and also wet or day environments would benefit.

**Contact:** Al Perez, President  
[alperez4@yahoo.com](mailto:alperez4@yahoo.com) (512) 670-6182

# Biomedical (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
Technology Holding, LLC	N182-096	Portable Ruggedized Energy Efficient Medical Sterilizer for Field Use	MCSC
Vivonics, Inc.	N171-002	Intranasal Cooling for Encephalopathy Prevention in Combat Casualties (ICEPICC)	MCSC

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

MCSC-PRR-4043

Topic # N182-096

Portable Ruggedized Energy Efficient Medical Sterilizer for Field Use  
Technology Holding, LLC

## WHO

**SYSCOM:** MARCOR

**Sponsoring Program:** Forward Resuscitative Surgical System (FRSS) – AMAL 645

**Transition Target:** Expeditionary Medical Systems

**TPOC:**  
[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** In addition to the Army and Air Force, government organizations like the Department of Homeland Security and Federal Emergency Management Agency (FEMA), non-profits and non-governmental organizations that provide disaster relief operations and remote area medical clinics like the Red Cross and Doctors Without Borders are in dire need of this device.

**Notes:** The Portable Ruggedized Energy Efficient Medical Sterilizer (PREEMS) device will be an FDA 510(k)-certified commercial medical device that can be used in civil and industrial medical applications.



<https://media.defense.gov/2015/Jul/29/2001265119/-1/-1/0/150720-M-KE800-109.JPG>

## WHAT

**Operational Need and Improvement:** Sterilization of medical and surgical tools is a critical step in minimizing the risk of infection to combat casualties during far-forward medical interventions. Current field sterilizers are large, power-intensive systems that require large amounts of clean water to operate and present a logistical burden to forward-deployed resuscitative surgical facilities. There is a need for a low-cost, person-transportable medical sterilizer capable of sterilizing small surgical tools and trays in a Role 1-2 tactical environment.

**Specifications Required:** The system internal chamber volume must be capable of holding one standard USN perforated sterilizing container (23 x 12 x 7 inches, NSN 6530-01-500-9583). The system must be hand-transportable by no more than two persons per MIL-STD-1472 (Threshold (T)), one person (Objective (O)), and must have no single exterior dimension greater than 40 inches. The system must consume no more than 800 Watts of electrical power (T), 500 Watts (O); must consume no more than 5 liters of water per use (T), 0 liters of water per use (O); and must be capable of prolonged use in all Marine Corps operational environments and meet all Marine Corps transportation and storage requirements per MIL-STD-810G. The system shall comply with all Human Factors Engineering requirements per MIL-STD-1472, including noise requirements per indoor use, operations using gloves or MOPP gear, and comply with all safety factors therein. The system must operate using 120 VAC 60 Hz/210 VAC 50 Hz single phase power (T), be capable of operating for up to 2 hours on 24 VDC hot-swappable rechargeable battery power (O). The system must be capable of performing at a minimum 18 sterilizations within a 48 hour period (T) to meet FRSS surgical requirements. The system must achieve U.S. Food and Drug Administration (FDA) 510(k) certification prior to fielding.

**Technology Developed:** Field-ruggedized medical device for providing field sterilization of surgical instruments, tools, trays, and other reusable medical devices that come into contact with patients, which is a highly portable, efficient, and water independent sterilizer for Navy applications.

**Warfighter Value:** Will provide a new medical sterilizer for the austere far-forward Roles 1 & 2 that satisfies the portability, efficiency, and durability requirements that said demand.

## WHEN

**Contract Number:** M67854-20-C-6503 **Ending on:** August 31, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Operational Alpha Prototype	Low	Demonstrated sterility assurance level in laboratory environment	5	2nd QTR FY21
Ruggedization of PREEMS System	High	Satisfactory Completions of MIL-STD-810H testing	6	4th QTR FY21
FDA 510(k) approval of PREEMS System	Med	Award of 510(k) status	6	3rd QTR FY22
Operational testing of Ruggedized PREEMS System	Low	Operational test of Final PREEMS System with fully loaded surgical tools to demonstrate sterility assurance	8	3rd QTR FY23

## HOW

**Projected Business Model:** Technology Holding LLC is a Research and Development company with a focus on Energy and Environmental Solutions. Researchers at Technology Holding are actively engaged in solving transformative problems for the government and commercial clients. We are working on a wide range of topics including but not limited to advanced battery technology, carbon dioxide (CO2) conversion to fuels/chemicals, advanced catalysis, new energy processes, biomass conversion, fuel cells and energy efficiency. We will partner with an established manufacturer to the military, which is already FDA Class II supplier. A lot of the components being used in the system are already procured as COTS products by the Marines to include the case, batteries, etc.

**Company Objectives:** Already partnered with an FDA Class II supplier to the military, Technology Holding seeks meetings with military and commercial hospitals, clinics, paramedics/EMTs, search and rescue teams, disaster relief organizations, and other industries requiring sterilization of surgical instruments, tools, trays, and other reusable medical devices.

**Potential Commercial Applications:** Potential private sector users include hospitals, clinics, paramedics/EMTs, search and rescue teams, disaster relief organizations, and other industries where infection from surgical tools is a common risk.

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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

MCSC-PRR-4045

Topic # N171-002

Phase II: Intranasal Cooling for Encephalopathy Prevention in Combat Casualties (ICEPICC)

Vivonics, Inc.

## WHO

**SYSCOM:** MARCOR

**Sponsoring Program:** Portfolio Manager Logistics Combat Element Systems (PfM LCMS) - PM Supply and Maintenance Systems (PM SMS)

**Transition Target:** Medical - Force Health Protection Program (FHPP) FNC

**TPOC:**  
[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** The key Department of the Navy customers include Battalion Aid Station (BAS), Shock Trauma Platoon (STP), Forward Resuscitative Surgical Suite (FRSS) and En Route Care System (ERCS) Authorized Medical Allowance Lists (AMALs).

**Notes:** Conceptual rendering of the Intranasal Cooler for Encephalopathy Prevention in Combat Casualties (ICEPICC) system that delivers tympanic membrane feedback brain cooling through the nasal cavity. Photo courtesy Vivonics, Inc.



Photo courtesy Vivonics, Inc.

## WHAT

**Operational Need and Improvement:** Brain cooling can prevent encephalopathy during events like traumatic brain injury, stroke, cardiac arrest, and respiratory failure, where blood oxygen availability is low, swelling is prevalent, and intracranial pressure is high. Cooling of the vessels within the nasal cavity as well as the barrier between the nasal cavity and the brain is a minimally invasive technique used to reduce brain temperature back to normal (normothermia) or even below normal body temperature (therapeutic hypothermia) without requiring cranial access.

**Specifications Required:** Vivonics, Inc. has been developing a portable system to provide a level of cooled airflow (<10C @ 25 liters per minute) shown conducive to lowering pig brains to both normo- and therapeutic hypothermic temperatures for over 4 hours from Role 1 through En Route Care.

**Technology Developed:** The patent protected Intranasal Cooler for Encephalopathy Prevention in Combat Casualties (ICEPICC) is a portable device which will enable intranasal cooling to be performed by a combat medic or paramedic, by affixing a nasal cannula and temperature probe to the patient and setting the desired brain temperature on a simple user interface.

**Warfighter Value:** According to a Defense and Veterans Brain Injury Center (DVBIC) analysis of surveillance data released by the Department of Defense (DoD), 375,519 U.S. military personnel were diagnosed with a TBI between 2000 and 2017, with a peak of 33,149 in 2011 alone. There is currently no robust fieldable technology that can achieve the Dept. of the Navy's goals of an intracranial temperature range of 33 - 35°C to within ±1°C in military field conditions and therefore the Dept. of the Navy currently does not attempt to cool the brain after TBI, despite the significant potential in lessening the degree and impact of TBI. The thermoelectric cooler (TEC) based system does not require a pressurized air source, specialized reactant, or circulating liquid, it can be powered by military battery and/or via an outlet, it will run off the chosen batteries for a minimum (without control strategy) of 13 hours, and is designed for Role 1 through definitive care, including En Route care.

## WHEN

**Contract Number:** M67854-19-C-6502 **Ending on:** August 31, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Safety and Effectiveness Animal Study Complete	N/A	Proof-of-concept and safety of candidate devices/systems demonstrated in defined laboratory/animal models.	TRL 4	3rd QTR FY21
FDA IDE Submission	Med	Investigational Device Exemption (IDE) review by Search Results Web results Center for Devices and Radiological Health (CDRH) results in determination that the investigation may begin.	TRL 5	1st QTR FY22
Human Subject Pilot Study: In-hospital	Med	Data from the initial clinical investigation demonstrate that the Class III device meets safety requirements and supports proceeding to clinical safety and effectiveness trials.	TRL 6	1st QTR FY23
Human Subject Pilot Study: Pre-hospital	High	Data from the initial clinical investigation demonstrate that the Class III device meets safety requirements and supports proceeding to clinical safety and effectiveness trials.	TRL 6	3rd QTR FY23
Human Subject Pivotal Trial: Pre-hospital	High	Clinical endpoints and test plans agreed to by CDRH.	TRL 7	1st QTR FY26
FDA De Novo	Med	The medical device may be distributed/marketed.	TRL 9	3rd QTR

## HOW

**Projected Business Model:** Vivonics seeks to minimize time to market for ICEPICC and additional capital will be the linchpin behind achieving such a goal. Licensing or partnering with an established medical device company for manufacture and delivery of ICEPICC is under consideration and multiple parties have expressed interest as a landing spot once certain inflection points are achieved. Alternatively, capital raise through distribution to the US Military could take place through our CranioSense, LLC subsidiary, which was established to commercialize our non-invasive intracranial pressure (ICP) monitoring system called IPASS. Commonality of the target users and patient population for ICEPICC and IPASS makes it logical to establish joint marketing and distribution. A direct salesforce will focus on sales to relevant medical providers, including EMS, ERs, and NeuroICU, among others.

**Company Objectives:** Vivonics is highly confident in the system it is developing and the civilian and military market need. We believe that the USMC will be a core customer but seek additional partners within the DoD. Ultimately, we are seeking further financial support to bridge the road to private money, FDA clearance, civilian launch, and transition to the military.

**Potential Commercial Applications:** According to the CDC, in 2010, about 2.5 million emergency department (ED) visits, hospitalizations, or deaths were associated with TBI—either alone or in combination with other injuries—in the United States. The ICEPICC has the potential for both prophylactic cooling and therapeutic cooling to improve outcomes for these patients as well as patient experiencing other ischemic events, such as those experiencing a stroke or cardiac arrest.

**Contact:** Ryan Myers, Lead Engineer and Director of Technology and Business Development  
[rmyers@vivonics.com](mailto:rmyers@vivonics.com) (781) 373-1930 x270

# Energy & Power Technologies (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
Physical Sciences Inc.	N18A-T008	Additive Manufacturing for Li-Ion Batteries	NAVAIR

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0461

Topic # AF08-T008

Shallow Water and Surf Zone Minehunting (MAD SWARM)

Physical Sciences Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 495 Barracuda Program

**Transition Target:**

**TPOC:**

(202)781-1406

**Other transition opportunities:**

**Notes:** This image shows one MAD SWARM search member in flight. The on-board sensor processing and control payload is integrated with the PSI InstantEye™ small unmanned aerial system. The magnetic sensor is suspended below the vehicle to reduce magnetic noise interference from the vehicle motors. The payload communicates with other search member vehicles to plan and coordinate a fully-autonomous search of a designated region to map out metallic objects to detect and locate mines.



Copyright 2021, Physical Sciences Inc.

## WHAT

**Operational Need and Improvement:** Decrease search time for naval mine-hunting activities in surf and beach zones, while keeping sailors remote from the contested territory. Aids the single sortie detect to engage mission.

**Specifications Required:** Detect and localize ferrous mine-like objects in very shallow water, surf zone, and beach zone. Deploy from an autonomous surface vessel, perform region search, and recover to launch craft without operator intervention or oversight.

**Technology Developed:** PSI has developed a magnetic anomaly detection (MAD) payload for use on its InstantEye™ small unmanned aerial system. Onboard search planning and multi-vehicle coordination software allow small teams of vehicles to search a defined region for ferrous objects, in shallow water and buried beneath sand. Real-time signal processing algorithms provide immediate indication of detected objects and allow search vehicles to coordinate and optimize the search and localization process.

**Warfighter Value:** Autonomous operation of the MAD SWARM capability from an unmanned surface vehicle would provide a safe and efficient stand-off mine search function for challenging surf and beach zone regions.

## WHEN

**Contract Number:** N68335-18-C-0278 **Ending on:** November 30, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Select small, sensitive COTS magnetometer sensor	N/A	Size, weight, power, noise level	3	October 2020
Coordinated multi-vehicle control	N/A	Reliable radio communications, robust control	3	May 2021
Integrate payload and sensor with InstantEye™ UAV	N/A	Stable flight, low magnetic interference	4	June 2021
Single-vehicle autonomous search and mapping	Med	Sensitivity, Detection range	4	September 2021
Multi-vehicle autonomous search and mapping	Med	Sensitivity, Detection range, Team efficiency	5	October 2021

## HOW

**Projected Business Model:** PSI currently manufactures the InstantEye™ unmanned air vehicle and numerous associated payload designs for military customers. The MAD SWARM capability will be introduced to this PSI product line as an additional payload option.

**Company Objectives:** PSI is seeking advocates and opportunities to fund further formal testing, demonstration, and validation of the MAD SWARM performance and end-user data products, as well as the development of additional capabilities including autonomous launch and recovery, collision avoidance, and host platform command & control integration.

**Potential Commercial Applications:**

**Contact:** James Glynn, Vice President, Corporate Initiatives  
glynn@psicorp.com (978) 738-8237

# Engineered Resilient Systems (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
Premier Solutions Hi, LLC	N182-122	Fleet Material Locator Information System (FMLIS)	NAVSUP

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

Topic # N182-122

Fleet Material Locator Information System (FMLIS)

Premier Solutions Hi, LLC

## WHO

**SYSCOM:** NAVSUP

**Sponsoring Program:** COMPACFLT N41

**Transition Target:** COMPACFLT and NOSS

**TPOC:**  
808-474-5843

**Other transition opportunities:**  
JITMEDLOG (Just-In-Time Medical Logistics)

**Notes:** Operational commanders need a clear view of material flows to support the warfighter. Today they rely on logistics analysts to sift through multiple Navy/DoD databases and construct reports on materiel flows and make provide best estimates on arrival times. MOTIV (material orders, transit, and inventory visualization) provides a one-stop logistics situational awareness view that uses AI/ML predictive analysis along with dashboards, alerts, and drill-down capabilities to quickly and efficiently answer questions like "will the shipment reach the carrier before it departs", "where can I get this crucial part", and "why are shipments being delayed".



<https://www.navy.mil/Resources/Photo-Gallery/igphoto/2002742563/>

## WHAT

**Operational Need and Improvement:** PROBLEM STATEMENT:

"Where's that part?"

Navy logistics analysts do not have access to a database that combines both afloat inventory and in-transit visibility.

Problem is particularly acute for Class IX (parts) in INDOPAC AOR.

Need for all relevant data collected in one place, organized to support the visualization of materiel in transit and in inventory on hand on afloat platforms

Allow afloat ordering activities to see where in-transit materiel is located

Ingest and analyze data from authoritative data sources: FIMARS, One Touch, IGC, Inform-21, and Combat Logistics Force (CLF) Load Management System (CLMS)

Display data in view that support operational needs (e.g. INDOPACOM LOGCOP)

**Specifications Required:** VISUAL ANALYTICS: See data in visual format (maps, timelines, graphs)

PREDICTIVE ANALYTICS: See when materiel is anticipated to arrive

PRESCRIPTIVE ANALYTICS: See potential impacts of plan changes

**TRANSITION TARGETS:** COMPACFLT, INDOPACOM LOGCOP; NSS-Supply; Naval Operational Business Supply System, NAVSUP IOCs

**ADDITIONAL REQUIREMENTS:** Java based logistics information management solution

utilizes artificial intelligence component

data driven and autonomous

data displaying inventory and in-transit visibility in a geospatial environment (i.e., Google Earth).

**Technology Developed:** MOTIV: AI Driven Tools for Logistics Operators

TOTAL VISIBILITY INTO NAVY PARTS INVENTORY – SHOW PARTS IN WAREHOUSES, IN TRANSIT, AND IN AFLOAT INVENTORY

SUPPORTS URGENT OPERATIONAL NEED FOR BETTER PARTS VISIBILITY – TOPIC SPONSORED BY COMMANDER PACIFIC FLEET FOR OPERATIONAL SUPPORT IN INDOPACOM AOR

## WHEN

**Contract Number:** N68335-20-C-0281 **Ending on:** June 30, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Requirements Analysis	Low	CONOPS OV-1	2	November 2017
Data Analysis	Low	Data Structure & Flow Document	3	September 2018
Data Cleansing	Low	Demo dataset	4	December 2019
Demonstration Milestone	High	Go No/Go	5	June 2021
NRDE Setup	Med	Go No/Go	5-6	July 2022
Demonstration to PACOM	Med	Transition to O&M funding	6-7	TBD

## HOW

**Projected Business Model:** Premier Solutions HI LLC

Business Model: Building a portfolio of SBIR and other logistics information technology properties to enable sustained engagements with Navy & other DoD customers

Hawaii-based, woman-owned small business

Prime contractor of FACET logistics system

Cleared facilities & staff; DCAA approved cost accounting

Outstanding Navy past performance

Successful Navy SBIR Phase III awardee

R&D focus on 5G, IOT, AI-driven logistics tech

Locations in Norfolk, Honolulu, Yokosuka

Supporting US Navy Warfighters worldwide

"Innovation with Aloha!"

**Company Objectives:** In addition to targeting transition programs, PSHI intends to utilize the MOTIV technology developed through this SBIR in our own FACET and CLIPBOARD products, which are already used Fleet-wide

**Potential Commercial Applications:** Commercial markets exist in all industries requiring transportation of high-value items

Special market niche in assisting parts suppliers to DoD

PSHI has existing commercial partners (e.g. One Network, Honeywell, Zebra) that will help provide an expanded aperture into the broader commercial space

PSHI has performed a commercial market/customer analysis with funding and support by the Hawaii Technology Development Corporation (HTDC)

**Contact:** Stephen Brennan, BD Director  
[steveb@premiersolutionshi.com](mailto:steveb@premiersolutionshi.com) 808-341-4702

# Ground and Sea Platforms (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
Materials Sciences LLC	N192-115	Durable Foreign Object Debris (FOD) Screens for Air Cushion Vehicles - MSC P4579	NAVSEA
Progeny Systems Corporation	N171-071	Plug-and-play Analytical Framework for Distributed Structured and Unstructured Data Sets for Condition Based Maintenance Plus (CBM+)	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0390

Topic # N192-115

Durable Foreign Object Debris (FOD) Screens for Air Cushion Vehicles - MSC P4579  
Materials Sciences LLC

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 377

**Transition Target:** Ship to Shore Connector (SSC)

**TPOC:**  
(850)234-4411

**Other transition opportunities:**  
Landing Craft, Air Cushion (LCAC)

**Notes:** The FOD screen is the structure protecting airborne debris from damaging the aft Propulsor Blades and rudders on the US Navy Air Cushion Vehicles (ACV), consisting of a frame structure with attached netting to prevent objects larger than 4" from contacting the blades.



<https://www.navsea.navy.mil/Media/Images/igphoto/2002490801/>

## WHAT

**Operational Need and Improvement:** The Current SSC and LCAC FOD screens are welded stainless steel structures with a stainless-steel wire rope net, which is both heavy and costly. The improved FOD screen will use a composite structure and synthetic netting assembled using novel, low-cost fabrication methods to reduce weight up to 50% and maintain or reduce cost.

**Specifications Required:** The function of the FOD screen is as critical to the function of the Craft as any component of the propulsion system. The screen must primarily protect the propulsor blade and assembly from impact events including bird strike and airborne debris from improperly secured payload without restricting air flow. The screen must resist saltwater, Ultraviolet light, and sand spray without physical erosion or performance degradation. Finally, the screen must be as easily installed and serviced as the existing structure.

**Technology Developed:** The technology MSC is developing is designed to match the impact performance of the steel structure with a lightweight material. Steel structures are well known for their ability to absorb enormous amounts of energy through their inherent material ductility through plastic deformation, which is vital in vehicle crash protection and other catastrophic events. Although the impact and static loads that the FOD screen must protect against are challenging, MSC has shown analytically that a lighter weight structure can resist repeated impact events without damage.

**Warfighter Value:** The lighter FOD screen allows for increased performance of the SSC in terms of payload, but also the lighter weight FOD screen will be easier to install and uninstall, making it safer for propulsor maintenance.

## WHEN

**Contract Number:** N68335-21-C-0119 **Ending on:** November 17, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Composite Basic Structural Feasibility and Weight Comparison	High	Preliminary Composite Designs met requirements and compared favorably to steel structure	3	February 2019
Fabrication Method Demonstration	Med	Demonstration Prototype Completed	3	February 2019
Refinement of feasible Designs	Med	Detailed Composite Designs analytically exceed requirements	3	July 2021
Lab Test Prototypes Fabricated and Completed (expected)	Med	Successful Drop-Testing on Full Scale Prototype	4	November 2021

## HOW

**Projected Business Model:** MSC maintains a growing composites manufacturing facility that is AS9100 certified, and currently has capabilities to meet prototype and production quantities for the Navy and the Prime Contractor for the SSC and retrofits of the LCAC. MSC will be the manufacturer and supplier of the composite FOD screens, with the necessary facilities and capabilities in-place. The near-term plan is for PMS 377 to procure directly from MSC, with a longer term scenario involving MSC supplying the FOD screens to Textron, who is the integrator of the LCAC and SSC.

**Company Objectives:** The business objective of MSC is to continue to grow as a supplier of composite structures for the Navy as well as other DOD and commercial customers, leveraging our history of analysis, design, and testing of composite structures to meet unique applications for our customers. MSC seeks to be the go-to developer and producer of innovative composite components where other suppliers may lack the materials engineering experience.

**Potential Commercial Applications:** The analytical tools and manufacturing methods developed in this SBIR are applicable to impact-resistant lightweight structures which can be broadly applied to protect marine and land structures subjected to repeated impact loads. The lightweight nature can be used to deploy protective screens in remote locations.

**Contact:** Mike Orlet, Project Manager  
[orlet@materials-sciences.com](mailto:orlet@materials-sciences.com) 215-542-8400

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0444

Topic # N171-071

Plug-and-play Analytical Framework for Distributed Structured and Unstructured Data Sets for Condition Based Maintenance Plus (CBM+)

Progeny Systems Corporation

## WHO

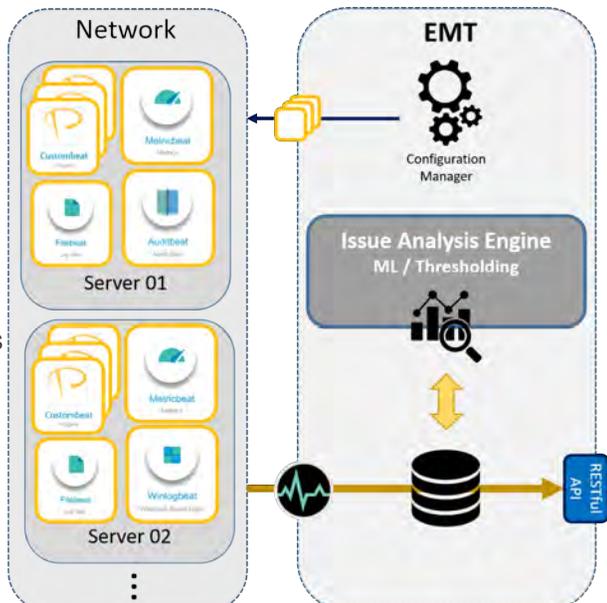
**SYSCOM:** NAVSEA

**Sponsoring Program:** PEO IWS 1  
**Transition Target:** Aegis Weapon System

**TPOC:**  
 202-781-4420

**Other transition opportunities:** Other programs responsible for afloat networks are viable transition paths including PEO SUB  
 - Non-Propulsion Electronics Systems (NPES)  
 - C5I & Weapons Integration Test Team (CWITT) Engineering Tools and SWFTS Baselines

**Notes:** The image shows the system architecture of the solution, including representative network components instrumented with agents that send component health status to a central data repository where analysis is conducted.



