

Topic: N141-014

Area I, Inc.

Integration of ALTIUS-ASW Avionics Architecture into USVs Enabling Heterogeneous Manned-Unmanned Teaming (MUM-T)

Area-I is a pioneer of advanced solutions for autonomous systems through the design, integration, and testing of unmanned platforms and their control systems. A key facet of these systems is the Maestro autopilot and avionics architecture which enables custom control schemes for advanced guidance, navigation and control and Manned-Unmanned Teaming (MUM-T) mission capabilities. The Maestro hardware and software has been developed by Area-I from the ground up, allowing complete control and customization of the system functionality to the customer's needs. This effort leverages Maestro's proven performance record onboard aerial systems to enable advanced mission capabilities of unmanned surface vehicles (USV) in autonomous port patrol, mine countermeasures, and anti-submarine warfare. The ultimate goal is to transition the technology onto a program of record.

### Technology Category Alignment:

Fixed Wing Vehicles (includes UAS)

Human/Autonomous System Interaction and Collaboration

Scalable Teaming of Autonomous Systems

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**SYSCOM:** NAVAIR

**Contract:** N68335-18-C-0004

Department of the Navy SBIR/STTR Transition Program

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Integration of ALTIUS-ASW Avionics Architecture into USVs Enabling Heterogeneous  
Manned-Unmanned Teaming (MUM-T)  
Area I, Inc.

WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** NAVAIR,  
ONR, PMS-408

**Transition Target:** Transition to US  
Fleet Forces Command as an  
engineering change/product  
improvement outfitted to globally  
dispersed Expeditionary MCM  
Companies under the Navy  
Expeditionary Combat Command  
(NECC), US Coast Guard, and  
Department of Homeland Security

**TPOC:**  
(301)342-2094

**Other transition opportunities:** Field-  
able prototypes to remain in 5th Fleet  
AOR with User Operational Evaluation  
System (UOES) and/or other  
designated area  
Proof-of-Principle for NAVAIR/DON  
SBIR  
Components are already on GSA  
schedule



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WHAT

**Operational Need and Improvement:** Area-I is developing technology to expand on the collaborative multi-agent autonomy capabilities of the U.S. Navy's Fleet protection infrastructure by expanding the family of unmanned systems able to maximize the probability of detection of enemy systems and to provide the means to eliminate the threat using the manned-unmanned teaming (MUM-T) framework. This work will aim to improve current capabilities to target and eliminate a detected threat through the integration of Area-I's Maestro architecture to various Unmanned Surface Vehicles (USV) platforms. Maestro enabled unmanned systems will reduce mission manning/materiel, improve relevant and timely target information transfer, reduce mission time for single and multiple sorties, improve mission monitoring and control, and asset loss mitigation.

**Specifications Required:** Include line of sight and over the horizon command and control capability. Incorporate onboard autonomy system developed for UAS for autonomous networking. Integrate sensors for threat detection, situational awareness, and Intelligence, Surveillance and Reconnaissance (ISR). Be capable of providing Automatic Target Recognition (ATR) contacts from embedded systems on the USVs. It will also carry means for line of sight and over the horizon retransmission of the contacts.

**Technology Developed:** Autopilot capable of USV navigation in Sea State 3 especially at slow speeds indicative of a station-keeping mission. Integration of Area-I's Resource allocation for Multi-Agent Planning (ReMAP) into port security, mine countermeasures, and anti-submarine missions to enhance single and multi-agent mission capability. Maestro system architecture complete with sensor integration and retransmission to manned operators at an increased standoff distance.

**Warfighter Value:** Allows commanders to react to information and adjust the ongoing mission(s) in-stride - significantly earlier than is currently possible. This capability will greatly reduce the security decision and reactionary timeline and address a top priority Fleet and DHS capability request. Allows operations outside the current force protection bubble required for manned systems.

WHEN Contract Number: N68335-18-C-0004 Ending on: January 31, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial Surrogate USV CST	Low	Lake testing of control algorithms	5	June 2018
Initial Maestro integration and ocean evaluation on mission relevant platform	Med	Capable of tracking user defined waypoints in an ocean environment	6	July 2018
Integration of decoupled autopilot on surrogate USV	Low	Interfaces on generic USV and tracks wpts at mission speeds	6	September 2018
Decoupled autopilot integration and ocean evaluation on mission relevant platform	Low	USV tracks user defined waypoints on open water	6	October 2018
ReMAP evaluation on operational relevant mission	Med	USV performs ReMAP maritime missions on open water	6	December 2018
Combined systems test on port security platform	High	Integrates platform subsystems over mission capable datalinks	7	January 2019

HOW

**Projected Business Model:** Area-I intends to sell the Maestro hardware and software as a complete unit to the Prime contractor with initial integration support. Area-I currently houses the capability of low-rate production for hardware at a rate of 100 units per year and could scale to 1000 units per year over the course of 6 months.

**Company Objectives:** Design and manufacture at quantity a tailored Maestro hardware stack onto existing Fleet USVs to support MUM-T missions as part of the Fleet protection infrastructure. The ultimate goal is to transition the technology onto a program of record and enable an integrated network of sensor platforms for enhanced Fleet protection.

**Potential Commercial Applications:** The Maestro hardware and software has been developed by Area-I from the ground up, allowing complete control and customization of the system functionality to the customer's needs. This effort leverages Maestro's proven performance record onboard aerial systems to enable advanced mission capabilities of USVs in autonomous port patrol, mine countermeasures, and anti-submarine warfare. Furthermore, this application will enable a framework for heterogeneous mission teaming of unmanned aerial vehicles, USVs, and unmanned underwater vehicles.

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