

Topic: N152-113

Scientific Solutions, Inc.

Multistatic Operationally Distributed Sonar System (MODSS) Capability Demonstration

Scientific Solutions, Inc (SSI) specializes in novel ocean acoustic technology servicing the U.S. Navy and other DoD components. Main product areas are acoustic monitoring for the protection of marine mammals, unwanted diver and unmanned vehicle detection (SDSN and MODSS) and senior level project management for various aspects at test and evaluation ranges. Marine mammal detection systems are currently deployed and the diver/UUV system is targeted to become a component of the Navy's Electronic Harbor Security System(EHSS). SSI's state-of-the-art, unique design and distributed system for detection is patent protected. Additionally, proprietary multistatic algorithms and unique modeling processes will reduce risk and provide greater confidence that the potential threat is not just another false alert. It is our vision that the NAVFAC Fleet Force Protection Ashore will integrate our system into their harbor protection systems.

**Technology Category Alignment:**

Synthesis/Analytics/Decision Tools

Acoustic, Seismic and Magnetic

Undersea Weapons

Frameworks for Interoperability

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**SYSCOM:** ONR

**Contract:** N68335-17-C-0131

# Department of the Navy SBIR/STTR Transition Program

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ONR Approval #43-4388-18

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## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Strategic Systems Program (SSP) Nuclear Weapons Security WQX-2 POR ACAT III

**Transition Target:** SSP, SPAWAR Pacific-Electronic Harbor Security Systems, NAVFAC

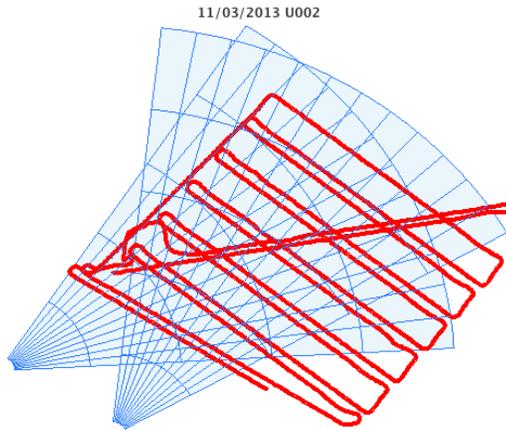
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**Other transition opportunities:**

SPAWAR Pacific- Electronic Harbor Security Systems, USCENTCOM Science & Technology (RDT&E), DoD Emerging Capability & Prototyping-Rapid Reaction Technology Office (RRTO), DHS, Oil & Gas Industries, Commercial Harbor Defense.

**Notes:** MODSS is a further development of the Swimmer Detection Sonar Network (SDSN). SDSN is a patented system using numerous unique signals to provide unwanted diver detection. Due to Scientific Solutions, Inc.'s experience in the detection of marine mammals, diver detection was the next logical advancement of our efforts. The diagram illustrates the detection tracks of a UUV over the system test area during a 2013 experiment at the relevant location.



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## WHAT

**Operational Need and Improvement:** New or improved sensing concepts and technologies are needed to better recognize the presence of Unmanned Undersea Vehicles (UUVs) operating in ports and harbors, particularly in the proximity of U.S. Navy ships and submarines. The maturity and proliferation of UUVs throughout the world is presenting an emerging challenge for force protection in harbor environments. Current strategies for detecting and classifying UUVs employ systems that were originally designed to detect combat swimmers and scuba divers. A number of these systems have demonstrated some capability against UUV targets that were presented in a controlled research environment, but the typical warning ranges do not provide a completely satisfactory response window. It is envisioned that multi-modal layered approach has the potential to significantly increase the average response window available to counter UUV approaches to U.S. Navy assets.

**Specifications Required:** Design considerations include an objective standoff distance and a false alarm tolerance. The improved sensing technology will be integrated into the over-arching asset protection infrastructure. Produce UUV sensor prototype hardware along with a concept of operations. Demonstrate and validate the performance of the UUV sensor developmental system against specified targets in a relevant environment.

**Technology Developed:** The MODSS development will work in conjunction with the U.S. Navy's legacy system to better improve detection and reduce false alerts. With the creation of real-time baseline multi-static UUV and diver detection, MODSS will be an enhanced and more robust Detection, Classification, Localization, and Tracking (DCLT) system. Ultimately we will validate the MODSS simulator development under DASD EC&P/RRTO funding to use confidently as a design tool.

**Warfighter Value:** Greater protection of the harbor environment where the warfighter works and lives and where there are critical assets, a more reliable system, that has better DCLT capabilities, reduced false alerts, the warfighter will have a much greater degree of confidence when the system does signal an event.

## WHEN

**Contract Number:** N68335-17-C-0131 **Ending on:** April 30, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Multi-static Algorithm Development	Low	Historical data extraction meets expectations	4	1st QTR FY19
Environmental Data Collection	Low	Collection of on-site ocean environmental data	4	2nd QTR FY19
Hardware Assurance Testing	Med	Long-term burn-in without failure.	4	2nd QTR FY19
Integration of software with ARL/UT	Med	Mutual Cooperation	4	1st QTR FY19
In-lab validation	Med	Expected data matches modeling	6	2nd QTR FY19
In-situ Operational Leave Behind	High	System detecting and tracking with reduced false alert rate	7	3rd QTR FY19

## HOW

**Projected Business Model:** SSI's plans for the MODSS program will be to integrate our system into the Navy's overall EHSS program. We view this as a component of the overall EHSS system leading to the enhancement of underwater defense techniques. We anticipate the threat of UUV use by our adversaries to become greater as time moves forward. Should the threat level elevate, we anticipate the use of the system to be expanded to a greater number of naval facilities. The methodologies behind MODSS should be of interest to Prime Contractors. When the system is validated, the principles used in the harbor environment should provide better fidelity to deeper ocean scenarios.

**Company Objectives:** SSI hopes to generate interest in the MODSS program from a number of prime contractors who participate in the areas of harbor defense. We also hope to attract a much greater bandwidth of attention beyond the navy components we are now working with. The acceptance of the system by NAVFAC and by SSP would help to secure funding to further develop and validate the system. While there has not been an event to date, should there be a UUV or diver attack, it is important to gain this support and to have a system developed in the U.S. which is ready to be placed into service at a moment's notice.

**Potential Commercial Applications:** With enhanced tracking, detection, localization, and classification capabilities, MODSS could be used in numerous applications. Marine mammal research which is needed during oil and gas exploration and removal of offshore structures. Alternative energy sources like tidal turbines may need marine mammal detection work or protection from unwanted sources. Commercial ports and harbors are vulnerable as well. DHS should be aware of the system as should the nuclear power industry to enhance safety near intakes at their facilities. A deployable system could be used by the commercial shipping and also by the U.S. Navy when in ports or in stationary positions.

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