## WHAT

**Operational Need and Improvement:** SWE STOs 2017 Distributed Agile Logistics (DAL) STO-2 Total Ownership Cost; Life Cycle Maintenance, A0; predictive and diagnostic tools for Fleet preventative maintenance & correct repair (PHM & CBM+)

**Specifications Required:** Plug-and-play agnostic algorithmic software framework that can deploy on board naval platforms to increase the scope, validity, veracity, and speed of PHM results in support of CBM+

**Technology Developed:** A central repository for system health data collected from various agents tailored to the domain. Analytics against the repository data to detect system degradation, predict errors, evaluate configuration drift and PMS status.

**Warfighter Value:** Analytics will be able to provide 'leading indicators' for mission readiness to command leadership based on collected structured data.

## WHEN

**Contract Number:** N68335-19-C-0207 **Ending on:** January 30, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Lab Test Event 1	Low	Installation Procedures Verified	5	April 2022
Lab Test Event 2	Low	Data Collection Algorithms Verified	5	May 2022
Lab Test Event 3	Low	Error Detection and Prediction Verified	6	June 2022
Pilot Demonstration	Med	Deployment and operation on a production platform	7	April 2023
Seminal Transition Event	Med	Phase III Transition	8	January 2024

## HOW

**Projected Business Model:** Leverage lab integration to provide system health monitoring for the Aegis lab  
 - EMT runs on lab Aegis networks to conduct "configuration change" monitoring  
 - EMT used to collect system health data during Aegis lab test events for new software installs  
 - EMT provides assessment of how the new software impacts the Aegis system network  
 Support development of PEO IWS 1.0 transition plan for fielding across afloat Aegis instances  
 - Leverage a successful pilot at the end of Phase II, Option 2 to transition to Phase III  
 Support development of a PEO SUB (Virginia and Columbia) NPES and C5I & Weapons Integration Test Team (CWITT) engineering tools set across SWFTS baselines  
 - PEO SUB establish a contract for instrumenting NPES & SWFTS

**Company Objectives:** The ultimate goal is to integrate and transition this technology into government and prime contractor systems for facilitating condition based maintenance.

**Potential Commercial Applications:** Isolated Data Center Enclave CBM+, Industrial Plant or Nuclear Plant Network CBM+

**Contact:** Sante Simms, Project Technical Lead / Principal Investigator  
[sante.simms@progeny.net](mailto:sante.simms@progeny.net) (216) 415-6060 x1141

Company	Topic	Project Title	SYSCOM
Engineering & Software System Solution, Inc.	N201-X02	FOCUS AREA 9 COLD SPRAY SUSTAINMENT AND MODERNIZATION FOR NAVAL DEPOTS	ONR
HighRI Optics, Inc.	N171-045	Hydrophobic and wide-angle anti-reflecting nanostructured coatings on hemispherical domes and windows; including high-refractive index surfaces	NAVSEA
Intelligent Automation, Inc.	N18A-T013	Rapid Identification of Effects of Defects within Metal Additive Manufacturing (RIED-AM)	NAVSEA
Metis Design Corporation	N12A-T007	Interlaminar Reinforcement of Composites via Tailored CNT Nanomorphologies	NAVAIR
Mira Labs	AF191-005	Augmented/Virtual Reality Data Architecture Methodology and Reference Platform	NAVSEA
Pacific Engineering, Inc	N192-108	Composite Structures for Missile Systems	NAVSEA
Product Innovation and Engineering, LLC	N18A-T005	Innovative Processing Techniques for Additive Manufacture of 7000 Series Aluminum Alloy Components	NAVAIR
SciGenesis, LLC	N181-004	Application of a Low-Cost, Flame-Resistant Treatment to the Marine Corps Combat Utility Uniform that Provides Durable, Flame-Resistant Properties	MCSC
Texas Research Institute Austin, Inc.	N19A-T011	Remotely Operated Vehicle (ROV) Deployed Underwater Attachment	NAVSEA
TRITON SYSTEMS, INC.	N153-127	Low Power Water Purification System	MCSC

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8734-21

Topic # N201-X02

FOCUS AREA 9 COLD SPRAY SUSTAINMENT AND MODERNIZATION FOR NAVAL DEPOTS

(ES3) Engineering & Software System Solution, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** NAVSEA Naval Shipyards, NAVAIR Fleet Readiness Centers (FRCs), USMC Logistics Command (MARCORLOGCOM)

**Transition Target:** Various Fleet Readiness Centers (FRCs), Air Force Depots, and other locations that conduct maintenance, repair, and overhaul of military assets

**TPOC:**

Corey Countryman  
[corey.countryman@navy.mil](mailto:corey.countryman@navy.mil)

**Other transition opportunities:** The Corpus Christi Army Depot has used cold spray to repair magnesium gearbox housings. Such repairs led to the restoration of military rotorcrafts, such as the UH-60 Black Hawk, the AH-64 Apache, and the Sikorsky H-53 helicopter in addition to using cold spray to make repairs on aluminum castings and access panels possible.

**Notes:** ES3 successfully completed US Air Force SBIR topic AF131-190 Phase I and II efforts meeting its primary goal of development, demonstration and validation required for future implementation of the low-/mid- pressure (up to 250 psi) cold spray repair applications for typical aluminum and magnesium substrates. Additionally, ES3 conducted Demonstration/Validation on aircraft components and drafted a cold spray application specification in USAF format.



Copyright ES3 2021

## WHAT

**Operational Need and Improvement:** NAVAIR aircraft and ground support equipment typically require restoration of structure and components damaged by corrosion, wear, and other surface defects. These aircraft structure and components are typically manufactured from aluminum substrates, as well as other alloys like magnesium, titanium, and low alloy, PH and CRES steels. Current repair techniques inspect, clean, and then apply Corrosion Preventative Compounds to prevent/reduce corrosion, but do not provide dimensional restoration. Additionally, these traditional repair techniques may utilize and/or produce hazardous materials and waste.

**Specifications Required:** One will meet with DON command stakeholders and operational end users to conduct pilot tests of fully functional prototypes in an operational environment. These tests are designed to be performed using DON operational personnel in real end user environments and scenarios. All testing will be coordinated with DON command and operational stakeholders. Results of this testing will inform stakeholders on the capabilities of the developed technology and the probability for its deployment in an operational environment. One will use feedback from DON users, systems integrators, and other potential defense and commercial beneficiaries and stakeholders to adapt their prototype to optimize defense operational and technical benefits and to provide optimal dual-use commercial market fit.

**Technology Developed:** ES3 has developed a gas mixing chamber that may be used in conjunction with cold spray systems which allows an operator to add helium to a nitrogen gas stream, increasing the gas velocity exponentially in comparison to pure nitrogen. This added velocity enables material deposition not feasible in low pressure cold spray systems. This Navy SBIR STP effort includes cold spray coating testing, processing and integration efforts of multiple cold spray systems with pure and mixed carrier gases, in order to develop required technical data for NAVSEA, NAVAIR and Marine Corp general authorization for sustainment.

**Warfighter Value:** The cold spray applications will facilitate dimensional restoration of damaged NAVAIR aircraft components, NAVSEA and Marine Corp land and amphibious vehicles from multiple programs/platforms in order to return them to service in a quick and efficient manner. This technology provides both depot and field level repair capability. In-situ repairs can be applied in the field without removing the aircraft, naval vessel or land/amphibious vehicles from service.

## WHEN

Contract Number: N68335-21-C-0180 Ending on: June 24, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop Test Protocol	Low	Test plan approval by TPOCs	5	2nd QTR FY21
Design & Manufacture Enhanced Gas Mixing Delivery System	Med	Design approved by TPOCs after design review.	6	3rd QTR FY21
Parameter Optimization	High	Achieved OEM and/or Gov't specified coating requirements	6	4th QTR FY21
Procure/Manufacture Test Coupons	Low	Produced Coupons per approved test requirements	6	4th QTR FY21
Conduct Test Plan	Med	Complete testing per approved test requirements	7	3rd QTR FY22

## HOW

**Projected Business Model:** ES3 is a high-end engineering firm specializing in engineering and design of aircraft components, Systems, and Subsystems; advanced material coatings for aerospace applications; specialized metallurgical, hydraulic, and mechanical custom testing; computational methods for structural dynamic analysis; maintenance repair and overhaul; and development of environmentally preferred material processes. We provide an array of services and products to commercial and government entities. ES3 engineers provide advanced coatings for a variety of specialized applications which encompass goals such as improved component performance, reduced environmental impact, improved reparability, and improved life cycle costs for the warfighters. ES3 will provide the testing and data required to transition and implement the technology in order to build organic capability within the DoD.

**Company Objectives:** Initially, the target market for this technology will be NAVAIR, NAVSEA, and USMC depots that are responsible for refurbishing and restoring worn or damaged surfaces of on any aircraft, ships, land vehicles platforms and/or ground support equipment. ES3 would like to meet with representatives to better understand their unique needs.

**Potential Commercial Applications:** Currently, the DoD has approved over 200 applications of cold spray repairs. In addition to the department of Defense, this technology would have applications in Commercial Aircraft, Ship, Automotive, Petroleum, Natural Gas, and Electric Power Generation industries to repair turbines, wind power generating equipment, pumps & other mechanical components.

Contact: Fred Laguines, Engineering - General Manager  
[fred.laguines@es3inc.com](mailto:fred.laguines@es3inc.com) (478) 298-8403

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0457

Topic # N171-045

Hydrophobic and wide-angle anti-reflecting nanostructured coatings on hemispherical domes and windows; including high-refractive index surfaces

HighRI Optics, Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** Navy Integrated Submarine Imaging Systems

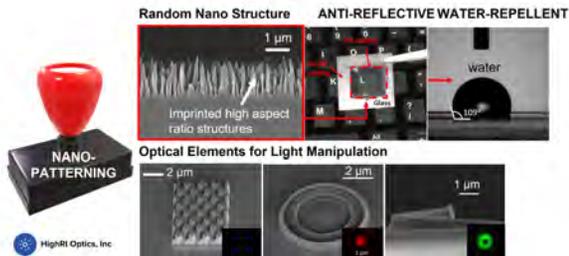
**Transition Target:** Optical Systems

**TPOC:**

(401) 832-7032

**Other transition opportunities:**

HighRI Optics, Inc seeks to explore other DoD, DoN, and commercial applications where broadband and wide-angle antireflection (AR) nano surface coating can be utilized. The surface coating technology is applicable beyond the AR nanostructures and can be used to pattern a variety of optical structures (lens, diffractive elements, etc.) to manipulate light.



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## WHAT

**Operational Need and Improvement:** Random Anti-Reflective (RAR) surface coating provides broadband antireflection on a wide-angle and water repellency for superior visibility of the imaging sensors. All of which will meet or exceeds all specified mission criteria.

**Specifications Required:** HighRI Optics's durable AR surface coating can minimize light reflection and sun-glint. The AR structures are designed to work over a broad light spectrum and wide angles. The AR structures can be applied to flat, curved, and hemispherical optics on both internal and external window surface to provide excellent optical properties. The finished AR coating will be durable to maintain both the antireflection and water repellency properties under harsh environmental conditions.

**Technology Developed:** HighRI Optics developed proprietary nanopatterning technology using nanoimprint lithography to pattern RAR nanostructures on various optical window materials and shapes. The technology uses a replication (stamping) method, which is reproducible and cost-effective. Nanopatterning technology can be used to pattern various nanostructures, including the RAR nanostructures and designed optical structures, such as lens and diffractive optical elements, to meet specific imaging needs. The performance advantages of the technology include: precise light manipulation, cost-effectiveness during re-application, reproducibility, corrosion and biofouling resistance, wide-angle anti-glaring, and self-cleaning.

**Warfighter Value:** The optical performance of RAR nanostructures has been shown to be superior to the conventional multi-layer antireflection approach enabling wide-angle and broadband antireflection properties. The surface treatment adds water repellency and corrosion resistance. The AR window surface has suppressed light reflection over a wide-angle. In summary, the technology provides considerable value to the warfighter, including 1) anti-glaring and hazing, 2) improved signal detection, 3) self-cleaning property from (super) hydrophobicity, and 4) reduction in maintenance (i.e., re-application) cost.

## WHEN

**Contract Number:** N68335-21-C-0210 **Ending on:** March 5, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Long duration environmental stability and reliability (small scale window – fused silica)	Med	Maintain optical properties and hydrophobicity. Resistant to biofouling.	5	December 2021
Military-spec evaluation of full-scale AR coated windows (small scale windows – fused silica)	Med	Passing the test	5	January 2022
Design / Assemble Full-scale nanoimprinter tool (If Option I is exercised)	Low	Successful Patterning on the full-scale windows	6	August 2022
Military-spec evaluation of full-scale AR coated windows (If Option II is exercised)	Low	Passing the test	6	June 2023
Long-term environmental durability (full-scale AR coated windows on the submarine)	Med	Maintain Optical Properties and hydrophobicity	6	December 2023
Cleaning / Maintenance Process Establishment (if Option II is exercised)	Low	Process are tested by NAVY personnel and varified	6	December 2023

## HOW

**Projected Business Model:** Primary business model is to supply AR finished optical windows to the customer with a sufficient volume for program applications. The customer will provide the specifications. HighRI sources the optical windows.

Secondary business model is to transfer the technology to high-volume manufacturing contractors utilizing the infrastructure and compliance. HighRI team will provide training and extended-term supervision of manufacturing until it becomes fully established and robust.

Third business model is for low-cost industrial and consumer markets. The low-loss, broadband, wide-angle, antifogging, and water-resistant nanostructured coatings can experience explosive market needs for non-military applications. HighRI will seek to transition to high-volume production in cooperation with large companies that are suppliers of similar parts to the broad industrial and consumer market.

**Company Objectives:** HighRI Optics's mission is to "enable advanced photonic applications" by the development of break-through nanofabrication technology and optical materials. We have already licensed novel optical materials to a multibillion-dollar company. HighRI Optics seeks opportunities with DoD and commercial applications where the superior AR properties, abrasion-resistant and hydrophobic surface can be utilized.

**Potential Commercial Applications:** HighRI's nanopatterning technology and optical materials find numerous applications in consumer applications. Antireflection is an essential part of the display and sensor technology for optimum performance. Beyond AR application, HighRI's technology is applicable for patterning many other optical structures, including lens and discrete optical elements, on a variety of surfaces, including high-refractive-index windows, fiber facets, and plastic surfaces. Consumer electronic products demand a thinner and lighter footprint with the high optical performance. HighRI's nanopatterning of optical elements, including antireflection, would be the key enabler of such technology.

**Contact:** Keiko Munechika, CEO, HighRI Optics, Inc.  
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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0376

Topic # N18A-T013

Rapid Identification of Effects of Defects within Metal Additive Manufacturing (RIED-AM) Intelligent Automation, Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** Cross Platform Systems Development (CPSD) Research & Development (R&D) Program

**Transition Target:** NAVSEA Technology Office (SEA 05T)

**TPOC:**  
(571)316-7323

**Other transition opportunities:** Commercial vendors such as Lockheed Martin, 3D Systems, etc.

**Notes:** This technology improves the Quality Control (QC) and Nondestructive Inspection (NDI) of additively manufactured metal components, and has been initially verified using complex NAVY parts fabricated by Additive Manufacturing (AM).



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## WHAT

**Operational Need and Improvement:** AM brings revolutionary capabilities to enhance warfighting readiness, and there is a great need to enhance the QC and NDI process of AM metallic parts used in the battlefield to ensure safe operations.

**Specifications Required:** Comprehensive database software include representative AM alloy systems, rigorous QC flow and portable NDI system

**Technology Developed:** This technology quantifies the effects of multiple AM defect types on the material properties of 3D printed metal parts based on a comprehensive AM material database developed in prior. The QC process also adopts advanced Resonant Ultrasound Spectroscopy (RUS) and vibrothermography NDI methods to enable quick filtering of unqualified parts.

**Warfighter Value:** Ensure part quality, save inspection costs, and accelerate the design, development, and certification process of AM metallic components

## WHEN

**Contract Number:** N68335-20-C-0146 **Ending on:** May 18, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Proof of Concept of RIED-AM System	Low	Demonstrate with Experimental and Simulation Results	2	February 2019
Implement RIED-AM Prototype System	Med	Demonstrate the Nondestructive Inspection Equipment and Database Software	3	May 2021
Enhanced RIED-AM Prototype System	Med	Enrich Material Database and Quantify Testing Benchmarks upon Different Applications	4	August 2022
Deliver Final RIED-AM Prototype System	Med	Further Expansion to other Additive Manufacturing Alloy Systems, and Test in the Field	5	August 2023

## HOW

**Projected Business Model:** Consultancy for enhancing AM processing, evaluation of the AM parts, direct product sells and software licensing to the Navy and Navy-recognized AM machine shops or vendors.

**Company Objectives:** Connect with new customers, expand the application and transit the technology

**Potential Commercial Applications:** Improve AM processes and material performance and aid the quality control of AM metallic components in aerospace, automobile and biomedical fields.

**Contact:** Xiaoliang (George) Zhao, Director, Transportation and NDE Program  
xzhaol@i-a-i.com 301-294-5232

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR 2021-861

Topic # N12A-T007

Ultrasonic Measurement Tools and Models for Gearbox Components - Converted to an SBIR - PII Discretionary for Base Effort

Metis Design Corporation

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-299

**Transition Target:** H-60 Seahawk

**TPOC:**  
(301)995-4147

**Other transition opportunities:** CH-53E, CH-53K, H-1, V-22

**Notes:** Sensors primary use is for preload verification of the inboard retention plate of the TGB after a maintenance event to eliminate manual torque verification checks that require disassembly of the rotor head. Sensor will assess structural integrity of the spline in combination with preload verification. The novel hardware & sensor integrates within the tail gearbox such that it can be ultrasonically inspected without disassembly. The embedded piezoelectric array maps changes to torque down to individual bolts and integrity down to the location on the spline tooth.

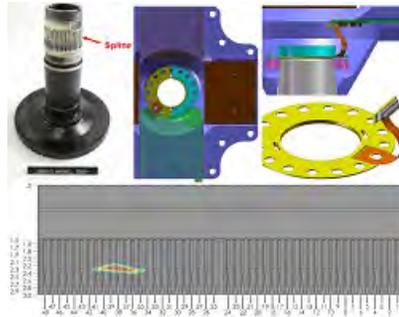


Image courtesy of Metis Design Corporation

## WHAT

**Operational Need and Improvement:** The Navy has a need for fully-integrated and automated approaches to accurate non-destructive assessment of structural health for rotorcraft gearboxes. Current inspection practices can require significant down-time, breaking of factory seals, specialized equipment and trained personnel to evaluate structural integrity, and is prone to operator error. Structural health monitoring (SHM) sensors and hardware are permanently integrated into an asset to provide real-time detection capabilities without disassembly.

**Specifications Required:** SHM systems need to maintain as good or better damage detection capabilities as current baseline practices, described by probability of detection (POD). Further, as SHM systems are permanently integrated, they must endure the environmental and loading requirements of the target platform.

**Technology Developed:** Piezoelectric (PZT) beamforming sensors are incorporated into the gearbox assembly, fully-integrated with all necessary hardware to facilitate testing. Power and data are transferred wirelessly through the tail rotor, eliminating the need for connectors or complex wiring. The system can resolve crack initiation to individual spline elements and indicate bolt-torque while the vehicle is at rest on the ground.

**Warfighter Value:** Structural health monitoring (SHM) provides reliable mapping of damage within structural components without manual tear-down inspection. This approach increases asset readiness and reliability, while reducing costs associated with preventative maintenance and inspection.

## WHEN

**Contract Number:** N68335-20-C-0858 **Ending on:** January 31, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Bolt-Torque Prediction Characterization	Med	Demonstrate ability to reliably measure torque +/-5%	5	August 2021
Fatigue Crack Prediction Characterization	Med	Demonstrate ability to reliably detect 0.050" crack	5	September 2021
Full-scale Hardware Production	Med	Fabrication of proposed production hardware	5	December 2021
CIVA Model Validation	Med	Good comparison of model data to demonstrated results	5	December 2021

## HOW

**Projected Business Model:** Presently Metis Design Corporation (MDC) sells hardware components directly through a low rate initial production (LRIP) partner. Once demand suffices, the system design and intellectual property (IP) would be licensed to an appropriate Tier II integrator to provide the hardware, installation and support. Funds would be derived through royalties, system customization and future upgrades.

**Company Objectives:** The company is looking for lead customers willing to facilitate advanced development testing through higher TRL, Tier I OEM customers as well as Tier II licensing partners.

**Potential Commercial Applications:** The demonstrated technology is suited towards fault detection for any rotating equipment. The SBIR focused on the tail gear box for MH-60 R/S Seahawk, but the system would provide benefits for any type of gearbox for any rotorcraft.

**Contact:** Seth S. Kessler, Ph.D., President/CEO  
skessler@metisdesign.com 6176615616

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0403

Topic # AF191-005

Augmented/Virtual Reality Data Architecture Methodology and Reference Platform

Mira Labs

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** WAR (Warfighter Augmented Reality) Project  
**Transition Target:** Program of Record

**TPOC:**  
(267)357-1712

**Other transition opportunities:** Present commercial applications include remote audits and remote collaboration within multi-national OEMs, mining companies, chemical suppliers, and explosive manufacturers. Minimizing down time for USAF Airmen via tele-maintenance and remote inspections with C-17 aircraft maintainers, and supporting faster decision-making for Pararescuemen with now-enabled Mira Heads Up Display for Android Tactical Assault Kit (ATAK) Viewer.

**Notes:** Unlike most Mixed Reality tools, Mira has won the Red Dot Award for product design, has been deployed for years, and is in SBIR Phase 3 contracting discussions with the USAF. Mira has successfully completed two Phase 1 projects under the USAF and is currently delivering on two Phase 2 projects, one for the USAF and one for the USN. Because of the proven successful implementation of this tool in various areas of work requiring maintenance, inspections, audits, and remote training, we know this solution can be quickly leveraged, with minimal training, across teams to provide global support to factories, ships, aircraft, or vehicles located anywhere within range of cellular or WiFi connectivity.

Image above shows the Mira Prism Pro Headset configuration options available. On the left is the optional Hardhat configuration, and on the right is without (Light and Dark Tinted lenses are options).



Copyright 2021, Mira

## WHAT

**Operational Need and Improvement:** Mira's Prism Pro headset enables engineers, supervisors, or SMEs to see what their teammates see on the shipyard and in the back shops, from anywhere in the world. It provides communication and connectivity, helps integrate and digitize paper processes and procedures, collects and can easily share data for analysis to enable collaborative decision making. This heads-up and hands-free, wearable technology allows teams to communicate interactively with remote subject matter experts by enabling real-time problem solving and training, and reducing down time and need for travel and related expenses (airfare, hotel, etc).

**Specifications Required:** Augmented Reality Data Architecture Methodology enabled with this smartphone powered headset. This technology is different in that it is a full-stack solution made from components that are more affordable than competitor headsets. Ease of upgrading when new smartphones are released allows for scalability because you are not locked into a proprietary device.

**Technology Developed:** This headset projects visual information in an easy to interact with format with minimal training or technological expertise. This solution is suited to frontline workers, it is user friendly and designed to be intuitive so that it can be deployed immediately and with minimal training. Use-cases include access to checklists in digital form via no-code software, linking teams remotely to facilitate collaboration with front-line workers and engineers, and much more. This tool allows for remote troubleshooting, and remote inspections and audits, via cell service or wifi connectivity.

**Warfighter Value:** Save maintenance personnel time, and increase team capacity, by allowing remote over-the-shoulder viewing for inspections or for trouble-shooting, all from a desktop or headset, located anywhere in the world. Makes following checklists for frontline workers easier via access to easily curated work flows, instead of needing to reference guidance located in Tough-books or paper job guides. Eliminates travel, so that people can collaborate and more efficiently complete inspection and maintenance processes for multiple vehicle types (i.e. ships, aircraft). This is a relatively low cost product, with outsized impact on cost-savings for the customer by saving money on travel while still maintaining effectiveness, and minimizing time spent to complete auditing tasks via automatic compliance reporting.

## WHEN

**Contract Number:** N68335-20-C-0869

Milestone	Risk Level	Measure of Success	Ending TRL	Date
ATAK Heads-up Display Situational Awareness Viewer	N/A	Completed	7	March 2020
Commercial Enterprise Sales, others	N/A	Commercial Sales	8	January 2021
Downrange C-17 tele-maintenance	Low	Pilot Studies with SMEs	7	May 2021
Electronic AR training for Dry Dock Procedures	Med	Test with PSNS Docking Foreman	7	August 2021

## HOW

**Projected Business Model:** We sell the Prism Pro headsets with SaaS subscriptions. This is a full-stack solution which provides a unified user experience. Mira is the Mixed Reality leader and aims to evolve into a system of record for industrial businesses. We are doing something you can't solve any other way, especially at this price point, by using smartphones and no-code software to quickly author content. Mira is your accessible Mixed Reality and mobility solution when cell phone or internet connectivity is present.

**Company Objectives:** Mira will continue to develop additional features to remain the industry leader in affordable heads-up and hands-free mixed reality headsets. Mira sells a connection which facilitates faster knowledge capture, transfer, and enables team collaboration for time critical operations and high-risk situations. We want to speak with programs and primes who prefer an "all-in-one" solution that is intuitive and easily scalable. Our team is comprised of a deep bench of Augmented Reality, Virtual Reality, and Mixed Reality experience, which is why Mira has had commercial successes (e.g. Toyota Tsusho America, Koch Industries, Nintendo) for 5 years, and is VC backed by Sequoia Capital and others.

**Potential Commercial Applications:** Allows following checklists, performing audits, remote-visits, or telemaintenance with frontline workers and supervisors simple via access to easily curated work flows, all in a heads-up, hands-free headset. This replaces the practice or need to reference guidance located in laptops or on paper job-guides. This solution facilitates collaborative teaming so that inspection and maintenance processes are safer, documented, and analyzable. This is a relatively low cost product, with outsized impact on cost-savings for the customer (e.g. trim travel times and lower expenses, minimize interruptions to work flows, reduce time needed to complete tasks, increase maintenance personnel capacity, enable remote training).

**Contact:** Esteban Castellanos, DoD Program Manager  
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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0421

Topic # N192-108

Composite Structures for Missile Systems  
Pacific Engineering, Inc

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PEO IWS 3L

**Transition Target:** Cruiser-Destroyer (CRUDES) platforms with MK 41 Vertical Launch Systems

**TPOC:**  
(540)653-3639

**Other transition opportunities:** Navy platforms with vertical launch systems can benefit from hybrid composite/metal uptake hatches and/or cell hatches. The corrosion resistant, heat resistant, durable, low-maintenance, and weight saving materials will save the Navy money and increase ship availability. Ticonderoga class CG, DDG-51 class, DDG 1000, unmanned vessels, AEGIS Ashore, and submarines can all benefit from this technology. Our allies and foreign partners will also benefit; they use the same system.



Image courtesy of Pacific Engineering Inc.

## WHAT

**Operational Need and Improvement:** The primary goal of the Small Business Innovation Research (SBIR) Phase II is to resolve a major maintenance problem with corrosion and availability for the weapon system. Currently, replacement is required during each availability at great expense which drives up sustainment costs.

**Specifications Required:** Reduce weight, meet shock and ballistics requirements, and reduce sustainment costs.

**Technology Developed:** Composite technology using specific resin and fiber selections unique to meet all performance requirements.

**Warfighter Value:** Preliminary analysis shows that in addition to solving corrosion issues, a weight reduction by 20-30 % while meeting ballistic requirements is achievable.

## WHEN

**Contract Number:** N68335-21-C-0169 **Ending on:** December 14, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Combine non-metallic components and metals (that will not corrode) using FST qualified resin materials through integrating state-of-the-art additives	Low	Sub Element testing per MIL STD 810	5	June 2021
Develop a ceramic-composite armor system that will meet envelope (Develop a non-metallic armor system that will meet envelope (	Low	Sub Element Ballistic Testing	5	September 2021
Incorporate materials and coatings that will not degrade or distort	Med	Structural and environmental testing complete. Prove out manufacturing processes through assembly	5	June 2022

## HOW

**Projected Business Model:** PEI has the in-house capability to build light weight composite uptake hatches and can transition products to the fleet. PEI will work with prime integrators for insertion of the products into their products which the various programs of record.

**Company Objectives:** Find ways to reduce weight and improve sustainment costs for defense components while meeting the shock and ballistic requirements and eliminating/reducing corrosion for the uptake hatches. Additionally, leverage other technology gains to provide an evolutionary approach to improving and introduction of products into the fleet.

**Potential Commercial Applications:** The commercial applications represent a large market. For example, potential breakthroughs in meeting ballistic protection requirements opens up the commercial market significantly across the entire protection realm. There is direct application to many of the armored vehicles used by the US Military. Additionally, corrosion resistance and weight savings for components can be applied across the military.

**Contact:** Dexter Myers, Vice President  
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6263792282

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2022-16

Topic # N18A-T005

Innovative Processing Techniques for Additive Manufacture of 7000 Series Aluminum Alloy Components

Product Innovation and Engineering, LLC

## WHO

**SYSCOM:** NAVAIR

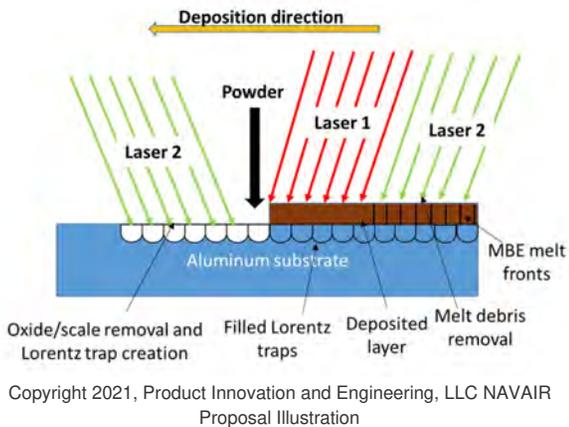
**Sponsoring Program:** PMA 201 Precision Strike Weapons

**Transition Target:** PMA 201 Precision Strike Weapons

**TPOC:**  
(301) 342-0297

**Other transition opportunities:** 7XXX aluminum and other reflective metals are extensively used throughout the Navy and the military. They are also used in aerospace, automotive, and general industry. The rapid repair and return to service benefits of our technology are particularly important for the military.

**Notes:** Image contains the concept of the MBE-DED system, some of the results achieved like oxide layer removal and secondary melt pool formation; and deposition and parts made using different aluminum alloys like Questek, and Scalmalloy.



## WHAT

**Operational Need and Improvement:** Naval aircraft components are commonly produced with 7000 series (e.g., 7075 and 7050) aluminum alloys due to their weight, strength, and fatigue properties. Current additive manufacturing (AM) methods fall short of successfully producing 7000 series aluminum alloys due to the reflective nature of the material. In addition, current AM methods, lacking ideal thermal control, produce inherently defective products with such issues as poor surface finish and high residual stresses.

**Specifications Required:** An innovative AM process is sought to successfully produce 7000 series aluminum alloy aircraft components. The novel process should accurately control the thermal profile locally and globally during component fabrication and reduce defects due to oxidation. Resulting components should demonstrate microstructural, mechanical and dynamic properties that are at least equivalent to, but preferably better than, traditionally produced parts and have minimal to no distortion per drawing tolerances. An innovative AM process has the potential to improve operational readiness, reduce total ownership cost, and enable on-demand parts manufacturing for naval aviation.

**Technology Developed:** A Multi-Beam Energy (MBE) Directed Energy Deposition (DED) system is used to process aluminum alloys. The system utilizes multiple laser energy sources to create a hybrid system that can both deposit and remove material. PINE is establishing that using a highly Gaussian beam, achieved through dynamic beam shaping (DBS), can quickly create and stabilize a melt pool even in highly reflective alloys, such as aluminum. Implementation of the system has led to the successful deposition of four aluminum alloys: Questek, Scalmalloy®, Gamma Alloy and ADDAlloy™. A second laser, operating in a pulsed mode, is employed to remove surface oxides and melt pool debris. The pulsed laser also enables the creation of a secondary solidification front trailing the primary laser, thereby allowing the MBE system to alter the cooling rates of some parts of the deposit. The advantage of this system is that ablation minimizes contamination in the form of melt ejecta and oxides which could detrimentally affect the metallurgical bonding of the next layer.

**Warfighter Value:** Fast repair and replacement of 7XXX parts for military aircraft, vehicles, and equipment is needed to maintain battle readiness and an "unfair advantage" for our warfighters. Fast part repair and replacement in depots and other non-battleground facilities will provide cost savings.

## WHEN

**Contract Number:** N68335-20-C-0029 **Ending on:** January 7, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
MBE/ DBS DED system completion	Med	Completed system with full capability of Multiple Beam, and Dynamic Beam shaping demonstration in a Directed Energy Environment	TRL 6	October 2021
Process paramter development for MBE?DBS	Med	Ideal paramter optimization for both primary and secondary lasers	TRL 6	November 2021
Aluminum alloy deposition and characterization	Med	Deposition and mechanical performance characterization of high performance aluminum alloys	TRL 6	December 2021
Computational model development	Med	Development of models to aid DED	TRL 5	December 2021

## HOW

**Projected Business Model:** The intention is to manufacture and market fully operational systems in industries that work with reflective materials like aluminum alloys and others, like copper and titanium alloys. We also plan to offer repair and replacement parts from our St. James, MO factory to aid the refurbishment or replacement of legacy components. We are also keen to pursue partnership opportunities with companies that require small batch and custom components to manufacture and repair components in the above mentioned alloy systems to augment profits and increase business opportunities. Leveraging our existing partnerships with industrial contacts will be pursued for these service opportunities.

**Company Objectives:** Having earned a reputation as a technology leader in additive manufacturing (AM) and having successfully licensed AM software, we are now ready to market and sell AM and hybrid subtractive/additive machining systems we have developed. We have funded most of our work through SBIR and STTR grants, and will continue using this funding mechanism to expand our technology. Adding system sales and repair services will provide the revenue to expand our manufacturing facility and grow our business. Our 19 years of collaboration with Missouri University of Science and Technology has allowed us to employ outstanding scientists and engineers. Growing as a manufacturing company will allow us to provide career growth for our current employees and further contribute to local economic development.

**Potential Commercial Applications:** Aerospace and automotive applications are the immediate industrial applications we are pursuing. We have working relationships with Boeing, Toyota, and others where our initial commercial sales are expected. Besides aluminum alloys, PINE's system can be used for other reflective materials like copper and titanium that exhibit similar problems to aluminum. There is a vast potential market for AM components and repair in these alloys in the aviation and medical industries where we would also like to pursue system sales and servicing opportunities.

**Contact:** Dr. Sriram Praneeth Isanaka, Project PI, Assistant Research Professor at Missouri S&T, Contractor to Product Innovation and Engineering  
[srirampraneethisanaka@gmail.com](mailto:srirampraneethisanaka@gmail.com) (573) 202-3511

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

MCSC-PRR-4124

Topic # N181-004

Application of a Low-Cost, Flame-Resistant Treatment to the Marine Corps Combat Utility Uniform that Provides Durable, Flame-Resistant Properties  
SciGenesis, LLC

## WHO

**SYSCOM:** MARCOR

**Sponsoring Program:** MCCUU, FROG Tropical Clothing, MC uniforms

**Transition Target:** Marine Corps Combat Utility Uniform (MCCUU)

**TPOC:**  
[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** All branches of the military's soldier protection systems

**Notes:** Image depicts fabric treated with SciGenesis' flame retardant (FR) technology undergoing the vertical flame test (ASTMD6413)



Image courtesy of SciGenesis LLC

## WHAT

**Operational Need and Improvement:** SciGenesis has improved the Marine Corps Combat Utility Uniform (MCCUU) to meet the operational need for an MCCUU with high flame retardancy while maintaining the operational need for durability, comfort, and camouflage.

Alternative flame retardant (FR) uniforms use expensive specialty fibers. These FR uniforms trap in air and sweat and have poor durability. They are not as comfortable and durable as the MCCUU making them less practical for combat.

**Specifications Required:** All specifications have been met on a lab scale level.

(A) Pass Vertical Flame Test (ASTM-D 6413) with (a1) an afterflame time of no more than 2 seconds, (a2) a char-length of less than 6 inches, and (a3) no melt/drip.

(B) Maintain FR-properties (a1-a3) after laundering (AATCC 135) at 50 laundering cycles.

(C) Treatment applicable to pre-sewn fabric and post-sewn uniforms.

(D) Minimal cost increase of approximately 10% of the current cost of an MCCUU.

**Technology Developed:** SciGenesis Flame Retardant Textile Treatment (SFRTT) attacks all aspects of the combustion triangle (a) heat source, (b) fuel, and (c) oxygen. The result is a flame retardant finish (passes ASTM D 6413) that withstands stringent laundering processes (AATCC 135). SFRTT (1) reduces the heat flux through the fabric, (2) converts combustible fibers into incombustible char, and (3) dilutes combustible volatiles with incombustible gases.

SFRTT(c) is proven on 50/50 nylon cotton textiles, the textile used in MCCUU. SFRTT is a proven clear finish with direct application onto an existing MCCUU as well as a proven color ink system for printing the camo pattern on textile.

Application of this technology will reduce the costs of an FR-uniform by 60%.

**Warfighter Value:** SciGenesis' SFRTT technology mitigates burns with no trade-off in comfort or durability to their current MCCUU.

## WHEN

**Contract Number:** M67854-20-C-6520 **Ending on:** April 26, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Mid-scale Industrial Application to sewn MCCUUs	Med	Meets criteria set forth by ASTM D 6413 & AATCC 135; and the physical requirements set forth by the MIL-PRF-MCCUU	5	1st QTR FY22
Industrial Scale Equipment Design	Med	System capable of treating 2500 uniforms per day at 30 mmHg	6	2nd QTR FY22
Production of 100 uniforms	Low	Meets criteria set forth by ASTM D 6413 & AATCC 135; and the physical requirements set forth by the MIL-PRF-MCCUU	7	3rd QTR FY22
Stability and Shelf Life Studies	Med	1 year shelf life with maintained FR durability	7	1st QTR FY23
User Acceptance Testing	Low	Warfighter comfort/cost/protection balance approved	8	2nd QTR FY23

## HOW

**Projected Business Model:** We will license our FR formulations to manufacturers of Marine Corps uniforms on a royalty basis. For industrial markets, we will license to finished fabric manufacturers in the US. Manufacturers using brominated FR chemicals are the highest value customers.

The US Army Natick Soldier Center projected initial use of 100,000 uniforms/yr after scale up certification. Longer term volumes of 400,000 uniforms/yr are projected. Scale up certification target is the end of 2022 with sales starting in 2023. Projected revenue for 2023 - \$0.5M; 2024 - \$1.0M.

The US Marine Corp projects initial use level upon certification would be 180,000 uniforms/yr. Development is expected to run through Mid-2022 with first sales expected in 2024.

**Company Objectives:** 1) To supply all of the US military's needs for a flame retardant nylon cotton uniform.

2) To extend the use of the technology to civilian applications.

3) To accomplish items 1 & 2 profitably.

**Potential Commercial Applications:** Treatment of clothing used by workers at moderate risk of burns. Commercial kitchen workers, electricians, police, and laboratory workers are examples.

**Contact:** Kelli Booth, President  
[kelli.booth@scigenesis.com](mailto:kelli.booth@scigenesis.com)

601.818.0612

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0386

Topic # N19A-T011

Remotely Operated Vehicle (ROV) Deployed Underwater Attachment

Texas Research Institute Austin, Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** Code D24

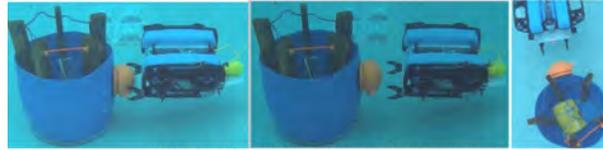
**Transition Target:** Next Generation EOD Underwater Response Vehicle

**TPOC:**

(301)744-5095

**Other transition opportunities:**

Commercial underwater repair and construction and off shore oil and gas industries.



*Pictures of the CDS being released after simulated bonding.*

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## WHAT

**Operational Need and Improvement:** The Navy needs the ability to non-intrusively attach specialized explosive ordnance disposal (EOD) by remotely operated vehicles (ROV) to neutralize underwater threats.

**Specifications Required:** The Navy has particular interest in strong underwater adhesives or other non-intrusive attachment systems that can be integrated onto ROV's to deliver specialized EOD tools. Attachment methods must be able to adapt to EOD tools without modification and must not increase the influence signature of the ROV.

**Technology Developed:** We have developed a new class of adhesives for underwater applications, the adhesive has exhibited excellent strength in all underwater conditions. The interface between the explosive ordnance disposal (EOD) should easily transition to the next generation of EOD ROV's.

**Warfighter Value:** We will be able to demonstrate the feasibility of a modular charge delivery system (CDS) that uses a quick reacting adhesive that allows the ability to neutralize a mine by precision placement of a mechanical disruptor using an ROV. The adhesive will work on all surface types, water temperatures, and degree of water salinity. This technology will reduce the risk to divers who currently manually attach the EOD's.

## WHEN

**Contract Number:** N68335-21-C-0029 **Ending on:** December 3, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Finalize underwater adhesive formulation	Med	Cure in less than 1 minute	6	November 2021
Integrate the system to ROV	Med	Tank Testing	6	May 2022
Tank testing of the system	Med	Functions correctly tank testing	6	May 2022
Sea Testing of system	High	Functions effectively at sea	7	November 2022

## HOW

**Projected Business Model:** The commercialization strategy will to both make and sell the rapidly curing underwater adhesive for use in underwater repair and construction along with Navy applications.

**Company Objectives:** We will add the rapid cure underwater adhesive to a line of subsea products already made and sold through the marketing arm TRI Applied Technologies, Inc. We currently have subsea products that are sold to the Navy and commercial customers to include, NCC coating, marine greases, and polyurethane over mold systems.

**Potential Commercial Applications:** Other potential markets would include off shore oil and gas and various subsea repair and construction markets. We will work with teaming partners and distribution to assist and transition the technology to these market segments.

**Contact:** Vince Newton, Director Business Development  
vnewton@tri-austin.com 7039444763

# Department of the Navy SBIR/STTR Transition Program

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MCSC-PRR-4048

Topic # N153-127

Low Power Water Purification System

TRITON SYSTEMS, INC.

## WHO

**SYSCOM:** MARCOR

**Sponsoring Program:** PM Engineer Systems

**Transition Target:** PM Combat Support Systems (CSS), Family of Water Purification Systems

**TPOC:**

[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** • Army

- NAVSEA
- NAVAIR
- Special Operations (JSOC)
- Air Force
- Disaster Relief (FEMA)
- Anti-fouling coatings
- Life raft survival system

**Notes:** • Image of Squad Water Purification System alpha prototype. (An improved photo will be provided.)  
• Triton Systems is a Global Business Venture company that successfully launches innovative products and solutions in emerging markets worldwide. We invest in new technologies through in-house incubation and external partnerships – creating thriving businesses from novel ideas.



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## WHAT

**Operational Need and Improvement:** • USMC Warfighters operate in austere environments where local water must be purified before drinking.  
• Resupply of water is difficult and expensive via air-drop or convoy.  
• Freshwater purification systems cannot purify brackish water.  
• Current small-scale seawater purifiers do not produce enough water.  
• A water purifier is needed for both fresh and brackish to support USMC Warfighters.

**Specifications Required:** • System scalable to allow user to configure it for their environment.  
• Purify 220,000 oz (T) or 300,000 oz (O) of potable water without filter change from freshwater consisting of up to 1,000 mg/L TDS, removing cysts, protozoa, bacteria, and viruses without chemical treatment and reducing turbidity up to 50 NTU.  
• Produce 1,400 oz (T) or 2,800 oz (O) of potable water without filter change from brackish sources consisting of 1,000 to 5,000 mg/L of TDS, removing cysts, protozoa, bacteria, and viruses and reducing turbidity up to 50 NTU.  
• Produce 60 oz/min (T) or 120 oz/min (O) of potable water from freshwater sources.  
• Produce 36 oz/min (T) or 72 oz/min (O) of potable water from brackish water sources.  
• Remove/reduce Toxic Industrial Chemicals / Toxic Industrial Materials (TICs/TIMs)....“Marine-powered”.

**Technology Developed:** • Marine-powered water filtration system meets contractual requirements.  
• Carbon block eliminates Toxic Industrial Chemicals / Toxic Industrial Materials (TICs/TIMs).  
• Low-power input enabled by energy recovery pump.  
• Anti-fouling coating increases filter permeability for increased water production.

**Warfighter Value:** • Enables purification of saline surface water, removes microorganisms, and Toxic Industrial Chemicals / Toxic Industrial Materials (TICs/TIMs).  
• Configurable so that only needed components are carried on mission.  
• Reduces amount of water carried on mission.  
• Improves field self-sufficiency of USMC Warfighter.  
• Reduces or eliminates logistics and cost of water resupply.  
• Enables missions not otherwise possible due to resupply constraints.

## WHEN

**Contract Number:** M67854-20-C-6514 **Ending on:** November 19, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Deliver 20 Beta Prototype Units for Testing	Low	On-time delivery of 20 systems.	TRL-7	1st QTR FY22
Preliminary Performance Testing at NAVFAC Desalination Test Facility	Med	Meeting all requirements at Threshold level or better.	TRL-7	3rd QTR FY22
LRIP Production of 140 Units for Test & Evaluation	Med	On-Time delivery of 140 systems.	TRL-7	1st QTR FY23
Completion of Performance & Environmental Testing	Med	Meeting all requirements at Threshold level or better.	TRL-8	2nd QTR FY23
Completion of User Evaluation (LUT & FUE)	Med	Meeting all requirements at Threshold level or better.	TRL-8	2nd QTR FY23
Delivery of First Production Units	Med	On-Time delivery of 270-432 systems.	TRL-9	4th QTR FY23

## HOW

**Projected Business Model:** • Triton Systems is teamed with a leading manufacturer of desalination equipment to produce the Squad Water Purification System (SWPS) for the Marine Corps.  
• Will apply for patent protection on any resulting IP.

**Company Objectives:** • Triton intends to supply the SWPS through an experienced military product distributor to the Marine Corps and wider DoD.  
• We will seek other military and non-military applications for this technology.

**Potential Commercial Applications:** • Potential non-military uses for disaster relief in coastal regions where ground and surface water sources are contaminated with seawater.  
• Anti-fouling coating can be used to improve the performance of sea water RO systems.  
• Improved hand-operated survival system for life rafts and downed air crews.

**Contact:** Brady Krass, Senior Engineer  
[bkrass@tritonsys.com](mailto:bkrass@tritonsys.com) (978) 856-1902

Company	Topic	Project Title	SYSCOM
Marine Acoustics, Inc.	N192-117	Undersea Acoustic Risk Analysis Decision Aid for Theater Anti-Submarine Warfare (TASW) Mission Planning	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0420

Topic # N192-117

Undersea Acoustic Risk Analysis Decision Aid for Theater Anti-Submarine Warfare (TASW) Mission Planning

Marine Acoustics, Inc.

## WHO

**SYSCOM:** NAVSEA

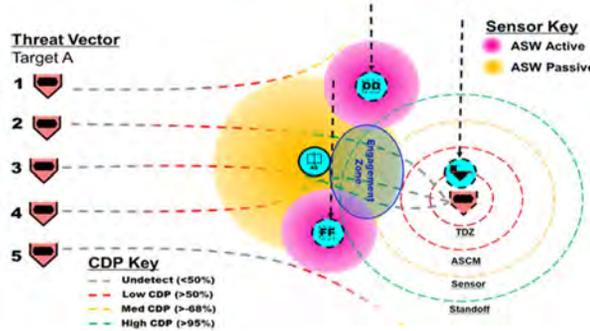
**Sponsoring Program:** PEO IWS-5E

**Transition Target:** AN/UYQ-100  
Undersea Warfare Decision Support System (USW-DSS)

**TPOC:**  
(401)832-3387

**Other transition opportunities:** NA

**Notes:** The Risk Analysis Tactical Decision Aid (TDA) calculates both Cumulative Detection Probability (CDP) and Cumulative Engagement Probability (CEP) for multiple theoretical logic-based target tracks en route to a High Value Unit ship or mission waypoint, relative to an assessed target Threat Vector. A separate quantitative evaluation of Anti-Submarine Warfare (ASW) Residual Risk (commensurate with Threat Posture), for both mitigated and unmitigated threats is quantified relative to various ASW zones of interest.



## WHAT

**Operational Need and Improvement:** Theater Anti-Submarine Warfare (TASW) Planners may be overwhelmed by decisions regarding risk to future plans, according to current asset allocation (mitigation) against potential threats. The Undersea Warfare Decision Support System (USW-DSS), a Command and Control (C2) system, was designed to help fuse this data into an ASW tactical picture, however, current USW-DSS lacks risk analysis mission planning capability that captures the full needs of the disparate users in both understanding and assessing risk (relative to existing mitigation measures) to these future plans.

**Specifications Required:** Develop and deliver a prototype for incorporating acoustic counter-detection risk analysis into the AN/UYQ-100 USW-DSS in support of TASW mission planning.

**Technology Developed:** The Marine Acoustics, Inc. (MAI) TDA utilizes MAI's logic-based, 4-D Monte-Carlo acoustic modeling and simulation software, as well as acoustic databases and sensor libraries developed as part of the SBIR Phase I effort. The MAI's Java-based TDA software is ideally designed to integrate as an overlay with USW-DSS via existing framework developed by partners L3Harris. Further the TDA, while designed as a standalone overlay during Phase II, will be capable of operating complementary to existing USW-DSS overlays as well as leverage existing acoustic models and databases as part of Phase III transition planning.

**Warfighter Value:** This technology directly addresses current lack of TASW watchfloor tools tuned to the needs of Future Operations (FUOPS) planners, specifically the ability to visualize, quantify and evaluate acceptable Commander's risk to future operations in order to provide guidance at key decision points in the planning process, as well as formulate appropriate mitigation plans. Further, MAI's approach accommodates the Course Of Action (COA) Development, Wargaming, and COA Decision steps in the Navy Planning Process.

## WHEN

**Contract Number:** N68335-21-C-0218 **Ending on:** February 5, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Performance Analysis Study	Med	Suitable track generation validated by ASW SME's	TRL-4	January 2022
Prototype Demo	Med	Demonstration of Risk Mitigation TDA on USW-DSS surrogate	TRL-5	January 2023
System of System Demo	Med	Demonstration of Risk Mitigation TDA on USW-DSS shore facility	TRL-6	January 2024

## HOW

**Projected Business Model:** Our business model is to directly develop software and associated documentation, as well as provide services to the government. Ultimately, the same software and documentation can be utilized by a Prime Integrator in transition to Navy ASW Programs of Record, Foreign Military Sales (FMS) applications, and/or commercial applications.

**Company Objectives:** MAI's short term objective is to develop and demonstrate TRL-6 capability for inclusion into the USW-DSS planning process. Our long term goal is to leverage advertisement of a successful SBIR transition (and lessons learned from this SBIR) in order to posture for future similar opportunities across the USW-DSS stakeholder community.

**Potential Commercial Applications:** Though the TASW Risk Analysis TDA is designed to transition to US Navy TASW Mission Planning capability such as USW-DSS primarily, the underlying capability, including acoustic modeling coupled with a robust 4-D Monte Carlo logic-based simulation and data collection capability has potential application across a multitude of applications both in the international ASW realm as well in applications involving Environmental Risk Analysis.

**Contact:** Steve Psaras, VP for Virginia Operations, Marine Acoustics Inc.  
steve.psaras@marineacoustics.com 703-465-8404

# Sustainment (Navy FST Booth: 4 April)



Company	Topic	Project Title	SYSCOM
TRITON SYSTEMS, INC.	N18A-T024	Hybrid Ceramic Matrix Composite/Polymer Matrix Composite (CMC-PMC) Skin Materials	ONR

# Department of the Navy SBIR/STTR Transition Program

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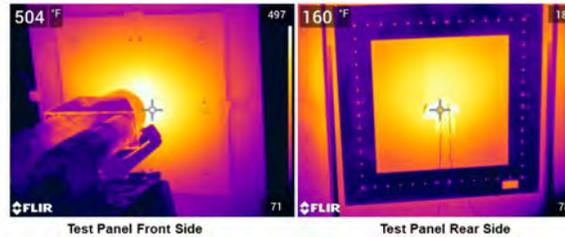
ONR Approval #43-8692-21

Topic # N18A-T024

Hybrid Ceramic Matrix Composite/Polymer Matrix Composite (CMC-PMC) Skin Materials  
TRITON SYSTEMS, INC.

## WHO

**SYSCOM:** ONR  
**Sponsoring Program:** PMA-261  
**Transition Target:** CH53-K  
**TPOC:**  
Dr. Anisur Rahman  
[anisur.rahman@navy.mil](mailto:anisur.rahman@navy.mil)  
**Other transition opportunities:**



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## WHAT

**Operational Need and Improvement:** Ability to maintain PMC skin integrity under thermal load with minimal parasitic thickness and weight increase.

**Specifications Required:** Keep the backside of the PMC at 250°F or below with a weight savings compared to a metallic heat shield system in approximately the same volume (~0.25").

**Technology Developed:** Multi-functional composite designed to avoid hot spots and isolate load carrying PMC from over temperature conditions.

- Thermal, chemical, and abrasion resistant outer layer.
- Robust, thermal isolation transition layer to accommodate CTE mismatch and reduce Z-axis thermal transfer
- Bolt on solution allows attachment and removal without damage to underlying aircraft skin
- Lightweight solution

**Warfighter Value:** - Hybrid composite skin enables greater operating temperature without replacement and requalification of the original CFRP composite.

- Hybrid composite skin increases operational life, thus reducing maintenance cost and down time.
- Hybrid composite skin allows integration of additional functionality to increase air vehicle survivability.
- Solution based on COTS materials that can be applied in the depot, in the field or on a manufacturing floor during production.

## WHEN

**Contract Number:** N68335-19-C-0335 **Ending on:** July 20, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Thermal test demonstrating that the shield keeps backside of CFRP front skin below 250°F with 500°F impingement	Low	1	2	3rd QTR FY21
Mechanical tolerance of heat shield demonstrated - Impact and loads	Low	8 ftlb drop impact test and 300 psi flatwise tensile performance	4	3rd QTR FY21
Demonstrate ability to fabricate curved heat shield	Low	Visual	4	3rd QTR FY21
Scale-up fabrication of flat panel heat shield to 2'x2' and pass thermal testing	Low	6	4	3rd QTR FY21
Chemical resistance of heat shield demonstrated	Med	MIL STD 810F	5	4th QTR FY22
Successful vibration testing of heat shield	Med	MIL STD 810F with modifications	5	4th QTR FY23

## HOW

**Projected Business Model:** We plan to fabricate the heat shields working with a toll manufacturing partner. Manufacturing plan is currently in development.

**Company Objectives:** We would like to identify further DoD applications for light weight, durable, heat shields for thermal protection at 700°F or lower. Triton Systems' goal is to supply light weight heat shields for DoD applications. These may include rotary or fixed wing aircraft (manned or unmanned), space vehicles, and weapon systems.

**Potential Commercial Applications:** Light weight heat thermal protection is of utility in commercial vehicles. Reduction of weight and metallic usage can result in cost saving and performance enhancements.

**Contact:** Dr. Arthur Gavrin, VP - Advanced Materials  
[agavrin@tritonsys.com](mailto:agavrin@tritonsys.com) 978-375-5310

## ***Featured Technologies***

- Advanced Electronics
- Autonomy
- Battlespace Environments
- C4I
- Cyber
- Electronic Warfare
- Human Systems
- Sensors

Company	Topic	Project Title	SYSCOM
Vision Engineering Solutions, LLC	AF191-D001	Low Cost Laser Communication Ground Terminal Network	NAVWAR

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVWAR (14 JANUARY 2022)

Topic # AF191-D001

Low Cost Laser Communication Ground Terminal Network

Vision Engineering Solutions, LLC

## WHO

**SYSCOM:** NAVWAR

**Sponsoring Program:** PEO C4I

**Transition Target:** TBD

**TPOC:**

(619)553-5379

**Other transition opportunities:** 1.

Fixed-site optical communication ground stations (OGS) for other services and agencies; 2. Transportable OGSs for deploying units; 3. Shipboard OGSs for naval and commercial ships.

**Notes:** Vision Engineering Solutions, LLC specializes in electro-optical tracking systems for long-range applications. The decades of experience our personnel have in tracking mortars, hypervelocity projectiles, satellites, and more, have prepared and positioned us well to help make space-to-ground optical communication networks a reality.

Vision was awarded an initial Phase II SBIR by AFRL, and a Sequential Phase II SBIR by NAVWAR to build OGSs. The OGS we describe here includes attributes of both systems. Several Vision products are included in our OGS, including our Precision Mount Control System (PMCS), a feature-rich, universal gimbal control system. Clear2Fire, our laser deconfliction and safety system, was an option selected by NAVWAR. The image shows an OGS in the early stages of integration (July 2021)



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## WHAT

**Operational Need and Improvement:** Laser communications (lasercom) are emerging as a means of meeting the projected bandwidth requirements of future space systems and alleviating the congestion in the radio frequency spectrum. Filtering and processing required to meet space-to-ground bandwidth restrictions leave unknown amounts of valuable information "on the cutting room floor" of the space terminal, while using precious size, weight, and power. In addition to increased bandwidth, many end users of satellite-generated data are looking for ways to increase the security of the data coming from space. Proven capabilities in optical communications already promise an order of magnitude increase in bandwidth over RF networks, while the reduced probabilities of detection, interception, and interference, inherent to optical communication make it much more secure than RF. Encryption technologies, such as quantum key distribution, will make it even more so.

**Specifications Required:** OGS capable of tracking LEO and GEO satellites, and satellites in transition between LEO and GEO. Communication wavelength: 1550nm band. Uplink data rate: 100 Mbps to LEO. Downlink data rate: Up to 1Gbps from LEO. Provide intensity modulation schemes, such as on-off keying (OOK) and pulse position modulation (PPM). Provide a laser beacon in either the 1060 nm or 1550 nm band. Incorporate a fast-steering mirror for point-ahead/behind errors and ability to correct tilt errors caused by atmospheric turbulence. Capable of daytime and nighttime operations. Design the system for at least 2 years of operational life. The OGS will connect to a network for data input and output via common networking protocols.

**Technology Developed:** Our OGS is designed to transmit and receive signals across the entire C Band of lasercom (1530 nm - 1565nm), accommodate all signal polarization states, integrate a single or multiple C Band optical modems, and be incorporated into existing and future communication networks.

**Warfighter Value:** Lasercom offers warfighters the potential to receive up to ten times the information, imagery, and intelligence from space they currently receive via RF, and to receive it more securely.

## WHEN

**Contract Number:** N68335-21-C-0067 **Ending on:** May 31, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Preliminary test of optical tracking subsystem (gimbal, optics, sensors, control software)	Low	Manual tracking accuracy of 10 microradians or better	TRL 4	March 2022
Preliminary test of optical receiver	Med	Receiver and receiving optical fiber are aligned; alignment laser enters receiver and impacts the center of the receiving fiber	TRL 4	April 2022
Software integration and local system test	Med	System searches, locates, and tracks satellites; satellite tracking accuracy of 1 microradian or better; laser signals of required wavelengths are received by the system	TRL 5	May 2022
System Demonstration at Customer Site	Med	System is fully integrated into customer's infrastructure; System searches, locates, tracks, and receives optical signals from required satellite(s); System tracking accuracy of 1 microradian or better	TRL 6	May 2022

## HOW

**Projected Business Model:** Our goal is to produce and sell the systems directly to network integrators. Vision Engineering Solutions, LLC can begin low rate initial production (8 systems per year) in March of 2022, with a plan to begin full rate production (24 systems per year) in March of 2023. If requirements outpace our growth capability, we will obtain production support from a larger business through subcontracting or licensing. Additionally, teaming with an optical modem provider, could enhance the attractiveness of our product.

**Company Objectives:** Our objectives at Sea-Air-Space will be: 1) communicate with constellation operators about communication links, ground network operators about integration; 2) communicate with NAVSEA about shipboard OGSs, and with MARCORSYSCOM about transportable OGSs; 3) communicate with Space Development Agency regarding integration with the National Defense Space Architecture; 4) identify candidate companies for production support.

Short-term company objective: build a reputation of excellence as a supplier of OGSs to DoD.

Long-term company objective: become a trusted advisor and supplier to US Government and commercial customers in optical communications and tracking applications

**Potential Commercial Applications:** Like the government's demand for greater bandwidth, the commercial demand is outpacing current capabilities. There are multiple efforts underway by commercial entities to establish optical communication ground networks- Empower Space, and BridgeComm, for examples. We are making contacts with these entities to pursue opportunities to help them succeed. Additionally, contacts will be made with satellite network providers. Teaming with them directly provides a more complete solution for space-to-ground lasercom.

**Contact:** Edward Logue, CEO  
elogue@visionengineered.com

(407) 412-7611

# Autonomy (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
Dynamic Dimension Technologies	N181-077	Surf Zone Simulation for Autonomous Amphibious Vehicles	ONR
GMATEK, Inc.	N193-A02	Multisensor Fusion and Analytics for Detection of Sensor Degradation	NAVSEA
Service Robotics & Technologies, Inc.	N201-X02	Adapting SR&T's M1 Hardware Portal for Navy Facility Health Monitoring and Prioritization	ONR
Trident Systems Incorporated	N193-A02	Unmanned Surface Vehicle (USV) and Unmanned Underwater Vehicle (UUV) Autonomous Behavior Development	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8743-21

Topic # N181-077

Surf Zone Simulation for Autonomous Amphibious Vehicles  
Dynamic Dimension Technologies

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** ONR Code 331 Advanced Naval Platforms

**Transition Target:** Future autonomous landing craft and amphibious vehicle programs for the Navy and USMC

**TPOC:**

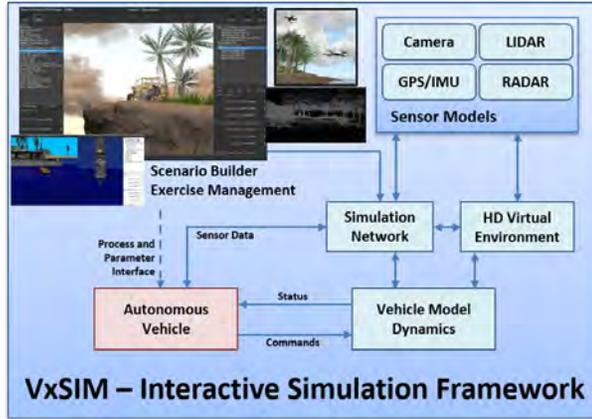
Troy Hendricks  
troy.hendricks@navy.mil

**Other transition opportunities:**

- Water craft launch and recovery
- Unmanned Systems launch and recovery
- Autonomy systems development for land, sea and air systems
- Manned-Unmanned Teaming
- Littoral Operations
- Interactive Synthetic Environments
- Digital Twin, Smart Bases and Smart Facilities

**Notes:** VxSIM designed with a multitier software architecture and integrated with autonomy software via the Robotic Operating System (ROS), provides an **accurate, scalable and flexible interactive simulation environment for new technology risk mitigation, CONOPS development and acquisition support.**

VxSIM can support many on many simulations for collaborative operations, formation maneuvers, swarming behaviors and manned-unmanned teaming in complex environments such as surf zones, off-road and urban regions.



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## WHAT

**Operational Need and Improvement:**

The Navy is accelerating autonomy capabilities for landing craft and amphibious vehicles with a focus on complementing experimentation with simulation. A major challenge of these vehicles is operating from the sea through the surf zone. A realistic simulation environment which provides appropriate sensor feedback and vehicles motions for software-in-the-loop testing is needed.

**Specifications Required:**

The simulation environment must:

- Represent the sea surface, breaking waves, bathymetry and beach/landing zone characteristics
- Characterize sensor performance in visual, thermal, and radar bands
- Describe underwater features such as bottom types and depth in the acoustic and visual spectrum
- Incorporate static and moving obstacles on the surface and submerged
- Incorporate realistic vehicle response model for wave, surf, and bottom interactions
- Allow for modular autonomy components such as sensors, fusion, path planning, obstacle avoidance, and low-level vehicle controls to be incorporated and executed by the vehicle under simulation

**Technology Developed:**

Dynamic Dimension Technologies (DDT) is developing the Water incorporated, Autonomy enabled Virtual vehicle testing Environment (WAVE) module for our Virtual experimental Simulation environment (VxSIM). VxSIM is a high-fidelity, multi-physics-based simulation framework which provides the ground-truth, labeled data required to test and train autonomy and artificial intelligence algorithms and systems in the loop.

**Warfighter Value:**

Navy gains an accurate, high-fidelity interactive simulation environment for the littoral domain that can be used to develop, test and train autonomy enabled systems for land, air, sea and undersea operations. The Warfighter benefits from more robust autonomy systems, improved search and surveillance effectiveness and more accurate decision making tools.

## WHEN

**Contract Number:** N68335-20-C-0107 **Ending on:** December 4, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Surf zone interface framework	Low	Demonstrate framework for ocean waves	3	3rd QTR FY20
Amphibious vehicle physics model	Low	Demonstrate amphibious vehicle with hydrodynamics and terrain interactions	3/4	3rd QTR FY20
Robotic Operating System integration	Low	Demonstrate ROS client/server data transmission	3/4	4th QTR FY20
Autonomy System Integration	Low	Integrate with Navy's autonomy system	4/5	4th QTR FY20
Breaking wave visualization	Med	Demonstrate breaking waves rendered in visual and sensor modes	5/6	1st QTR FY21
Soft soil and tracked vehicles	Med	Demonstrate tracked vehicles and soft soil models	6	1st QTR FY22

## HOW

**Projected Business Model:**

DDT is proud to support the Navy, Army, Air Force and commercial sector with the development of high fidelity Modeling and Simulation applications, including VR, AR and Model-based Systems Engineering solutions. Our innovations include AI, Blockchain and Cloud-based applications for data analytics and security, and transfer learning technologies.

DDT intends to market VxSIM in support of Autonomous Vehicle, sensor fusion and AI testing and algorithm training for Government and Commercial applications. VxSIM will be license managed. DDT will provide service support, training, custom model development and integration with hardware or software in the loop. We will also provide independent system testing for performance and behavior analysis to support system certification and safety requirements.

**Company Objectives:**

DDT was founded with a vision of applying innovative research and development technologies to benefit the broader community. Our mission is to add value to our clients and the community as a whole. Our objective is to leverage our research in the field of digital connected and virtual environments, to aid development of applications that improve emergency response, increase safety, reduce environmental impact, reduce costs for maintenance, planning, and much more. We are interested in discussing this technology with PEO USC for applications with littoral craft.

**Potential Commercial Applications:**

- Automotive autonomous vehicle development
- Off-shore oil and gas
- Digital Twin and Smart Cities
- Connected Automated and Autonomous Vehicle infrastructure
- Renewable energy such as wave energy harvesting

**Contact:** Karl Leodler, Founder & CEO  
kleodler@dynamicdimensiontechnologies.com

703-963-2204

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8818-21

Topic # N201-X02

Adapting SRT's M1 Hardware Portal for Navy Facility Health Monitoring and Prioritization Service Robotics & Technologies, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Naval Enterprise Sustainment Technology Team

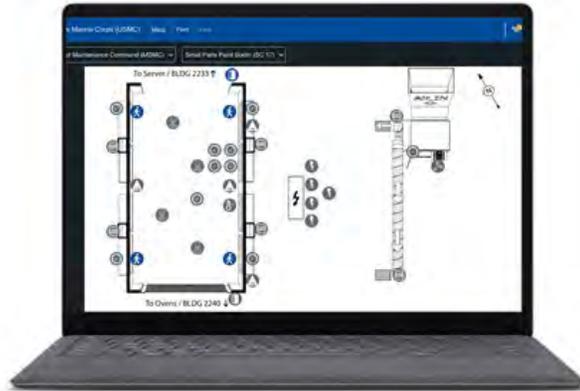
**Transition Target:** NAVSEA Naval Shipyards, NAVAIR Fleet Readiness Centers (FRC), USMC Logistics Command (MARCORLOGCOM)

**TPOC:**

Corey Countryman  
[corey.countryman@navy.mil](mailto:corey.countryman@navy.mil)

**Other transition opportunities:** NAVFAC, MARCORLOGCOM

**Notes:** SRT's M1 Portal is a Mission Control Center for monitoring facility health and infrastructure systems. Our patented software pulls data from deployed sensors across the facility into a common data management ecosystem and performs cross-platform data analytics. This hardware agnostic device integration platform provides wide-ranging facility insights based on individual deployment needs.



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## WHAT

**Operational Need and Improvement:** DON seeks modern tools, solutions, and processes to reliably and safely get assets back in the field as quickly as possible and intends to collaborate with innovative small businesses. The US DOD and DOD infrastructure has been successful because of both maintenance of existing systems and consistent looking ahead for new technologies. The MARCORSYSCOM solicitation invited applicants to introduce cross-platform cooperation of infrastructure, bringing necessary legacy infrastructure into shared data ecosystems with sensors and intelligence, allowing for greater information to support decision making.

**Specifications Required:** Navy/USMC is looking to reduce downtime of critical facility infrastructure, primarily focused around maintenance depots and machine shops supporting warfighter operations. Facility managers seek an integrated facility health monitoring system that will be able to track real-time health status of buildings, identify and prioritize areas for repair, and predict where future failures might arise.

**Technology Developed:** SRT is a software integration company that has developed a software platform to optimize smart facility data management, allowing facility leaders to monitor, analyze and automate across platforms. We specialize in the development of an integrated, hardware-agnostic software ecosystem for robots, smart sensors, and Internet of Things (IoT) devices. This M1 Hardware Portal provides building managers with real-time insight into all aspects of the building—from custodial or delivery robots, to environmental conditions, to security or utility monitoring within the facility. SRT has demonstrated our software in a USMC MDMC Depot, monitoring runtime, machine health, and air quality management. This project will expand across 4 additional shops during the course of this program.

**Warfighter Value:** SRT's software will modernize legacy and manual systems to provide predictive notifications for anticipated machinery downtime. SRT worked with the client to establish how a smart facility deployment would reduce shop downtime, providing actionable information to adjust workflow. By leveraging SRT's smart building ecosystem, the integration of existing hardware and sensors, the deployment of additional sensors, and SRT's predictive analytics module, SRT's system can profoundly improve facility efficiency, optimize maintenance requirements, and improve reporting of machinery operations.

## WHEN

**Contract Number:** N68335-21-C-0196 **Ending on:** July 15, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
NSF SBIR funded initial platform capabilities	N/A	Devices Share Data in a Common Ecosystem	4	1st QTR FY18
Navy Phase 1 project prepared for specific DoD applications	N/A	Simulation of data environment to demonstrate meets USMC need	5/6	4th QTR FY20
Navy Phase 2 Base project led to first DoD deployment	Low	Deployed Fully Integrated System and Detected Off-Nominal Conditions	8	4th QTR FY21
Navy Phase 2 Option 1 project will include 4 additional deployments	Low	Demonstrate cross functional applications at multiple sites	9	2nd QTR FY22

## HOW

**Projected Business Model:** SRT's M1 Hardware Portal is a software framework for integration of new and existing Building Automation Systems, smart hardware, and legacy software. SRT's modular software allows for rapid standup and deployment of systems licensed to end users with consultative customization and recurring maintenance. SRT engages in both direct sales and working through Prime's. SRT's commercial traction for facility health monitoring is currently in commercial real estate, higher education and warehousing.

**Company Objectives:** DON maintains extensive infrastructure across the US and around the world. Maintenance and management of this infrastructure falls to facility managers, who seek an integrated facility health monitoring system that will be able to track real-time health status of buildings, identify and prioritize areas for repair, and predict where future failures might arise. SRT will continue to work with localized deployments that support these facility managers, while highlighting the capability to assess and investigate data from across locations easily, thereby providing information to support DON decision making across their fleet.

**Potential Commercial Applications:** SRT presented several commercial applications during the PoP which focused on deployments to address: warehouse logistics and asset management, remote monitoring to reduce manual inspection, low power mode for buildings to distribute power to most essential infrastructure, performance monitoring of motors to proactively schedule condition-based maintenance, enterprise level integration of data and legacy software, and robotics for mapping and multi-robotic fleet control.

**Contact:** Gregory P. Scott, Ph.D., Chief Executive Officer  
[greg@srtlabs.com](mailto:greg@srtlabs.com) (571) 327-8763

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0462

Topic # N193-A02

Multisensor Fusion and Analytics for Detection and Correction of Sensor Degradation  
GMATEK, Inc.

## WHO

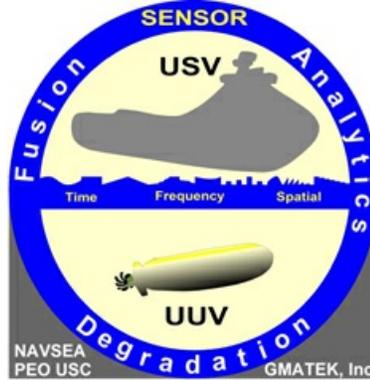
**SYSCOM:** NAVSEA

**Sponsoring Program:** PEO-USC

**Transition Target:** unmanned Surface and underwater vehicles (UxV), medium USV (MUSV)

**TPOC:**

**Other transition opportunities:** This technology also applies to unmanned air vehicles (UAV) as well as conventional ships and vessels to supplement human watchstander senses and capabilities.



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## WHAT

**Operational Need and Improvement:** Develop autonomous behaviors so that an Unmanned Surface Vehicle (USV) and/or an Unmanned Undersea Vehicle (UUV) can respond to a given situation like a manned surface ship or submarine. During a mission, sensor inputs may degrade over time. Novel approaches are sought to detect such degradation and adjust accordingly. Detection of degradation requires determining if changes in environmental conditions or target behavior/type may be the cause. If the degradation is determined to be within the sensor, possible approaches include adjustment or re-calibration techniques, re-initialization of the sensor, or adjusted tactics to compensate for the degraded sensor. The USV/UUV might also have an option to send a snippet of raw sensor data back to a controlling platform for confirmation of a problem by a human operator. Approaches could also include a method for computing the value of continuing the mission with the degraded sensor and comparing it to the value of returning immediately to the host platform or maintenance location for repairs.

**Specifications Required:**

**Technology Developed:** Our Sensor Degradation Reasoning System (SDRS) product technology uses artificial intelligence to gain insight into sensor behavior and to detect performance degradation. We do this by examining sensor data in real time and determining whether it appears to be degraded and possibly unreliable for use by unmanned and autonomous surface and underwater vehicles (UxV) as well as seafarers on vessels in decision-making and mission performance. Sensors supported include visual and FLIR imaging, radar, sonar, lidar, inertial navigation, GPS and GNSS, AIS, audio, weather and engineering sensor suites through direct connection as well as NMEA and other bus connectivity.

**Warfighter Value:** SDRS technology can help determine when naval vehicles and vessels guided by various sensors are likely to become disoriented due to degraded sensor data caused by natural conditions or the nefarious actions of adversaries. Without the ability to discern whether your sensors are degraded or providing information correctly, automated reasoning systems and trained watchstanders are effectively blinded. We can help fix that.

## WHEN

**Contract Number:** N68335-20-F-0465 **Ending on:** October 29, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Concept Feasibility	Low	Characteristic proof of concept	TRL-3	April 2020
Prototype Demonstration	Med	Demonstration in a relevant environment	TRL-6	October 2021

## HOW

**Projected Business Model:** GMATEK, Inc. will perform production system development and integration of COTS components with SDRS software for use within naval and commercial vehicles and vessels, including installation and integration with vehicle sensor systems and any required upgrades needed for specialized vehicle system compatibility.

**Company Objectives:** Our immediate goal is to integrate SDRS technology into new and existing naval vehicle and vessel platforms.

**Potential Commercial Applications:** Potential commercial applications include extending into commercial vessels and large yachts to supplement onboard watchstander capabilities in maintaining situational awareness.

**Contact:** R. Glenn Wright, President  
glenn@gmatek.com 443-951-8001

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0437

Topic # N193-A02

Unmanned Surface Vehicle (USV) and Unmanned Underwater Vehicle (UUV)

Autonomous Behavior Development

Trident Systems Incorporated

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS-406

**Transition Target:** Mark 18, Mod 2

**TPOC:**  
(619)553-2670

**Other transition opportunities:** UxVs, UxV prime platform OEMs, UxV Autonomy OEMs



US Navy photo: <https://www.navy.mil/Resources/Photo-Gallery/igphoto/2002480811/>

## WHAT

**Operational Need and Improvement:** Autonomous vehicles present a number of benefits to the DoD. Initial development of these vehicles has focused on achieving specific mission sets, and only minimal internal health monitoring. Enhanced autonomy development for either an Unmanned Surface Vehicle (USV) or Unmanned Underwater Vehicle (UUV) (collectively UxV) would greatly benefit from increased self-awareness and health monitoring.

To address this need, and provide greater situational awareness to UxV platform autonomy, the UVHMS is designed to provide Machine Learning (ML) based pattern recognition and anomaly detection so that a UxV can autonomously respond to the present conditions.

**Specifications Required:** A system to improve situational awareness which:

- \*Processes streaming data,
- \*Utilizes machine learning (ML) to identify to recognize patterns as well as anomalies,
- \*Interface with existing platform systems and autonomy, and
- \*Provides outputs which enable the USV/UUV to more closely approach that human capability regarding platform health.

**Technology Developed:** The Unmanned Vehicle Health Monitoring System (UVHMS) is a health prognostic and diagnostic system with ML-based health monitoring at its core, which processes platform data to provide prognostic and diagnostic insights to autonomy and operators regarding potential platform degraders and remaining useful life.

**Warfighter Value:** The UVHMS system increases the decision making capabilities for command leadership, integrates directly with existing autonomy infrastructure to drive mission behaviors, and provides scalability to accommodate transition to a range of UxV platforms.

## WHEN

**Contract Number:** N68335-20-F-0454

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hardware-in-the-Loop Demonstration	N/A	Demonstration of system prototype in a controlled environment	4	July 2021
Demonstration and Testing	Low	Demonstration of system prototype connected to platform	5	November 2021
Field Demonstration and Testing	Low	In field demonstration of system prototype	6/7	March 2022

## HOW

**Projected Business Model:** Trident's established business model for successful commercialization of SBIR technology would both sell directly to the government and to Prime contractors. The direct to government route would be employed for retrofits of existing CBM technology. In these cases Trident would handle any test and evaluation (T&E), low rate initial production (LRIP), and full production as the Prime utilizing existing vendor relationships.

To integrate within new platforms, Trident is prepared to perform as a subcontractor under the Program of Record Prime contractor. The same capabilities are brought to bear on the contract and Trident is able to work with existing technical data packages (TDPs) and technologies to integrate the UVHMS.

**Company Objectives:** As a world-class team that delivers technology solutions that make a difference, Trident's goal for UVHMS is to integrate it directly into Program of Record platforms to streamline autonomous health decisions for UxV platforms, increase self-awareness and boost operational uptime for these platforms. This would be achieved both as new platforms are produced and also be used to augment existing platform autonomy packages.

**Potential Commercial Applications:** Commercial UxV platforms, typically used for scientific and hazardous environment tasks, have the same health monitoring requirements. UVHMS provides capabilities which integrate within existing autonomy packages and can produce results within commercial UxVs and autonomy packages just as easily as the DoD packages. Refinement of RUL and platform insights increases platform reliability, platform availability, and objective completion.

**Contact:** Edward Baumann, Sr. Program Manager  
[edward.baumann@tridsys.com](mailto:edward.baumann@tridsys.com) 703-267-6016

Company	Topic	Project Title	SYSCOM
Applied Ocean Sciences	N19A-T022	Local Stochastic Prediction for UUV/USV Environmental Awareness	ONR

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8851-21

Topic # N19A-T022

Local Stochastic Prediction for UUV/USV Environmental Awareness

Applied Ocean Sciences

## WHO

**SYSCOM:** ONR

**Sponsoring Program:**

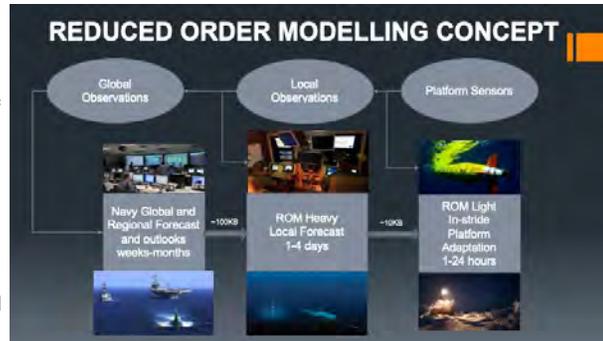
**Transition Target:** Primary transition of results will be to Unmanned Vehicles Operations programs.

**TPOC:**

Dr. Scott Harper  
[scott.l.harper@navy.mil](mailto:scott.l.harper@navy.mil)

**Other transition opportunities:** This technology can also be used for surface and air mission planning and autonomy applications by adapting input fields and target parameters. This will enable transition to a wider range of programs within NAVAIR and NAVSEA scopes.

**Notes:** The figure above shows a schematic with the components of the Reduced Order Modeling (ROM) system to be implemented for UUV/USV network environmental awareness. This project develops solutions to be included in the central and right boxes using Dynamic Modal Decomposition of ocean fields from numerical simulations and then uses non-intrusive filters for local in-stride forecast reconstruction and machine learning based data assimilation.



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## WHAT

**Operational Need and Improvement:** In order to enable underwater autonomy along time spans of weeks to months, Navy operations need ocean predictions that usually exist among data files of the order of MB to GB to be rapidly delivered to UUV fleets and operations centers using files sizes of 100KB to 10KB, with the relevant environments and uncertainties. These are to be used to enable local in-stride assimilation of local observations and as inputs for path optimization and sensor performance estimation/mission optimization.

**Specifications Required:** Technical solution needs to be compatible with autonomy designs being tested and implemented within the Navy and should include a light version of the system coded on Single Board Computers (SBC) to match different Size, Weight and Power (SWaP) constraints, for vehicles payload integration.

**Technology Developed:** This work delivers a software solution that enables the distribution of ocean fields (and other associated surfaces) updates and in-stride data assimilation to forward deployed platforms or teams constrained by bandwidth limitations using files of order 10-100KB. The same principles apply to the distribution of very large sets of files describing environmental uncertainties (e.g. ensemble distributions). The tools run both at control centers and on-board Underwater and Surface Unmanned Vehicles (UUV/USV). The technology uses a dynamic mode decomposition analysis and artificial intelligence to achieve a Reduced Order Modeling (ROM) solution for both file distribution and local in-stride assimilation of observations. The ROM products update a local ocean picture, valid for the time ranges the ROM modes persist (periods from 5-7 days and up to several months) and target primarily the variables and parameters of relevance for the UUV/USV missions planning and execution (e.g. sound speed and currents).

**Warfighter Value:** This technology delivers a critical requirement for long range underwater autonomy. By delivering environmental updates that could be broadcasted using small size signals and in-stride assimilation of local data, this technology enables underwater vehicles to optimize battery usage, sensor usage and route along missions requirements using small to none supervision for long time periods (order weeks to months).

## WHEN

**Contract Number:** N68335-20-C-0567 **Ending on:** July 29, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
ROM mode-based and data assimilation solutions	Low	Solutions capable to use mode basis to reduce file sizes of MB to KB and perform local data assimilation using laboratory data	TRL 3	4th QTR FY21
Mode-based analysis and data assimilation ready for UUV/SUV integration	Low	Solutions capable to run on small and low power consumption boards and interface with vehicles sensor data	TRL 4	4th QTR FY22
ROMS integration (light system and reachback solutions)	Med	System integrated with concepts of operations of Navy UUV/SUV missions	TRL 5	4th QTR FY23
Mission demonstrations of ROM solutions within relevant environments	Med	System successfully demonstrated during long range UUV missions	TRL 6	4th QTR FY24

## HOW

**Projected Business Model:** MIT and AOS will work with UUV developers to build final solutions with the light version for payload integration using the ROM solutions interfacing with mission planning and vehicles sensors. These solutions will then be tested during identified ONR sea tests and end-to-end simulation systems. Final results will set protocols for UUV and mission planning and enable to design payloads that can be offerer to final customers. A heavy version solution will also be delivered for users with larger bandwidth and wider data sets access that can be used for wider applications that use environmental inputs for optimization of ship-aircraft routing, acoustic and drifting sensors placement and operations and in particular when capable to benefit form the inputs of large size ocean and atmosphere ensembles that cannot be distributed rapidly within operational time constraints.

**Company Objectives:** The short term objective is the AOS and MIT partnership to deliver and maintain capabilities to Navy customers with rapid solutions for local environmental adaptation and enable long endurance autonomy. AOS is company that has also major skills in acoustic modeling, sonar prediction, signal processing, bio-acoustics, atmospheric sciences and on implementing environmental artificial intelligence/optimization solutions to practical Navy problems. AOS has also been delivering unique underwater soundscapes/noise predictions within several projects. As such another objective will be to have the AOS-MIT team studying solutions to wider Navy requirements and implement these new ROM solutions to expedite distribution of information and local in-stride processing for large multi-disciplinary applications within battlespace optimization and Initial Preparation of Environments, combining air-surface-underwater assets for mission effectiveness.

**Potential Commercial Applications:** Payloads for UUV manufacturers for long range mission planning and optimization. Tool kits for interacting with large number of files used in ensemble forecasting and extract targeted information in small size files. Software for aircraft path planning. Present solutions interface with Navy prediction systems and a public version will also be thought to interface with public data sets. AOS and MIT will also work together on pursuing additional applications within aircraft and UAV mission planning and execution.

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[emanuel.coelho@appliedoceansciences.com](mailto:emanuel.coelho@appliedoceansciences.com)

228-342 4773

# C4I

## (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
ARiA	N19B-T035	Universal Sensor Application Programming Interface (API) for Undersea Data	NAVSEA
ASSETT, Incorporated	N093-192	Real-time Decision Aid for Enhancing Ship's Self-defense	NAVSEA
Clear Science, Inc	N142-121	The Advanced Climate Analysis and Forecasting System - Decision Support System	ONR
Knexus Research Corp.	N181-079	Continuous Interactive Learners for Mission Planning	NAVSEA
Mosaic ATM, Inc.	N191-032	Artificial Intelligence Real-Time Track Modeling and Simulation for Combat Systems	ONR
Stottler Henke Associates, Inc.	N193-A01	Business Operations Streamlining System (BOSS)	NAVSEA
TeamWorx Security, LLC	N193-A01	Improving Acquisition Processes through Machine Learning and Automation	NAVAIR
Vulcan Wireless Inc.	N181-003	USMC Ground Radio LPI/LPD Interference Mitigation Active Communication Antenna	NAVAIR
Vy Corporation	N193-A02	Unmanned Surface Vehicle (USV) and Unmanned Underwater Vehicle (UUV) Autonomous Behavior Development	MCSC
P&J Robinson Corporation	N18A-T018	Protocol Feature Identification and Removal	ONR

**WHO**

**SYSCOM:** NAVSEA

**Sponsoring Program:** IWS5E

**Transition Target:** AN/UYQ-100 USW-DSS

**TPOC:**  
(301)227-2585

**Other transition opportunities:**

Tactical Decision Aids (TDAs), Command and Control systems, and ground, sea, and air platforms that receive and process sensory information.

**Notes:** The included image displays the three major components of the Universal Sensor Definition Schema (USDS) and their respective positions in the USDS processing pipeline. The image also highlights the delineation between components of USDS that are intended for different users. Sensor producers can use the USDS programming language to construct descriptions of their sensors which sensor consumers can use to generate immediately usable source code and documentation in a programming language of their choosing.

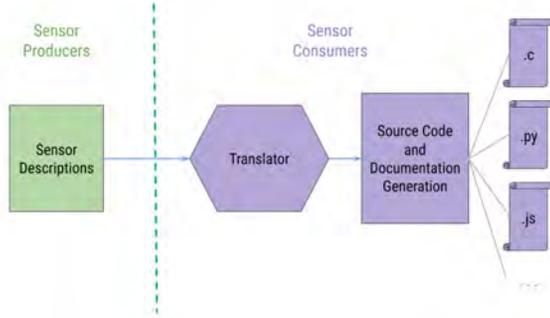


Image copyright, 2021, ARiA

**WHAT**

**Operational Need and Improvement:** The need for efficient and streamlined integration of legacy, modern, and future sensors is ever increasing. As the number of sensors increases, so does the overhead of the integration of those sensors into a growing number of applications and platforms that make use of those sensors. The prevalence of potential errors in the integration process also increases as the overhead of integration increases. USDS seeks to eliminate these overheads and errors by streamlining the integration process for these sensors. USDS improves upon the current process by providing a common syntax to describe sensors and their common associated functionality, and a mechanism for developers to translate these descriptions into immediately usable source code. This precludes developers from having to construct interfaces for each new sensor or data source that is to be integrated into a system and allows the developer to instead focus on the critical elements of the application or platform instead.

**Specifications Required:** The Navy requires a tool to streamline the integration of legacy, modern, and future sensors into applications and platforms such as the AN/UYQ-100 USW-DSS. USDS provides a common mechanism of sensor integration. It reduces the overhead of sensor integration into applications and platforms and reduces the likelihood of developmental errors.

**Technology Developed:** USDS streamlines sensor integration through providing a common syntax in which sensor developers can describe the data that is produced by their sensors, and common associated functionality. Application and platform developers can then take these descriptions and translate them into the programming language that is required for an application or platform. USDS generates immediately usable source code as an output that developers can efficiently integrate into their projects. In addition to source code, USDS also produces documentation that developers can use to inspect the generated code and describes the structures and functions that the code provides to them.

**Warfighter Value:** USDS simplifies the sensor integration process, reducing application development time and reducing the likelihood of errors. This aids the warfighter by allowing for applications to be developed that addresses their needs in more timely and error-free way. In addition, systems such as tactical decision aids can be upgraded and extended with additional sensors more efficiently, allowing for more informed decisions to be made.

**WHEN**

**Contract Number:** N68335-21-C-0187 **Ending on:** February 17, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Task IIB-1 Prototype Enhancement	Low	USDS description language and translation pipeline demonstrated and evaluated	5	February 2022
Task IIB-2 Development of USDS Implementation of ACDM	Low	All structures in the ACDM capable of being supported and translated by USDS	5	February 2022
Task IIB-3 Feature Enhancements	Low	USDS capabilities and functionality extended to incorporate feedback and needed features	6	February 2023
Task IIB-4 Prototype Hand-off	Low	USDS successfully integrated into USW-DSS and able to support all required features	6	February 2023

**HOW**

**Projected Business Model:** The primary goal of USDS is to be sold directly to the Navy and integrated into the AN/UYQ-100 USW-DSS. ARiA will work with the Navy, other DoD agencies, and large primes to license USDS where appropriate in other applications, platforms, and systems that make use of sensors.

**Company Objectives:** ARiA will continue to develop USDS to become the standard for sensory interfacing for both the Navy and other DoD Agencies. USDS will be expanded to produce source code for all relevant and used programming languages, and support features that allow USDS to be used with all sensors that are currently in use. USDS will also be expanded to allow it to be used as a service, allowing customers to upload sensor descriptions and receive usable source code.

**Potential Commercial Applications:** The primary commercialization target is integration of USDS in TDAs, command and control systems, and other sensory platforms. USDS is also able to be licensed to primes and system integrators. USW-DSS Prime Progeny is a target for USDS Licensing. As USDS intends to become a sensor interfacing standard TASW communication is another target for USDS integration. Thus Lockheed Martin, the integrator for SQQ-89 and BQQ-10/ARCI, is another commercialization target.

**WHO**

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 425

**Transition Target:** Submarine Combat System

**TPOC:**

(202) 781-2747

**Other transition opportunities:** This pipeline and process could be adapted for a wider range of submarine data or could be used for surface or air platforms. It is particularly well suited for complex, federated environments with large, disparate data sets. The development pipeline components are platform agnostic and can quickly be adapted for a range of uses, and our onboard data interface, a particular strength of the program, can be adapted to a range of data sources and message types.

**Notes:** Submarine Warfare Federated Tactical Systems (SWFTS) Data Architecture (SDA) has used the pipeline to develop two applications. The first, a data analytics application related to submarine maintenance, was successfully tested at sea in the fall of 2020. The latest application is a machine learning application designed to operate within the submarine combat system. This application has been tested in simulated submarine combat system environments and is targeted for a lab test in 2021. The lessons learned from our development and integration efforts, including cybersecurity requirements and best practices to integrate into a classified environment, have been documented and built into our process, enabling third party users to easily overcome these common obstacles.

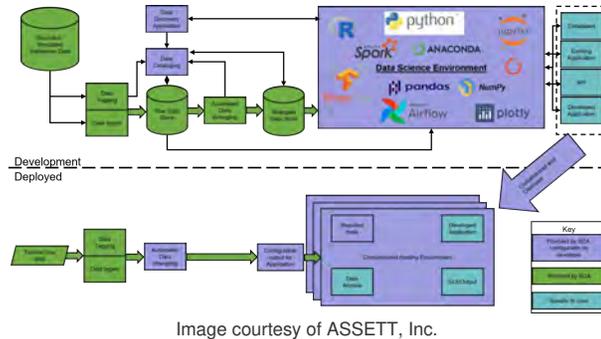


Image courtesy of ASSETT, Inc.

**WHAT**

**Operational Need and Improvement:** This approach consolidates, organizes, catalogs, and simplifies the wide range of data created onboard submarines. Providing all this data in a single location enables developers to bypass lengthy data gathering and interfacing steps and focus on development. For deployment, our program provides a data interface tool to remove the lengthy process of learning how to interface with submarine data, understanding the many differences between platforms and versions, enabling developers to rapidly test and integrate new capabilities.

**Specifications Required:** Enable use of AI/ML onboard submarines.

**Technology Developed:** SDA created and tested a development and deployment pipeline tailored for bringing AI/ML applications to the submarine force. The cloud-based development environment includes cataloged, cleaned, organized data for use in analytics and application development. To simplify deployment, SDA has developed a data interface tool that interfaces with submarine combat system messages and provides a simplified output for the application. SDA has verified this process by developing a data analytics application and deploying it at-sea on a live test, and by developing a Machine Learning application.

**Warfighter Value:** The AI/ML application SDA has developed will assist submarine contact management teams in understanding their environment and identifying unusual contact behavior. More importantly, the SDA pipeline will enable a range of third-party developers to rapidly develop and test new applications. Due to the simplified development and deployment pipeline, developers can quickly create an application and deploy it at-sea, allowing submarine operators to provide feedback early and often, ensuring the final product best fits their needs. Because the pipeline is so simplified compared to previous development and deployment processes, program offices can sponsor a range of use cases and quickly test them to find what provides the best value to the warfighter.

**WHEN**

**Contract Number:** N68335-20-C-0162 **Ending on:** September 30, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstration of development pipeline capabilities	N/A	Design approved, data analytics capabilities verified	4	June 2020
Sea-test of data analytics application	Med	Application successfully integrated onboard and able to perform analytics on live data	7	September 2020
Initial demonstration of machine learning model	Low	Model performs adequately and identifies the desired behavior in the provided dataset	6	February 2021
Integration of machine learning application into government test facility	Med	Application interfaces with live combat system data and outputs valid results	7	September 2021

**HOW**

**Projected Business Model:** SDA has wide applicability within the Navy, other armed services, and commercial customers. ASSETT will leverage the success achieved through the development of applications and an environment for SWFTS on submarines to demonstrate the ease with which developers from government, academia, and industry can now access large, disparate data sets to create AI/ML capabilities.

**Company Objectives:** ASSETT'S objective is to receive a Phase III award and involve other companies as needed to continue the complete development of the SDA in functional phases. The phased approach is Phase I – Augmented Intelligence, Phase II – Machine Learning, Phase III – Human-Machine-Teaming. As SDA grows the ML and AI solution for operational and tactical mission areas on the submarine, ASSETT will extend this technology to surface ship operations, command center operations, and anywhere operators are faced with many data streams from which they must extract meaning and make decision.

**Potential Commercial Applications:** SDA would be particularly useful in complex, high-hazard operating environments where non-integrated control and data systems exist and AI/ML application development is desired but not currently possible.

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8756-21

Topic # N142-121

The Advanced Climate Analysis and Forecasting System - Decision Support System

Clear Science, Inc

## WHO

**SYSCOM:** ONR

**Sponsoring Program:**

**Transition Target:** Fleet Numerical Meteorology and Oceanography Center (FNMOC)

**TPOC:**

Dr. Daniel Eleuterio  
[daniel.eleuterio@navy.mil](mailto:daniel.eleuterio@navy.mil)

**Other transition opportunities:** The ACAF-DSS core technology can be expanded and adapted to create customized solutions for decision-makers, intelligence analysts, modelers/simulators by providing foreknowledge of the atmosphere, 2 weeks to 1 year in advance.

**Notes:** The ACAF-DSS displays information in many forms via the advanced user interface to assist users in making great decisions for resource planning and staging, risk mitigation, energy consumption and many other potential uses. The goal of the ACAF-DSS is to provide information in a form the warfighter can leverage. From a presentation-ready figure, to data suitable for importing into a tactical decision aid, to an API return for use by another application or cloud, the ACAF-DSS lives up to its billing of being the 'Swiss army knife' of climate information.

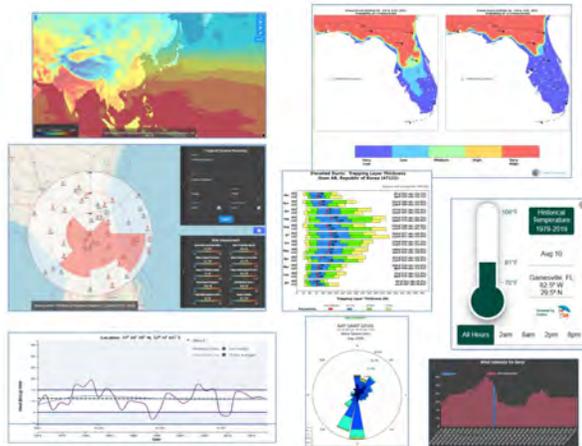


Image courtesy of Clear Science, Inc.

## WHAT

**Operational Need and Improvement:** Decision-makers, intelligence analysts, modelers/simulators and others can gain a significant tactical or strategic advantage with foreknowledge of the atmosphere from two weeks to 1 year and beyond. Commonly available predictive models offer environmental predictions to about two weeks. Longer range models are improving, and when used, they must be understood within the context of the state of the climate and historical limits.

**Specifications Required:** This technology must leverage modern computing technology in terms of data storage, large dataset schema and rapid, asynchronous recall techniques. In addition, the application will deliver the information in the most value-added method possible be it an advanced user interface packed with analysis tools, or calculated data delivered via an API for use in outside applications or clouds. More importantly, the application will deliver the predictive environmental information in a form the decision-maker, analyst, modeler, planner or researcher can readily consume such as an intuitive chart, a probabilistic summary or even a stoplight diagram.

**Technology Developed:** The ACAF-DSS is an environmental decision support system. The ACAF-DSS accesses scores of historical datasets and long-range predictive models to provide the decision-maker with heretofore unavailable weather and oceanography information. The system applies an innovative approach to data recall coupled with a clustered computing power and an interactive user interface to make petabytes of data accessible and discernible. Based on the user's request the system recalls the necessary data, computes the requested solutions, and displays or sends it to the user within seconds. Within the user interface the user may layer multiple requests on a global, interactive map, create cross-sections in space and time, correlate regions/times, create vertical profiles within the ocean or atmosphere and more.

**Warfighter Value:** Planning for intelligence gathering, resource employment, unit movements, location selection, risk mitigation and other governmental activities typically takes place at timescales that are far longer than commonly available weather models predict. The ACAF-DSS offers the warfighter a means to understand the emerging environmental conditions far in advance of operations to make better decisions and plans. Access to this information continuously improves today's and tomorrow's decisions and plans cumulatively impacting strategic and tactical decisions and ultimately improving outcomes.

## WHEN

**Contract Number:** N68335-20-C-0827 **Ending on:** March 31, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Complete redesign of legacy ACAF using new technologies	N/A	Survey of candidate technologies	2	2nd QTR FY17
Common global/regional dataset schema invention and implementation	N/A	Data conversion per invention and integration	4	3rd QTR FY18
Data API + asynchronous data usage	N/A	Production of calculated answer grids	5	3rd QTR FY19
Breadboard complete	N/A	Demonstratable system available	6	1st QTR FY20
Transition of data and data API components to FNMOC	N/A	Transition to operational DOD systems	7	4th QTR FY21
Transition of UI component to FNMOC	Med	Updated system replaces previous	7	2nd QTR FY22

## HOW

**Projected Business Model:** CSI will leverage the core, very broad ACAF-DSS technology to create custom solutions for government (e.g., long-range hurricane formation predictions, fire conditions early warning, freeze probability outlook, etc.). CSI will also license this technology to use as-is for use by institutions for operations or research

**Company Objectives:** CSI will continue to develop the ACAF-DSS technology and transition it to the DOD. In addition, CSI will continue to seek commercial and government partners that have specified and limited needs for which the technology can be leveraged. CSI's ACAF-DSS technology is unmatched in the marketplace and we intend to maintain our leadership in the area of providing access to a large set of climate/historical and predictive datasets from which instant analysis and computations can be completed. We will continue to invent technology and approaches for the exploitation and display of decision-supporting environmental information.

**Potential Commercial Applications:** Commercial application of this technology span many economic sectors. Business interests that have interest in predicting weather or ocean phenomena can benefit from this technology. For instance insurance/reinsurance would immediately enhance underwriting with a better understanding of their environmental hazard risk posture many months in advance. The finance and investing sector could time strategy better with an understanding of the future environment. Energy buyers are extremely environmentally sensitive in timing of purchases. Construction, logistics, shipping, etc. Nearly all economic sectors could capitalize and profit from accurate, advance knowledge of environmental conditions that impact them most, and lead times that favor their operations

**Contact:** Bruce Ford, President  
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352-478-8560

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8691-21

Topic # N181-079

Continuous Interactive Learners for Mission Planning (CILEMP)

Knexus Research Corp.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:**

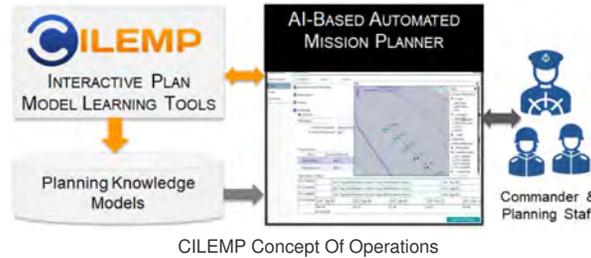
**Transition Target:** PMS-495 (MineNet Tactical)

**TPOC:**

Dr. Behzad Kamgar-Parsi  
[behzad.kamgarparsi@navy.mil](mailto:behzad.kamgarparsi@navy.mil)

**Other transition opportunities:**

Department of Defense-NAVAIR PMS 298 (Joint Mission Planning System), Planning Support for Air Force Air Operations Centers (AOC), Government and Non Government Agencies- Crisis Action and Disaster Recovery Planning (e.g., FEMA) Commercial Industry - Construction Project Planning, Oil and Natural Gas, Mining Exploration Projects



CILEMP Concept Of Operations

## WHAT

**Operational Need and Improvement:** Automated tools for mission planning operate with knowledge models comprising asset performance capabilities, behaviors, and environmental models. The state-of-the-art tools manually encode and test the planning models which is a slow, error prone process; and models can quickly become inconsistent and obsolete. Lack of complete and accurate models degrades the tool's ability to plan and puts the warfighters at a serious disadvantage.

**Specifications Required:** Develop machine learning methods for acquiring and updating planning models that exploit mission performance data and user feedback including after action reports, as well as planning decisions and critiques of system performance. Develop algorithms to learn and update asset performance models for predicting asset performance in novel situations and use this information to effectively allocate them and maximize mission measures of effectiveness. Demonstrate the robustness and scalability of methods on complex multi-domain, multi-asset, mission planning problems.

**Technology Developed:** CILEMP is a collection of advanced multi-strategy machine learning software tools that acquire and update planning domain models for AI-based hierarchical planning systems. It learns actions, tactics, and divide and conquer strategies from plans authored by commanders and their planning staff. It implements a modular architecture and interoperates with AI-based hierarchical mission planning software. Our tests on military and non-military mission planning problems show that it successfully learns planning models from just a few examples.

**Warfighter Value:** CILEMP will simplify the deployment, use, and the effectiveness of AI-based tactical and operational planning aids. It will overcome the knowledge modeling bottleneck and enable wide spread adoption of AI-planning technology across services. It reduces the effort and time to deploy AI-based automated planning aids for new mission types from months to days, and reduces the total cost of ownership of mission planning systems by an order of magnitude. It improves end user experience due to its ability to tailor its response based on continuous learning.

## WHEN

**Contract Number:** N68335-19-C-0570 **Ending on:** September 13, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Integrated plan model learning concept	N/A	Validation with Subject Matter Experts	3	1st QTR FY19
Feasibility of action model learning	N/A	Action Model Learning on an unclassified Navy mission typen	3	3rd QTR FY19
Integrated CILEMP Software Framework	Low	Demonstration of end-to-end learning on one unclassified mission type	4	1st QTR FY22
Robust Planning Model Learning Services	Low	Successful demonstration and evaluation on multiple DoD mission types and test cases	5	4th QTR FY22
Integrated Learning for Transition Target	Med	Pass acceptance tests for mine warfare tactical planning aid	6	4th QTR FY23

## HOW

**Projected Business Model:** CILEMP algorithms and software are protected under the SBIR data rights. Additionally, we will file multiple patents to protect the intellectual property. The CILEMP engine and its multi-strategy learning algorithms will be available for licensing and integration with automated mission planning systems. Knexus is looking for prime partners to co-develop, test, and transition CILEMP algorithms to additional Programs of Record (PORs) that need AI-based tactical planning and model learning.

**Company Objectives:** Identify additional PORs for CILEMP and related automated mission planning technologies to improve mission performance. Develop partnerships with primes and other technology integrators to extend, mature, test, and transition CILEMP technology. Develop applications for the non-DoD market segment and the commercial industry. We are looking for investments and partnership from commercial industry to develop a robust set of automated planning tools.

**Potential Commercial Applications:** CILEMP plan model learning as well as our automated planning software are widely applicable to not only DoD agencies but also to other governmental and non-governmental agencies such as those that perform crisis action planning, disaster recovery, or deliver humanitarian aid. They also apply to the commercial industry; for instance, they can streamline, accelerate, and improve project planning in the construction and oil and gas industries.

**Contact:** Kalyan Moy Gupta, President  
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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0466

Topic # N191-032

Artificial Intelligence Real-Time Track Modeling and Simulation for Combat Systems

Mosaic ATM, Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** IWS-1

**Transition Target:** AEGIS

**TPOC:**

(540) 653-1240

**Other transition opportunities:**

Mosaic is pursuing data science solutions for additional NAVAIR, NAVSEA and Air Force platforms and applications.

**Notes:** \*Image: Yokosuka, Japan (Feb. 14, 2012) Operations Specialist 1st Class Lionel Mahoney, training supervisor aboard the Arleigh Burke-class guided-missile destroyer USS Stethem (DDG 63), records enemy locations during a fleet synthetic training scenario. (U.S. Navy photo by Mass Communication Specialist 3rd Class Andrew Ryan Smith)



<https://www.flickr.com/photos/usnavy/6887652103/>

## WHAT

**Operational Need and Improvement:** To preserve free access to the seas and hold adversaries at risk, the Navy must maintain information dominance for decision superiority. It has become vital to leverage advancements in data stream analytics to improve combat efficiency at sea.

**Specifications Required:** The government customer desires a prototype demonstration at a Land Based Test Site which represents a combat system environment.

**Technology Developed:** The goal is to apply artificial intelligence and machine learning tools for current benefits.

**Warfighter Value:** Mosaic has been able to quickly develop and deploy next generation air defense and surface warfare. These analytics enable informed tactical decisions to optimize kill-chain execution in a resource constrained environment.

## WHEN

**Contract Number:** N68335-21-C-0151 **Ending on:** December 15, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Base: MS1 - Develop end-to-end prototype with RTS Agent	Low	Software 0.1 demonstration	3	August 2021
Base: MS2 - Deploy Software 0.1 in Virtual Twin at a land-based test site	Low	Successful deployment in test environment	4	September 2021
Option: MS3 - Complete Software 0.2 with model deployment functionality	Low	Software 0.2 demonstration	6	March 2022
Option: MS4 - Deploy Software 0.2 in Virtual Twin at land based test site	Med	Successful deployment at land based test site	7	July 2022
Option: MS5 - Complete Software 0.3 with full functionality incorporating fleet feedback	Med	Software 0.3 demonstration	8	March 2023
Option: MS6 - Deploy Software 1.0 at sea for Seminal Test Event at land based test site	Med	Successful deployment in live environment at land based test site	8	April 2023

## HOW

**Projected Business Model:** Mosaic is leveraging existing systems. We are actively pursuing opportunities to deploy those algorithms in Army, Navy, and Air Force platforms. We have made a significant initial investment and have sound financial operations to ensure the viability and opportunity for the proposed technology to be pursued through commercialization.

**Company Objectives:** This project is focusing heavily on developing identity and intent micro services capable of building a common operational picture. We would like to continue to expand that development to include a threat assessment micro service that will preclude a tactical action micro service.

**Potential Commercial Applications:** Outside of the DoD, we are already able to incorporate the identity and intent algorithms into two FAA SBIRs in order to facilitate integration of unmanned aircraft systems into the National Airspace System.

**Contact:** Jim Gardner, CAPT USN (ret), Senior Program Manager / Head of Research and Development  
[jgardner@mosaicatm.com](mailto:jgardner@mosaicatm.com) (800) 405-8576 x102

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2021-958

Topic # N193-A01

Business Operations Streamlining System (BOSS)

Stottler Henke Associates, Inc.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** Digital Transformation

**Transition Target:** NAVAIR PMAs

**TPOC:**

(301)342-4781

**Other transition opportunities:** BOSS will help Navy and DoD managers of developmental programs track risks and cope with emergent issues that threaten program disruption. Commercially, BOSS can also assist program managers at DoD primes and other organizations. We are working with Northrup Grumman to identify potential fits for BOSS within their existing program management processes and tool suites. The Aurora scheduling engine incorporated into BOSS was developed by Stottler Henke under NASA SBIR sponsorship and has been the basis for \$38M in non-SBIR business with Government and industry.

**Notes:** An unmanned MQ-25 Stingray aircraft refuels a manned F/A-18 Super Hornet



<https://www.navy.mil/Resources/Photo-Gallery/igphoto/2002736395/>

## WHAT

**Operational Need and Improvement:** "Know your risks, and you know your program." Developing modern complex naval systems is a risk-prone activity. Navy program managers must (1) identify risks; (2) track those risks; (3) prioritize emerging issues and their consequences; and (4) identify mitigations and program repairs. The earlier that risks are identified, the more options remain available. The more thorough the option analysis, the better the outcomes with respect to cost, schedule, and performance.

**Specifications Required:** Apply artificial intelligence and machine learning technologies to reduce the number, scope and cost of mistakes, increase productivity, and allow allocation of DoD resources to higher-level and mission-priority activities. For project management, reduce the time and money spent assessing the current state of projects with respect to cost, schedule, and performance; identify risks, optimize allocation of resources, and automate routine project tasks. Seek workforce productivity and efficiency enhancement, and automation of business systems and digital workflow.

**Technology Developed:** BOSS applies a range of artificial intelligence techniques that exploit program-relevant data, historic cross-program data, and program management expert knowledge to identify, track, evaluate, visualize, and more quickly resolve risks and emerging issues.

**Warfighter Value:** BOSS's support for risk brainstorming informed by records of previous projects will enable more complete risk coverage to minimize surprises and failures. Its advanced data analysis and extrapolation will provide early warning of issues, leaving more time for program adaptations that minimize cost and schedule impacts. Using expert knowledge in schedule and cost analysis, BOSS will rapidly and accurately determine risk/issue status and generate consequence assessments. Additionally, generation of visualizations and intelligent advice will enable better understanding and faster identification of effective responses that keep programs on track.

## WHEN

**Contract Number:** N68335-20-F-0564 **Ending on:** November 4, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
End of Phase I	Med	Concept of Operations defined and supporting technologies clarified.	3	April 2020
Expert Validation of Phase II Capabilities	Med	Presentation to recently retired PMAs validates prototype direction and capabilities	4	July 2021
Experimentation with Phase II Prototype	Med	Experiments with prototype on representative program data	5	April 2022
If Phase II.5 awarded, NAVAIR PMA experimentation with Prototype	Med	Positive feedback from NAVAIR PMA piloting use of BOSS.	6	January 2023

## HOW

**Projected Business Model:** We will start with direct sales to Navy and DoD customers, then use initial success stories to broaden our efforts, supported by primes and other licensees. This approach worked to build our highly successful Aurora scheduling engine business, a technology that serves as a key underlying component of BOSS. Stottler Henke has successfully transitioned a range of SBIR-funded technologies to Government and commercial customers using a variety of techniques, including (1) direct sales of software customization and support services, (2) subcontracting through major primes, and (3) licensing technology to vendors best positioned to reach a target market. Since BOSS is widely applicable, all of these approaches will likely play a role in its commercialization.

**Company Objectives:** Our immediate objective is to meet with Navy Program Managers who would use BOSS to manage their programs. To ensure BOSS fits within NAVAIR's and DoD's larger context of emerging methods, processes, and tools, we would also meet with digital transformation visionaries and program management tool providers from Navy PEOs and beyond. We also seek meetings with representatives of DoD prime contractors to demonstrate the benefits BOSS has for program cost, schedule and performance either for internal program management needs or marketing to Government and commercial customers.

**Potential Commercial Applications:** With customization, BOSS can be applied to any program where there are substantial risks to be identified and monitored, and emerging issues to be recognized and resolved. This is truly a dual-use technology.

**Contact:** Dr. Eric Domeshek, Project Manager  
[domeshek@stottlerhenke.com](mailto:domeshek@stottlerhenke.com) (617) 945-8350

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2021-863

Topic # N193-A01

Improving Acquisition Processes through Machine Learning and Automation

TeamWorx Security, LLC

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** NAVAIR SBIR Program Office

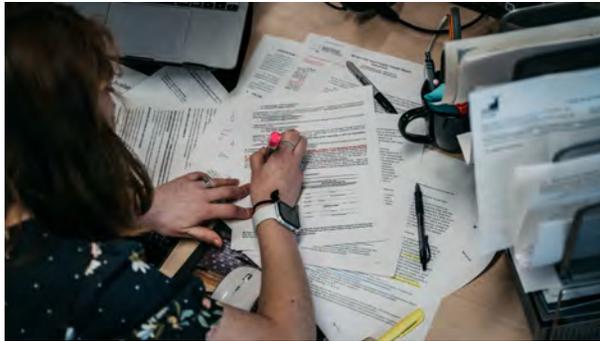
**Transition Target:** NAVAIR Office of Procurement

**TPOC:**  
(301)342-4781

**Other transition opportunities:** US Navy and USMC Echelon 1, 2, and 3 Acquisition Program and Procurement Offices. Other DoD procurement offices. Federal procurement offices or entities that must summarize and analyze labor- and data-intensive documents.

Commercial entities working in IT systems integration to include CIOs and prime contractors.

**Notes:** Image represents standard business office activity before automation



Copyright 2021, TeamWorx Security

## WHAT

**Operational Need and Improvement:** Contracting offices are required to analyze large volumes of numerical and textual data when evaluating contract proposals. NAVAIR has an overabundance of contract actions and proposals to evaluate, challenging and stretching labor, time, and financial resources. INDEX is a technology solution that automates this evaluation by employing Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML) technologies. INDEX automates large amounts of structured and unstructured numerical and textual data accurately. As a result, labor workload is reduced while the level of accuracy of the automation is increased. This allows allocation of resources to higher-level and mission-priority activities rather than highly manual, repetitive, error-prone tasks.

**Specifications Required:** INDEX is approximately 170 times faster reading documents, taking only ~45 seconds to read 1,000 words in contrast to the 3 minutes required by human readers. Additionally, it is 40 times faster reporting and summarizing documents, taking ~13 minutes to produce a 20-page report that requires ~33 hours of an analyst's time.

**Technology Developed:** INDEX accelerates digital work streams, achieves cost savings by reducing working hours and technological overhead, and increases productivity at scale. By automating customized content for contracts, forms, and memos, our product significantly reduces the amount of labor and effort required for back-office applications and/or day-to-day business. The technology organizes, extracts, and generates both textual data (keywords, narrative, summaries) and numeric data (equations, rates, adjustments) from documents, spreadsheets, and unstructured data. It then represents this data in an easy user interface that allows users to view, select, and search key data to more quickly and accurately auto-populate reports in accordance with the FAR. Data is generated using a combination of NLP, ML, and AI methods.

**Warfighter Value:** INDEX can observe a cost savings of thousands of labor hours annually, and similar outcomes can be expected for equivalent use cases. INDEX saves time and reduces the human effort required to read and parse textual data, and it accelerates an analyst's understanding of data by extracting original textual content into summarized content for the user. Our automated process transfers repetitive and labor-intensive tasks from the human to the technology.

## WHEN

**Contract Number:** N68335-20-F-0574

Milestone	Risk Level	Measure of Success	Ending TRL	Date
R&D	Med	Implement UI to improve user journey, reduce labor cost, and increase system efficiency	3	July 2021
R&D	Med	Demonstrate automatic summaries using NLP, NLU, and NLG models	3	September 2021
R&D	Med	Integrate results from research and testing into final prototype design	4	November 2021
R&D	Low	Identify cost and feasibility of integration with mission-specific systems of potential customers	4	July 2021
R&D	Med	Deliver an operational prototype system; enable analysts to quickly visualize and interpret data	4	November 2021

## HOW

**Projected Business Model:** Our primary business model is to license the technology directly to the Government. Alternatively, we are willing to license to system integrator Primes.

**Company Objectives:** TeamWorx Security is interested in discussing INDEX's capabilities with program management, contracting officers, contracting specialists, TPOCs, and anyone responsible for large scale document review. We are looking for exposure to organizations responsible for programming, contracting, and those who assesses large amounts of numeric and textual data. This technology can be applied to other data intensive documents to save human analysts' time, improve speed, efficiency, and accuracy.

**Potential Commercial Applications:** This technology has broad dual-use applicability to any program or business office where text documents are used to create analysis summary, such as systems engineering review activities, developmental and operational test and evaluation activities, procurement planning, cost-estimating and evaluations. It could have commercial application in the healthcare, commercial aviation, and civilian transportation industries where the automation of highly manual and error-prone text analysis processes can improve business outcomes.

**Contact:** Ken Holliday, Capture Manager  
[ken@teamworxsecurity.com](mailto:ken@teamworxsecurity.com) 703-507-4106

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

MCSC-PRR-4099

Topic # N181-003

USMC Ground Radio LPI/LPD Interference Mitigation Active Communication Antenna  
Vulcan Wireless Inc.

## WHO

**SYSCOM:** MARCOR

**Sponsoring Program:** Marine Corps Systems Command

**Transition Target:** Provide an end to end solution that easily integrates into a tactical radio system using a software defined radio that provides a ground radio Low Probability of Intercept/Low Probability of Detection (LPI/LPD) interference mitigation to the communication link

**TPOC:**

[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** We see multiple paths to transition for the VAAT (Vulcan Antenna Array Transceiver). Our commercialization strategy is to use Intellectual Property (IP) core, as it is cheaper and easier. The technology developed will be directly applicable to a wide variety of wireless systems and can be readily adapted to multiple waveforms and applications.

**Notes:** The figure shows Vulcan Wireless's VAAT (Vulcan Antenna Array Transceiver) which is a radio add on. Due to limited budget, we still need to build an entire 360 coverage field of view, in a future Phase II

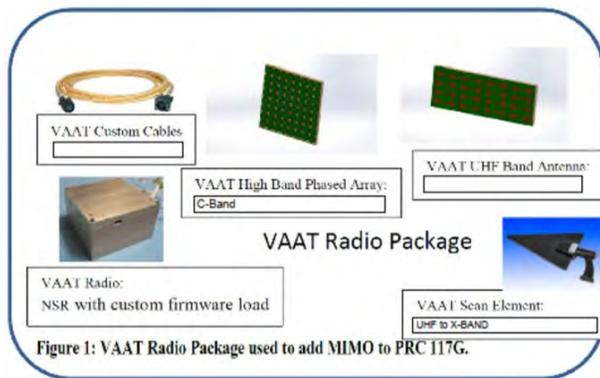


Figure 1: VAAT Radio Package used to add MIMO to PRC 117G.

Copyright 2019, Vulcan Wireless, Inc.

## WHAT

**Operational Need and Improvement:** There is a need to develop an improved range and concealed communications in a contested area to allow for improved LPI/LPD Interference mitigation. Marine Corp Systems Command (MARCORSYSCOM) utilizes multiple communication systems in environments that require covert communications, as they are exposed to severe interference. To significantly improved the LPI/LPD (Low Probability of Intercept/Low Probability of Detection) from detection we proposed an add-on MIMO (Multiple Input Multiple Output) module that connects to the antenna port of the existing tactical radio, specifically the AN/PRC-117G. The control of the tactical radio is done via Ethernet to coordinate the tactical radio and add-on module to insure proper configuration, such as carrier frequency and waveform selection.

**Specifications Required:** Provide an active interference mitigation antenna that will connect to Marine Corps communications radios to include the AN/PRC-117G or other variants. The specific requirements of the Tactical Radio waveform are:

- \* Simulate the channel effects (multipath and fading)
- \* Simulate frequency impairments the channel (Doppler and frequency uncertainty)
- \* Simulate effects of interference
- \* Simulate Multiple Input Multiple Output (MIMO) beam forming for both Transmission and reception antenna patterns
- \* Review RF specifications of multi-element receiver (downconverter and digital sampling receiver)
- \* Review RF specifications for multi-element transmitter (digital converter and upconverter transmitter)

**Technology Developed:** Vulcan Wireless, Inc has demonstrated we can develop a light weight, low power, man portable radio add-on called VAAT (Vulcan Antenna Array Transceiver) radio package that enhances the range of the radio, which also establishes covert communications that works even when exposed to severe interference.

**Warfighter Value:** The system provides an enhanced and cost effective solution to military communications that is portal, light weight and low power radio, protecting and secure communications from detection in hostile areas. This can be applied to many systems throughout the military.

## WHEN

Contract Number: M67854-20-C-6510 Ending on: October 15, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design stand alone VAAT (Vulcan Antenna Array Transceiver)	Med	Simulated an array of prototype antenna to validate the manufacturability.	TRL-4	1st QTR FY20
Fabricate VAAT (Vulcan Antenna Array Transceiver)	Med	Lab demo of PRC-117 to VAAT system. VAAT detects and acquires remote communication signal and forms an input antenna beam for signal	TRL-6	1st QTR FY20
VAAT (Vulcan Antenna Array Transceiver) integration	Low	Antenna chamber demo with PRC-117G	TRL-7	3rd QTR FY22

## HOW

**Projected Business Model:** Vulcan Wireless Inc's VAAT radio package was developed to take a widely used tactical communication system and make the system more robust and improve its LPI/LPD/AJ characteristics. The system is fully deployable without the need for NSA cryptographic keys, thus is unclassified. The User operates the PRC-117G with standard COMSEC procedures and methods to the VAAT. However, to avoid NSA COMSEC /INFOSEC certification requirements no data from the spectrum analyzer is stored within the VAAT unit itself. The add on VAAT radio is designed to cover a 360 degree area of coverage that will automatically scan to find remote terminal that will automate the set up and operate, with no interference in a hostile area.

**Company Objectives:** Vulcan Wireless Inc was awarded a Phase II contract to expand this technology in the area of LPI/LPD interference mitigation. Vulcan Wireless is looking to expand this technology with additional research and development into risk reduction, digital beam forming and control software with a 360 degree area of azimuth coverage. The value Vulcan provides is the radio hardware and add-on will increase security for the military and keep communication secure. The goal of this program is to defeat communications interference in a battlefield scenario. We are leveraging our design off the Vulcan CSR-SDR and NSR-SDR radios.

**Potential Commercial Applications:** It is anticipated that we will leverage our digital beam forming techniques into IP core that can be scaled for a wide variety of wireless applications that can be readily adapted to multiple waveforms and applications. We will market the IP blocks along with our existing RF hardware products. IP cores are becoming much more portable as much higher integration is being done in silicon. In the past each beam forming application used highly customized hardware making it very difficult to segment into a reusable IP core. This is no longer true with the introduction of RF SoC our IP cores will be reusable in any radio system that utilizes this core. Vulcan Wireless has commercialized Software Defined Radios for small space vehicles and this technology will enhance future radio systems.

Contact: Kevin Lynaugh, President  
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# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0437

Topic # N193-A02

N193-A02 Unmanned Surface Vehicle (USV) and Unmanned Underwater Vehicle (UUV) Autonomous Behavior Development

Vy Corporation

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 406

**Transition Target:** Dual Use: Subsurface threat detection and collision avoidance in autonomous vehicles and signal separation for ASW

**TPOC:**

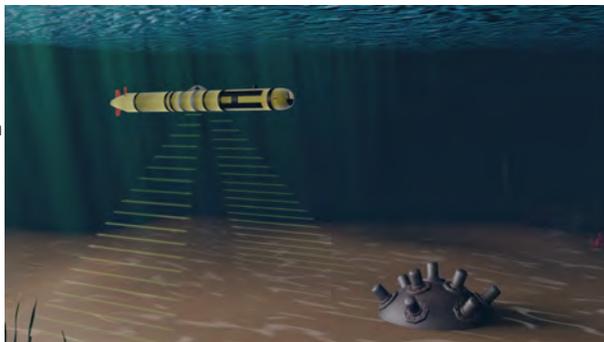
401-832-5297

**Other transition opportunities:**

Automated Target Recognition (ATR) with no training and auditable decision trail in different lighting conditions, in conditions involving occlusions and cluttered backgrounds, shadows (occlusions of lighting) and other appearance variables.

**Notes:** Automatic target recognition

(ATR) is the ability for an algorithm or device to recognize targets or other objects based on data obtained from sensors. Common sensors include radar, sonar, and lasers. Highly skilled operators are used to interpret signals from ATR sensors. As the demand for autonomous UXV operations and behavior in both hostile and friendly environments steadily increases, new approaches will be required. Automated detection of targets currently requires the creation of extensive training databases and various deep learning techniques to outperform conventional methods. Conventional deep learning systems are dependent on RGB color input which is highly variable and relies upon many thousands of manually generated training vectors for real-world use cases which must be manually labeled. Additionally, these deep learning systems lack auditability and transparency: there is no way to explain how their decisions are made.



Fully Autonomous Sub Surface Threat Detection - Image courtesy of Vy Corporation

## WHAT

**Operational Need and Improvement:** Automated pattern and anomaly recognition, collision avoidance, and fully autonomous decisions.

**Specifications Required:** API Suitable for integration with the Navy's Common Control System (CCS) and Unmanned Autonomy Architecture (UMAA)

**Technology Developed:** Dual-Use Application Programming Interface (API) for sub surface mine detection using side scan sonar and signal separation for acoustic whale data. Development of Docker Container has created a framework to facilitate pipeline analysis services tied to customer needs and available computing capacity. This approach allows the customer to choose which elements happen on the unmanned underwater vehicle (UUV) and which elements can be completed post mission. Deliverables include three serial elements: post mission analysis, tethered target ID during mission, and fully autonomous Automated Target Recognition (ATR).

**Warfighter Value:** Improve UMAA Stack Reliability through sensor fusion, transparency, and auditability. Fully autonomous decisions. Shape-Based Modeling Segmentation acoustic signal separation analysis from a noisy background facilitates superhuman performance.

**ATR**

New approaches to reduce training time, improve reliability, and provide an auditable methodology for continuous ATR improvement is highly desirable.

**Signal Separation/Adaptive Filtering**

There have been few advances in signal separation and adaptive filtering in the last twenty years. New threats have created an immediate need for a methodology capable of finding and characterizing signals at a super-human level. Using Fast Fourier Transforms (FFTs) to expand signal time data, Vy's SBMS technology can be used to fit Polynomials (MetaBéziers) to orderly parts of spectrogram signal data to eliminate virtually all noise and achieve super human performance. We call this technology "Project Jonesy" in honor of the "super-human" sonar operator in The Hunt for Red October.

## WHEN

**Contract Number:** N68335-20-F-0592 **Ending on:** November 5, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Collect Representative Sample of Real World Data	Low	At least 30 sub surface threat samples & several hours of whale calls and ship noise.	7	December 2020
Improve throughput and processing time	Low	Minimum 20X improvement; currently achieving greater than 50X	7	October 2021
QGIS Plug-in for Vectorized Geo-Referenced data	Low	Operational plug-in to create novel new data layers	7	September 2021
Package Software as a Scalable Docker Container	Low	Infinite scalability	8	March 2021
Sub Surface Mine Threat Model Demonstration	Med	Greater than 80% ROC	7	October 2021
Adaptive Filtering by Signal Domain Vectorization Demonstration	Med	Greater than 85% RCC	5	October 2021

## HOW

**Projected Business Model:** Vy's SaaS (Software as a Service) Platform is offered through the IBM Marketplace and others. Customers are charged based upon usage. Pricing is tied to the size of each image, volume, number of users, storage, and support calls. Subscriptions for larger computing blocks are available on a month to month and an annual basis. For customers requiring on site computing, Vy's Shape Based Modeling API (application programming interface) is available in a docker container packaged as a PaaS (Platform as a Service). We offer special projects works for customers requiring custom model development and consulting services. For larger customers, a project manager is assigned to the account to help meet the customer's current and future needs.

**Company Objectives:** Vy Corporation ("Vy", or the "Company") Vy is an artificial intelligence software company. The company has developed and patented a platform to vectorize and make decisions about "big data" imagery generated by satellite, video, sonar and radar, the platform is called Shape-Based Modeling Segmentation (SBMS). This allows for: Superhuman performance (novel new data streams), auditable and transparent decision-making. Faster, more reliable recognition and characterization. The platform uses mathematical models called Bézier curves and decision trees to vectorize visual and hyperspectral imagery and save it in an industry standard database (SQL). Vectorization turns related pixels into mathematical functions. Key competitive differentiators are the ability to query our novel vectorized image data using widely available tools like Python, as well as an ability to fuse our data with existing platforms and systems to make faster and more reliable decisions.

**Potential Commercial Applications:** Vy's SaaS platform optimizes image recognition for cost-effective customizable industry-agnostic data accumulation, analysis and reporting of real-time actionable information. Targeted commercial verticals include: satellite image analysis, insurance underwriting/claims, utility maintenance/inspection, agriculture/climate change, and life science/drug discovery. There is an increasing need for super human data analysis capabilities; Vy offers transformational vectorization technology for fully automated satellite image analysis with no training and up to 100 to 1 convergence efficiencies.

**Contact:** John T. Freyhof, CEO  
[john.freyhof@vycorporation.com](mailto:john.freyhof@vycorporation.com)

610-225-0498 Ext. 251

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is

unlimited.

ONR Approval #43-8627-21

Topic # N18A-T018

Protocol Feature Identification and Removal

P&J Robinson Corporation

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Total Platform Cyber Protection (TPCP) Innovative Naval Prototype (INP)

**Transition Target:** Endor Future Naval Capability (FNC) & Avalanche FNC. Additional transition opportunities with all Navy Government Off-The-Shelf (GOTS) and Commercial Off-The-Shelf (COTS) stand alone and enterprise software applications when security, efficiency and performance are key factors. Legacy systems are high value targets due to the difficulty in safely and effectively removing the features from the source code of the target protocol.

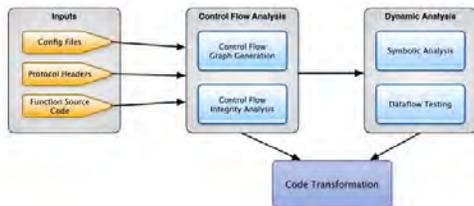
These protocol features that are not enabled in a configuration need to be identified as potential targets and be disabled or removed.

**TPOC:**

Dr. Dan Koller  
[daniel.koller1@navy.mil](mailto:daniel.koller1@navy.mil)

**Other transition opportunities:** FNC Avalanche

**Notes:** Artus is Latin for "compaction" or "to make smaller" ArtusProtocol is part of a suite of products to remove bloat and unwanted features from software and protocols.



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## WHAT

**Operational Need and Improvement:** The Navy extensively leverages and adopts communication protocols and standards developed for commercial and public sectors. These standard, feature-rich protocols are often implemented as a one-size-fits-all library and are generally deployed as a whole. It is extremely rare that an application or even a set of applications within the computing system requires and invokes the entire feature set supported by a standard protocol. In most deployments, many features are not needed and are never invoked by the application(s). However, these extraneous, unnecessary features are invoke-able by an external party and represent an attack surface and risks that need not be incurred. The Navy would like to acquire the capability for modifying standard protocols it deploys for reducing the attack surface and limiting the risk exposure to only that of the protocol features that are essential to its application(s).

**Specifications Required:** Support protocol features necessary for correct communication of Navy application(s) and nothing else. All other protocol features should be removed from the protocol code/library. The core functionality of the protocol remains intact. The resulting protocol is still compatible with an external party communicating via the standard protocol. Software toolset does not require access to source code. Consultation with original software developers not required.

**Technology Developed:** ArtusProtocol, a fully functioning software toolset for identifying and tagging protocol features, allowing end users to selectively remove unwanted features and their corresponding code.

**Warfighter Value:** Warfighter's rely upon the accuracy and availability of information. Compromised software and data can be adversely affect outcome and even cost lives. Removing unwanted features, dead code and Cyber Vulnerabilities and Exposures (CVEs) can reduce the available attack surface while improving the simplicity, reliability and efficacy of software systems used by warfighters.

## WHEN

**Contract Number:** N68335-19-C-0633 **Ending on:** August 19, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase II Base: Research & development to show development progress towards successful prototype demo.	Med	Verified the Protocol Feature Identification tool, to include the Source Code Mapping as well as the transformation of Source Code.	4	4th QTR FY21
Phase II Option: Generalize and mature tools (not awarded yet)	Low	Continuation of Feature Identification and Source Code Mapping, integrate and test functions. Generate Control-Flow Graph of Modified and/or Removed Features	5/6	2nd QTR FY22
Phase III: Transition to Navy Command (not awarded yet)	Med	Provide Beta version of tool for use by Navy personnel and refine product for integration with existing orchestration and deployment tools	9	2nd QTR FY24

## HOW

**Projected Business Model:** ArtusProtocol will be open source and PJR will offer a fully supported version and services to facilitate integration with customer Continuous Integration and Continuous Development (CI/CD) models. PJR plans to leverage current existing Navy customers/contracts as well as developing new customer relationships. PJR will also reach out to existing partnerships with Large Systems Integrators (LSIs) to deliver on major programs. Since the relocation of corporate headquarters (HQ) to Boerne, Texas we will be targeting the Army Futures Command in Austin, TX in developing a new customer relationship. PJR also plans to develop delivery partners to rebadge/resell software licenses, and support agreements to their commercial and Government customers. PJR plans to offer Artus Protocol licenses for sale or software as a service along with installation and configuration services to ensure customer success. Customers can purchase a license outright or hire PJR or a delivery partner to use Artus Protocol on new versions and releases of the software.

**Company Objectives:** Objectives for the FST event include: lead generation, competitive research and partner development. The longer term goals for the Artus Protocol is to continue to build the Artus product suite including the ArtusJava. Artus will help PJR grow through additional revenue generated by support agreements and services. Indirectly, PJR will benefit from the competitive differentiation and "street-cred" gained as customers adopt and deploy software and protocols transformed via Artus tools.

**Potential Commercial Applications:** PJR is building the "To The Power of 5" suite to optimize customer software and networks thus providing the cyber security so necessary in securing their assets. PJR will offer these software and protocol transformation tools to commercial customers special focus on healthcare industry as well as the critical infrastructure of municipalities and/or government-specifically the Supervisory Control and Data Acquisition (SCADA) systems.

**Contact:** Cindy McClister, Business Development Manager  
[cmclister@pjrcorp.com](mailto:cmclister@pjrcorp.com) 830-400-4133 ext 105

# Cyber

## (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
Secmation, LLC	N191-037	SecMUAS - Secure Modular Unmanned Aerial Systems	ONR
Great Lakes Sound & Vibration, Inc.	N191-023	Efficient 3-inch Acoustic Device Countermeasure (ADC) Depth Control System Technology	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8729-21

Topic # N191-037

SecMUAS - Secure Modular Unmanned Aerial Systems

Secmation, LLC

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Tactically Enabled Reconnaissance Node

**Transition Target:**

**TPOC:**

David Gonzalez  
[david.r.gonzalez@navy.mil](mailto:david.r.gonzalez@navy.mil)

**Other transition opportunities:**

SecMUAS is a modular robot development system which enables rapid development while "baking in" cybersecurity. It is designed to support small unmanned systems applications in multiple environments and to produce security documentation with traceability to expedite the path to security approvals. Groups and platforms such as PMS 406, PMA 231, XLUUV, LDUUV, Blue UAS, and other Unmanned Systems programs would benefit from this technology

**Notes:** Secmation, a leading small business in the fields of Cybersecurity R&D and Product Development, is on the Applied Research Associates (ARA) team awarded a \$18.8M four-year base contract to provide unmanned maritime systems support for the Naval Information Warfare Center, Pacific's (NIWC PAC) ISR Department.



U.S. Navy photo, VIRIN: 201019-N-LI768-1111P.JPG  
<https://www.defense.gov/observe/photo-gallery/igphoto/2002521585/>

## WHAT

**Operational Need and Improvement:** This is a need for rapid deployment and validation of novel flight control effectors and algorithms designed for the most challenging operations. A solution will serve as an integrated avionics backbone for UAVs with high-performance control systems, sensors and cyber-secure command and control.

**Specifications Required:** The backbone will consist of modular hardware and software components necessary for manufacturing autonomous vehicles. The hardware will utilize domestically sourced components, including central processing units (CPUs), data acquisition, and transceivers. The software stack will be designed around the hardware with modules to support a wide array of input/output types. The system will support standards for common communication protocols, including encryption layers for both communications and data storage. Anti-tamper features will be included. Computational capability will be extensible with Field Programmable Gate Array (FPGA) modules. Other modules will include analog to digital converters, digital to analogue converters, actuators, and sensors. An Integrated Development Environment (IDE) will tie all of the embedded software modules and hardware components together in a manner that will allow control algorithms to be graphically designed, simulated, and deployed to the target hardware.

**Technology Developed:** SecMUAS incorporates a US designed/manufactured Secure Control Unit with advanced security and performance features. SecMUAS provides a Configuration IDE providing a rapid unmanned system software development capability that automatically incorporates security features needed to implement security policy. SecMUAS also incorporates a library of validated UAS hardware/software components, an NSA certified communication system, and ground station, enabling full UAS system design and integration.

**Warfighter Value:** Future UAVs deployed with this backbone will benefit from a greatly improved security posture by eliminating existing vulnerabilities such as channels for spyware and malware. This approach is the first step in building a larger infrastructure for distributed maritime operations with organic security, networked sensors, communications, and intelligence, surveillance, and reconnaissance (ISR) capabilities.

## WHEN

**Contract Number:** N68335-21-C-0150 **Ending on:** July 1, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial SecMUAS Release	Low	Identification of early adopters and obtaining feedback to improve used experience	3	1st QTR FY22
Initial QuadCopter Flight Tests	Med	Initial flight tests of UAS designed using SecMUAS tools.	4	2nd QTR FY22
Second SecMUAS Release	Med	Ability of users to develop and build small UAS using the SecMUAS tools	5	3rd QTR FY22

## HOW

**Projected Business Model:** Secmation is a small business that provides engineering, technology, and tools to add information security to new and existing products. We specialize in emerging security applications that are not well served by traditional IT solutions.

Secmation's business model leverages investment from multiple, synergetic Government R&D programs to develop modular cybersecure unmanned systems. The Secmation's business model is to offer target customers a path to secure unmanned vehicle development regardless of the organization's security knowledge and/or maturity. Secmation will focus on Software/IP licensing, customization services, and annual maintenance contracts as revenue sources as it pertains to the various elements of the SecMUAS solution, both hardware and software.

**Company Objectives:** Secmation would like to meet with relevant points of contact at Program Offices and Primes to expedite technology transition and security approvals that enables new unmanned system capabilities be deployed for use by the warfighter while offering system developers plug & play secure design solutions for unmanned systems.

**Potential Commercial Applications:** SecMUAS offers commercial Cyber Physical Systems (CPS) the same level of security employed by the military with shorter development and security certification timelines. The SecMUAS tools are applicable to all types of cyber physical systems including but not limited to the following: undersea, surface, air, and space autonomous vehicles, IoT and Smart devices, and industrial control systems.

**Contact:** Dr. Hal Aldridge, CEO  
[Hal.Aldridge@secmation.com](mailto:Hal.Aldridge@secmation.com)

919-887-2560

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0400

Topic # N191-023

Efficient 3-inch Acoustic Device Countermeasure (ADC) Depth Control System Technology

Great Lakes Sound & Vibration, Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 415, Undersea Defensive Warfare Systems Program Office

**Transition Target:** MK2 Acoustic Device Countermeasures (ADC)

**TPOC:**  
(401)832-3838

**Other transition opportunities:** The MK3 and MK4 are other potential Navy applications. In addition small UUVs, acoustic decoys, and sonobuoys are other promising applications.

**Notes:** Our manufacturing plant is currently in production on several product lines for the US Navy LCS; the Multi-Mission Surface Combatant ship; the Joint Light Tactical Vehicle; and the Stryker armored vehicle, among others.



<https://media.defense.gov/2021/Mar/01/2002590804/-1/-1/0/190301-N-KC128-0072.JPG>

## WHAT

**Operational Need and Improvement:** Current 3-inch Mk 2 devices utilize an electric motor and a small, ducted propeller for depth control. The motor runs off the existing Eagle-Picher lithium aluminum/iron disulfide (LiAl/FeS<sub>2</sub>) thermal battery (EAP-12189), which also provides power to the acoustics of the device. Improved acoustic performance in terms of increased duration and increased acoustic sound pressure levels is needed to counter ever-improving adversarial torpedoes. Reducing, or eliminating, the need for the depth control system to require power from the battery would leave increased power for enhancement of the acoustic output or duration of the device. Available power for the depth control varies depending on the launch depth and the acoustic mode.

**Specifications Required:** The technical challenge in designing the selectable depth control system is fitting it within the existing volume of approximately 70 inch squared and making it robust enough to survive and operate following exposure to accelerations and forces experienced by the device when it gets launched out of the internal countermeasure launcher aboard all current U.S. Navy submarines, at potentially all submarine operational depths. The maximum Peak Device Acceleration (G's) that could be encountered is approximately 1/2 SINE Wave 120 g's for 30ms, and the maximum Hull Exit Velocity is 105 fps. By fitting it into the existing volume and surviving launch transients, the system could be utilized for both current and future devices.

**Technology Developed:** GLSV has developed a more efficient depth control system that conserves battery power for increased acoustic performance and/or operational range, is autonomous, and allows depth settings to be programmed prior to launch.

**Warfighter Value:** An efficient depth control mechanism capable of being implemented into both existing and future 3-inch diameter Acoustic Device Countermeasures (ADC) would allow for increased amount of power for improved (i.e., greater source level and/or longer duration) acoustic performance.

## WHEN

**Contract Number:** N68335-21-C-0033 **Ending on:** January 20, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial Prototype Build and Hydrodynamic Pressure and Shallow Water Controllability Testing	Low	Device ability to maintain target depth and maintain sealing during pressure testing	5	December 2021
Prototype Full Launch, Acoustic Directivity and Max Depth Testing (if Option I exercised)	Med	Device survivability and ability to maintain target depth	6	December 2022
Build and Delivery of 5 units to the Navy for Qualification Testing (if Option II exercised)	Med	Device delivery and successful qualification	7	December 2023

## HOW

**Projected Business Model:** GLSV Inc. is a small business established in 1996 to offer engineering services with a focus on noise and vibration. GLSV has since expanded our capabilities to offer complete turnkey solutions as a full-service engineering and manufacturing company with a strong background in defense, marine, automotive, off-highway, and recreational markets.

Our experience includes structural design and analysis of a launch handling and recovery crane, stern door and ramp design and analysis, and design and analysis of shipboard components to meet MIL-S901D shock requirements. GLSV performs preliminary concept design, prototype development, detailed design and analysis, integration, validation testing, and manufacturing services.

Currently our plan is to sell our technology to the prime contractor who produces and supplies the MK2 countermeasure to the Navy. They have committed to supporting us and we currently have them under subcontract to provide us with representative components that will go into our prototypes.

**Company Objectives:** GLSV would like to meet with those involved with NOAA and other ocean-monitoring deployed sensors in addition to Undersea Defensive Warfare Systems Program Office (PMS 415), Anti-Submarine Warfare Systems Program (PMA-264), Unmanned Maritime Systems Program Office (PMS 406), and other Navy program offices that may be able to utilize this technology.

**Potential Commercial Applications:** An example of a dual-use commercial application would be the launch of environmental measurement devices utilizing the efficient depth control system from Autonomous Undersea Vehicles (AUVs), or ships of opportunity, given the volume optimization of the launch mechanism.

**Contact:** Sam Hanson, CAE Engineer  
[SamH@glsv.com](mailto:SamH@glsv.com) (906) 482-7535

# Electronic Warfare (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
D'Angelo Technologies, LLC	N18A-T014	Advanced Ship-handling Simulators	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0422

Topic # N18A-T014

Advanced Ship-handling Simulators  
D'Angelo Technologies, LLC

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PEO Ships / PMS 339

**Transition Target:** PEO Ships

**TPOC:**  
(202)372-5861

**Other transition opportunities:**

**Notes:** A retired US Navy Captain testing out the Advanced Shiphandling Training Developments and an example of VR Shiphandling Training



Image courtesy of D5T 2021 and  
<https://media.defense.gov/2018/Jul/02/2002377702/-1/-1/0/180702-N-00443-0001.jpg>

## WHAT

**Operational Need and Improvement:** There is a need to create an automated, adaptive, real time coaching module for the purpose of accelerated instruction and improved positive transfer of learning for Surface Warfare Officers (SWOs). The current method of instruction relies on time consuming one-on-one instructor's visual observation of each student. Through the automation of the training and evaluation process SWOs will be afforded the opportunity to train more frequently and receive enhanced in-depth feedback to improve operations. D'Angelo Technologies is working to automate the evaluation and tutoring process to afford SWOs the opportunity to train without tying up an instructor. SWOs will be more skilled and competent handling ships and the frequency and risk of accidents during mission critical evaluations will be reduced.

**Specifications Required:** The Navy needs a training solution that develops open systems architecture software and algorithms to enhance the current Intelligent Tutoring System (ITS) for ship-handling simulators. This system needs to include adaptive coaching and an intuitive and easy to understand post evaluation in the form of an after action report.

**Technology Developed:** D5T created a suite of software in order to tackle the operational needs. These include:

- ConnFed: A data pipelining program that acts as the connection bridge between ITS software developed, D5T's Voice Commands Engine, and D5T's VShip Launcher
- Voice Commands Engine: A C#.NET app responsible for supporting all text to speech and speech to text functionality needed for the Ship Handler using the product
- VShip Launcher: A C#.NET app that provides a user friendly interface to interact with aforementioned D5T and VMASC software as well as GDIT's VShip software stack

**Warfighter Value:** This system will improve warfighter success. It will produce better trained Surface Warfare Officers who become more highly skilled and competent, it will improve mission success and it will reduce accidents due to improper or lack of training.

## WHEN

**Contract Number:** N68335-20-C-0321 **Ending on:** August 27, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop and Test Framework as a Component	Low	Framework functional when SME tests	3	February 2021
Implement Framework into System and Test	Low	Framework functions as a unit with COVE	4	March 2021
Incorporate Base Feedback and Optimize Framework	Low	System operates following optimization	4	May 2021
Expanded Algorithm Development and Integration	Low	SME positive testing feedback	4	October 2021
Initial integration of prototype framework at SWOS	Med	Integration, SWOS testing, positive feedback	5	February 2022
Transition and Delivery Plan	Low	Accepted transition and documentation	6	March 2023

## HOW

**Projected Business Model:** The algorithms developed will result in an autonomous agent that will integrate with the US Navy's COVE (Conning Officer Virtual Environment) and COVE-ITS (COVE-Intelligent Tutor System) to bring the user a more focused training simulation. Training programs in other fields will benefit from integrating an autonomous agent to help learning performance and skill development.

D5T envisions delivering the first product as a Navy specific training package tailored specifically to COVE. The first customer will be Surface Warfare Officers School. Additional customers include all Navy sites that implement COVE. The result of this effort are interactive training and gaming modules (including adaptive coaching, analysis, in-depth feedback) which can be used for any training application and gaming interfaces where participant interaction and simulation feedback is critical to the success of the exercise. D5T is the developer of this technology but will work with its commercial partner (GDIT) and the Navy to issue licenses and support contracts for continued implementation.

**Company Objectives:** Our ultimate goal is to integrate our work into the current SWO's training regimen by enhancing the Navy's ship-handling training simulators they already use. Removing instructor overhead during training of SWOs will translate into reduced time taken to produce a fleet of competent and qualified SWOs.

**Potential Commercial Applications:** The potential for commercial application would apply to advanced training systems for commercial industry. The marine, shipping, and cruise/tourism industries all utilize ship-handling simulators similar to the Navy's currently used technology, but also lack autonomous assessment capabilities. Reducing the need for instructors through improved system feedback is applicable to other Navy training environments as well.

**Contact:** Maurissa D'Angelo, CEO  
[maurissa@dangelotechnologies.com](mailto:maurissa@dangelotechnologies.com)

(216) 650-1552

# Human Systems (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
Intelligent Automation, Inc.	N193-A03-2	Training-Assessment-Feedback Loop to Empower the Information Warfighter	ONR
Li Creative Technologies, Inc. (LCT)	N182-133	Advanced Battlefield Communications System in Operations and Training	ONR
Skyward, Ltd.	N193-A01	Integration of Automatic Dependent Surveillance	NAVSEA

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8746-21

Topic # N193-A03-2

Training-Assessment-Feedback Loop to Empower the Information Warfighter  
Intelligent Automation, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Social Networks and Computational Social Science, Code 341

**Transition Target:** Identity Management (IdM)

**TPOC:**

Dr. Rebecca Goolsby  
[rebecca.goolsby@navy.mil](mailto:rebecca.goolsby@navy.mil)

**Other transition opportunities:** AFRC, CHINFO, Other DOD intel organizations

**Notes:** The publicly available information (PAI) environment has become a battlefield for adversaries of the United States and its allies.

Countering disinformation, propaganda, and social hysteria effects are top priorities across the Navy and Marine Corps, as these threats hinder mission effectiveness and jeopardize mission success.

Available information (PAI) is a rich source of data that can be mined for insights.

Analysts need powerful tools, analytic workflows, and realistic environments where they can practice with feedback to hone mission-critical skills.



U.S. Army photo,

[https://www.army.mil/article/169541/security\\_clearance\\_investigations\\_to](https://www.army.mil/article/169541/security_clearance_investigations_to)

## WHAT

**Operational Need and Improvement:** Analysts need to understand adversarial information operations in publicly available information (PAI); they need powerful tools to analyze the data; and they need to practice in a realistic environment to hone mission-critical skills.

**Specifications Required:** This project supports ONR's Project OMEN (Operational Mastery of the Information Environment) which aims to develop new workflows, concepts of operation, and technologies.

**Technology Developed:** This work embeds analytic and training capabilities in Scraawl® ([www.scraawl.com](http://www.scraawl.com)), a web-based COTS PAI tool that is currently in use by a number of DoN organizations (our initial transition targets). Advanced analytics and visualizations help analysts gain insights from the data. Web-based training modules and logging help train novices and document expert analytic workflows.

**Warfighter Value:** This technology will significantly improve analysts' ability to detect, track and ultimately counter adversarial information operations. This effort will help formalize information operations curriculum in a general way that can be applied to a wide range of strategies and support the training of a variety of analyst communities. In addition, the capabilities developed as part of effort will be integrated into tools already in use by the analyst community, enhancing their ability to combat adversarial information operations. The instructional modules, workflow trace features, and workflow templates will be packaged and sold as part of the Scraawl tool suite, which is currently in use by hundreds of analysts across the DOD.

## WHEN

**Contract Number:** N68335-20-F-0548 **Ending on:** October 25, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
New analytics & visualizations	Low	New features integrated into Scraawl and made available to active licensees	5	4th QTR FY21
Web-based lessons for Scraawl	Med	Lessons will enable analysts to use Scraawl tools effectively. Biggest source of risk is the dynamic nature of the information environment. Must keep lessons updated to reflect current IO strategies.	5	4th QTR FY21
Synthetic data for exercises	Med	Synthetic posts will be human-readable and mimic strategies of specific information actor types (e.g., news bots). Features of synthetic data must be detectable using Scraawl and other analytic tools.	4	4th QTR FY21
Logging of analyst workflows in Scraawl	Med	Analyst actions will be captured in sufficient detail as to document workflows and facilitate assessment of performance in exercises	4	1st QTR FY22

## HOW

**Projected Business Model:** IAI will continue its Scraawl license-subscription model with increased pricing for inclusion of new capabilities. IAI has successfully used this model over the past 5 years to transition new analytic tools to the operational community. IAI will also continue to deliver PAI training to government Scraawl customers.

**Company Objectives:** Our goal is to expand our presence in the PAI analysis market through new tool capabilities and analytic workflow training.

**Potential Commercial Applications:** Scraawl also has commercial customers, e.g., marketing professionals. This user community has very different workflows than the DoD PAI analysts, but they could also benefit from strategic workflow training.

**Contact:** Lisa Scott Holt, Ph.D., Director, Human Interaction and Performance  
[lholt@i-a-i.com](mailto:lholt@i-a-i.com) 301-294-5212

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-8628-21

Topic # N182-133

Advanced Battlefield Communications System in Operations and Training  
Li Creative Technologies, Inc. (LCT)

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** ONR

**Transition Target:** Manufacture the AI Headset for military use and/or license intellectual property (IP) to prime contractors (3M, Gentex) and leverage their distribution channels.

**TPOC:**

Dr. Kristy Hentchel  
[kristy.hentchel@navy.mil](mailto:kristy.hentchel@navy.mil)

**Other transition opportunities:**

Hearing protection market – first responders and workers in mining, oil fields, manufacturing, construction, and transportation who are routinely exposed to high noise levels.

**Notes:** AI Headset is enabled by artificial intelligence, to replace existing military headsets and to enhance situational awareness and hearing protection. The core technology has already in use commercially. LCT had two Phase III awards. Deliverables are in DoD/NGA daily operations.



U.S. Marine Image:

<https://www.marines.mil/Photos/igphoto/2001962773/igsearch/headset/>

## WHAT

**Operational Need and Improvement:** Warfighters rely on their hearing to detect, identify, and localize sound sources and thus potential threats. The DoD seeks new technologies to improve communications, localization, and auditory preservation for combat and training scenarios. To this end, LCT is developing a new AI Headset to enhance human hearing capability for situational awareness and provide better hearing protection.

**Specifications Required:** Enhanced hearing, artificial intelligence (AI) enabled situational awareness, digital signal processing (DSP) enabled noise cancellation > 30 dB; fit in existing helmet

**Technology Developed:** LCT invented a next-generation military headset based on AI and advanced DSP. LCT is designing and building the AI Headset with advanced technologies.

**Warfighter Value:** Warfighters' situational awareness and hearing protection will be significantly improved with the new technology. Warfighters will experience enhanced hearing, lower environment noise, easy to locate sound source and type, and clearer communication. Overall, warfighters' reaction time will be reduced, combat safety will be improved, and hearing will be better protected.

## WHEN

**Contract Number:** N68335-21-C-0198 **Ending on:** March 22, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hardware design	Low	PCB and enclosure are working	4	3rd QTR FY22
Algorithm research	Low	Algorithms are tested and satisfied with datasets	4	4th QTR FY22
Software development	Low	All developed software works with hardware	5	1st QTR FY23
Prototypes are ready	Low	AI Headsets pass LCT testing and are shipped to PM	6	2nd QTR FY23

## HOW

**Projected Business Model:** License IP to prime contractors that manufacture military headsets, or manufacture the AI Headset in house.

**Company Objectives:** Be the technology leader in electronic hearing protection devices. Design and manufacture leading-edge AI Headsets. Leverage all opportunities for commercialization, including marketing, sales, and recruiting more business partners.

**Potential Commercial Applications:** The AI Headset is intended to replace existing military headsets for all armed forces to reduce hearing loss and improve situational awareness and is compatible with standard military helmets. The new headset is also applicable to first responders and workers in high-noise industries, including mining, oil and gas, construction, and transportation. The global electronic hearing protection devices market was valued at US\$ 441.2 million in 2019 with a compound annual growth rate (CAGR) of 8.0% over the forecast period 2019-2027 (Source: Coherent Market Insights).

**Contact:** Peter Li, CEO  
[li@licreative.tech](mailto:li@licreative.tech)

1-973-822-0048

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0355

Topic # N193-A01

Integration of Automatic Dependent Surveillance

Skyward, Ltd.

## WHO

**SYSCOM:** NAVSEA

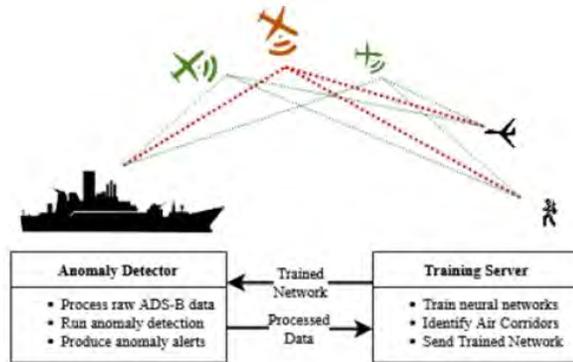
**Sponsoring Program:** Broad ranging topic related to AI/ML in support of the Navy Technology Acceleration Pilot, PEO IWS 6

**Transition Target:** Cooperative Engagement Capability (CEC)

**TPOC:**  
(202) 781-3014

**Other transition opportunities:** Battle Management Aid (BMA), Air Traffic Control in unimproved regions, AIS anomaly detection for watercraft anomaly detection, civil/military aviation integration

**Notes:** Anomaly detection in imagery has been demonstrated to the Air Force through another SBIR by identifying debris and potential unexploded ordnance in post-attack airfield scenarios.



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## WHAT

**Operational Need and Improvement:** Extracting patterns from Automatic Dependent Surveillance-Broadcast (ADS-B) data to identify air corridors and detect anomalous behavior could provide crucial information for both commercial and military applications. Advancements in machine learning (ML) allow for identification of complex patterns and adaptive anomaly detection. Since flight routing is constantly changing due to temporal variables such as weather, identifying air corridors and detecting anomalous aircraft behavior requires a live approach that takes into account such variables.

**Specifications Required:** The Navy seeks to develop models and algorithms through AI/ML processes to autonomously characterize behaviors of self-reporting aircraft using ADS-B data. The behavior models and data will be used to (1) identify apparent air corridors and (2) detect anomalous behavior in support of determining aircraft intent.

**Technology Developed:** To autonomously identify threats in a challenging and ever-changing airspace, Skyward has developed a system which includes hardware signal detectors with on-board processing and identification of anomalies based on trained algorithms, a training server which continuously gathers ADS-B data from detectors and updates the system as conditions change, Machine Learning (ML) algorithms which analyze the signal data and adapt to understand "normal" behavior in the airspace, and a Common Operating Picture (COP) to graphically display flight corridors and anomalous flights for review by the analyst or air traffic controller monitoring the airspace. Different from other ML algorithms which operate in a "black box" process, the Skyward system also offers explainability - descriptions of why particular flights have been identified as anomalous.

**Warfighter Value:** ML enables the system to understand a complex and changing environment with autonomous anomaly identification to identify trends and abnormalities which would be impossible for human observers. Autonomous identification of anomalies presented along with context of each anomaly allows those interacting with the system to understand the airspace faster and with better information. This will reduce workload and stress on air traffic control as they try to identify friend or foe.

## WHEN

**Contract Number:** N68335-20-F-0565 **Ending on:** November 1, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Feasibility Research of Anomaly and Corridor Detection of ADS-B Data	N/A	Assessment of feasibility, award of Phase II	3	April 2020
Successful ADS-B Flight and Global Anomaly Detection	Med	Detect 90% of anomalies in dataset	6	August 2021
Working scalable prototype COTS Anomaly Detector Unit	Low	Prototype successfully collects data and passes inspection testing	6	October 2021
ADS-B Anomaly Detection Training Server Software implemented locally and on DoD HPC	Low	Collect, store, and train on 12 months of data collected	6	October 2021
Integration into CEC program with prime contractor	Med	Successful integration into prime contractor's system with full-scale evaluation	8	December 2025

## HOW

**Projected Business Model:** Skyward's ADS-B anomaly detection will be integrated with the CEC program across several USN platforms. Phase III efforts with PEO IWS 6 will ensure successful integration within the CEC architecture. Skyward will license its AI/ML algorithms to the prime contractor for CEC, working closely to ensure successful integration with their systems. Skyward will also license the hardware designs as necessary to supplement the AI/ML algorithms for use within the CEC program. Additional uses in other areas such as the integration of civil and military aviation with the Air Force and FAA will be sought to apply the unique capability developed by Skyward to the global airspace.

**Company Objectives:** Skyward's objective is to improve the situational awareness of the U.S. military by continuously improving AI/ML techniques for use across all branches to improve the safety and survivability of people and their resources. Skyward intends to pursue DHS and USCG use as well to protect the borders of the U.S. for potential terrorist threats as well as drug and human trafficking.

**Potential Commercial Applications:** Skyward is seeking integration with existing air traffic control (ATC) systems such as En Route Automation Modernization (ERAM) and Standard Terminal Automation Replacement System (STARS) to improve the air traffic controller workload and speed of anomaly identification. The AI/ML algorithms are expected to assist ATC more quickly identify potential concerns in the air space and with more confidence improving the safety of air traffic and reducing the stress on controllers who are often over-burdened.

**Contact:** Jason Woodall, Director, Commercialization  
jwoodall@skywardltd.com 7405860178

# Sensors

## (Navy FST Booth: 5 April)



Company	Topic	Project Title	SYSCOM
Physical Sciences Inc.	AF08-T008	Shallow Water and Surf Zone Minehunting (MAD SWARM)	NAVSEA
Technology Service Corporation	AF141-253	LIFTS and ISR for Maritime Operations	NAVAIR

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2021-0461

Topic # AF08-T008

Shallow Water and Surf Zone Minehunting (MAD SWARM)

Physical Sciences Inc.

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PMS 495 Barracuda Program

**Transition Target:**

**TPOC:**

(202)781-1406

**Other transition opportunities:**

**Notes:** This image shows one MAD SWARM search member in flight. The on-board sensor processing and control payload is integrated with the PSI InstantEye™ small unmanned aerial system. The magnetic sensor is suspended below the vehicle to reduce magnetic noise interference from the vehicle motors. The payload communicates with other search member vehicles to plan and coordinate a fully-autonomous search of a designated region to map out metallic objects to detect and locate mines.



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## WHAT

**Operational Need and Improvement:** Decrease search time for naval mine-hunting activities in surf and beach zones, while keeping sailors remote from the contested territory. Aids the single sortie detect to engage mission.

**Specifications Required:** Detect and localize ferrous mine-like objects in very shallow water, surf zone, and beach zone. Deploy from an autonomous surface vessel, perform region search, and recover to launch craft without operator intervention or oversight.

**Technology Developed:** PSI has developed a magnetic anomaly detection (MAD) payload for use on its InstantEye™ small unmanned aerial system. Onboard search planning and multi-vehicle coordination software allow small teams of vehicles to search a defined region for ferrous objects, in shallow water and buried beneath sand. Real-time signal processing algorithms provide immediate indication of detected objects and allow search vehicles to coordinate and optimize the search and localization process.

**Warfighter Value:** Autonomous operation of the MAD SWARM capability from an unmanned surface vehicle would provide a safe and efficient stand-off mine search function for challenging surf and beach zone regions.

## WHEN

**Contract Number:** N68335-18-C-0278 **Ending on:** November 30, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Select small, sensitive COTS magnetometer sensor	N/A	Size, weight, power, noise level	3	October 2020
Coordinated multi-vehicle control	N/A	Reliable radio communications, robust control	3	May 2021
Integrate payload and sensor with InstantEye™ UAV	N/A	Stable flight, low magnetic interference	4	June 2021
Single-vehicle autonomous search and mapping	Med	Sensitivity, Detection range	4	September 2021
Multi-vehicle autonomous search and mapping	Med	Sensitivity, Detection range, Team efficiency	5	October 2021

## HOW

**Projected Business Model:** PSI currently manufactures the InstantEye™ unmanned air vehicle and numerous associated payload designs for military customers. The MAD SWARM capability will be introduced to this PSI product line as an additional payload option.

**Company Objectives:** PSI is seeking advocates and opportunities to fund further formal testing, demonstration, and validation of the MAD SWARM performance and end-user data products, as well as the development of additional capabilities including autonomous launch and recovery, collision avoidance, and host platform command & control integration.

**Potential Commercial Applications:**

**Contact:** James Glynn, Vice President, Corporate Initiatives  
glynn@psicorp.com (978) 738-8237

# Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR Public Release 2021-954

Topic # AF141-253

LIFTS and ISR for Maritime Operations  
Technology Service Corporation

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PEO U&W

**Transition Target:** MQ-8 Firescout

**TPOC:**

(301)757-2035

**Other transition opportunities:** MH-60R/S, V-22, TRUAS

**Notes:** LIFTS Precision Approach and Landing CONOP

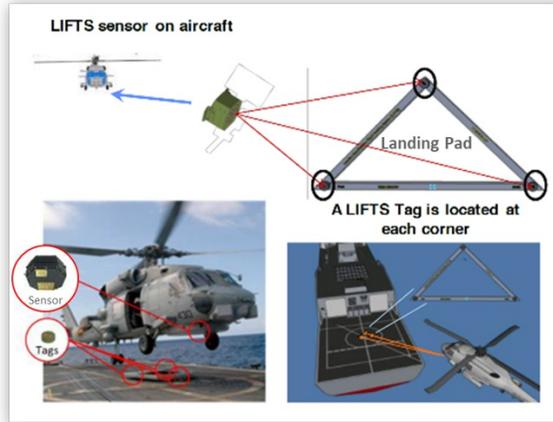


Image Courtesy of TSC 2021

## WHAT

**Operational Need and Improvement:** Autonomous landing of rotary wing UAS and helicopters in all weather conditions in A2AD environments.

**Specifications Required:** Enable autonomous and safe landing of rotary wing UAS and helicopters in all weather conditions in A2AD environments (including GPS denied and total EMCON) from at least 10 NM from landing zone.

**Technology Developed:** TSC developed LIFTS to provide a RF sensor solution for the Navy Air Warfare Center - Aircraft Division (NAWCAD) 4.3.2 Sea-Based Automated Landing and Recovery System (SALRS).

Cooperative radar interferometer and communications sensor system for Positioning, Navigation, and Timing (PNT) provides precision range and bearing measurements and establishes a datalink for communication. LIFTS uses frequency agnostic architecture and support for LPI/LPD waveforms and meets low-size, weight, and power (SWaP) software defined radio implementations.

**Warfighter Value:** LIFTS is a small SWaP sensor that can be mounted onto a manned or unmanned systems that communicates with small SWaP tags that can be placed on vessels or the ground. LIFTS uses RF and maintains performance in all environments including difficult maritime conditions, uses LPI/LPD waveforms with encryption to minimize EMCON and authenticate and protect the positioning information and requires no a priori knowledge of its location to correctly generate precision location information. This enables precision landing in a GPS denied and total EMCON environment, day night up to sea state 5. LIFTS development has been focused on aircraft, but is easily applicable to surface vessels

## WHEN

**Contract Number:** N68335-20-C-0334 **Ending on:** July 14, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Completed Prototype Hardware for Sensor and Tags	Low	Successfully demonstrated capability and measurement accuracy in a lab	4	September 2017
Completed Final Form Factor Prototype Demonstration	Low	Successfully performed outdoor testing and validated measurement accuracy	5	November 2017
Completed Successful Demonstration on small UAS	Med	Flight test with position data validation	5	May 2021
Integration and Demonstration on large UAS or Manned Platform	Med	Flight test with position data validation	5	February 2022
Integration and Demonstration with UAS Autopilot	Med	Demonstration of autonomous landing	6	June 2022

## HOW

**Projected Business Model:** TSC intends to offer LIFTS as a payload product that would be applicable to multiple platforms. The intent is to avoid custom or platform specific versions allowing flexible integration among many platforms.

RDTE and NRE requires to transition to production but when done so the target price is <\$100k for interrogator and <\$10k for tags. TSC has similar products in productions for these price ranges

**Company Objectives:** Provide payload products to support integration onto any UAS either directly to the government or through a system integrator.

**Potential Commercial Applications:** None.

**Contact:** Brandon Wolfson, CEO  
brandon.wolfson@tsc.com 703.251.6450

## Navy SBIR/STTR Transition Program Demo Day April 6, 2022



Four Navy-funded Technologies from Navy STP participants  
will be showcased from 9:15-11:30 on 6 April 2022

 **09:15-09:45**

### Augmented/Virtual Reality Data Architecture Methodology and Reference Platform

**Description:** This heads-up and hands-free headset leverages mixed reality to enable tele-maintenance among teams, from anywhere in the world. This technology is smartphone powered, ready for deployment, affordable, scalable, and saves personnel time, and cuts company downtime and travel expenses.

 **09:50-10:20**  
Imagine the Impact™

### OHIO Class External Hull Antifouling

**Description:** Boston Engineering is developing a semi-autonomous antifouling system to reduce maintenance costs and increase Operational Availability. The Maritime UltraViolet Antifouling (MUVA) system “cleans” submarine and ship hulls quickly and effectively without damaging hull coatings.

## Navy SBIR/STTR Transition Program Demo Day April 6, 2022



Four Navy-funded Technologies from Navy STP participants  
will be showcased from 9:15-11:30 on 6 April 2022



**10:25-10:55**

### Development and Validation of a Computational Tool for Missile Flight Through Rain

**Description:** Missiles may have limited flight envelope due to adverse weather and rain conditions. Our software enables the probability of failure of missile nose cones and seeker domes to be analyzed as a function of raindrop size, velocity of impact (including the slowing of drops in the shock wave), raindrop distortion in the shock wave, and angle of incidence. This capability can be used to optimize missiles to better withstand rain impact.



**11:00-1130**

### Training-Assessment-Feedback Loop to Empower the Information Warfighter

Scraawl TrndZ: Automated Discovery of Emerging Trends. Scraawl TrndZ® is a streaming collection and analysis dashboard that enables discovery of emerging trends in publicly available information (PAI). The big-data architecture, user-editable, searchable monitors, and real-time computation provide users with ready access to a detailed summary of large volumes of data (millions of posts). Scraawl TrndZ is interoperable with Scraawl SocL and Scraawl PixL for deeper analysis.

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