Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.

Topic # N131-036 Automated Generation of Electronic Warfare Libraries Lakota Technical Solutions, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 2.0 Above Water Sensors

Transition Target: The primary Navy application is the NAVSEA Surface Electronic Warfare (EW) Improvement Program (SEWIP) Block II

TPOC: (812) 854-4804

Other transition opportunities: -AN/BLQ-10 Submarine Electronic Warfare Support System - Surface Electronic Warfare (EW) Improvement Program (SEWIP) Block III - Raytheon Space and Airborne

Systems (SAS) EW systems



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WHAT

Operational Need and Improvement: Electronic Warfare (EW) systems detect Radio Frequency (RF) emissions and classify them based on EW reference libraries. Subject Matter Experts (SME) are employed to 'tune' (aka colorize) reference libraries to improve threat classification accuracy. There is a need to automate this process to the greatest extent possible to reduce current and labor intensive costly manual processes in order to optimize the accuracy of the overall classification process. Through improvement of the classification processes, HELO will ultimately help to improve ship self-defense against an ever evolving set of anti-ship missiles.

Specifications Required: Lakota Technical Solutions' objective is to develop technologies that automate the creation of Electronic Warfare (EW) emitter libraries that ultimately result in processes that correctly identify and classify threat candidates. The development of this EW toolset provides the Navy with automated processes to efficiently and correctly map RF sensor data into the tactical EW systems as part of the ship's overall self-defense process.

Technology Developed: Hierarchical Emitter Library Optimization (HELO) automatically generates an EW reference library in order to optimize the classifying process. HELO mimics the SME's process in creating the EW reference library, but through its automated processes is able to explore a wide range of potential solutions. Future baselines of the software will incorporate Meteorology and Oceanography (METOC) feeds, leverage regional intelligence information updates and commanders' perspective to adapt EW reference library in a near real-time process for optimal responsiveness of the threat classification portion of the ship self-defense processes.

Warfighter Value: HELO enables the classification system to exceed current classification accuracy requirements to a targeted ratio of correct classifications to total classification decisions of 90 percent. HELO achieves these accuracies and reduces optimized tactical EW reference library creation times by a factor of 100. HELO improves USN platform survivability by providing agile, cost-efficient, and repeatable processes to automate emitter library generation, effectively decreasing the warfighter's detect-to-engage timeline by improving accuracy of the EW threat classification process.

HOW

Projected Business Model: HELO will initially be delivered as a tool suite to the Navy to augment/replace the manually intensive process of 'Colorizing' the EW Reference Library. Lakota's business model anticipates follow-on maintenance contracts to provide customer support/training and product upgrades for this tool suite. Once the initial software baseline has been validated within the SEWIP environment, Lakota plans future iterations of the software to be developed to update the reference libraries in near real-time by incorporating METOC data feeds, regional intel data and commanders perspective regarding rules of engagement and asset availability as part of the overall Electronic Warfare Battle Management processes in use.

Company Objectives: Lakota was founded to provide innovative solutions to the complex problems associated with maintaining US military's information dominance on the battlefield.

Potential Commercial Applications: If the HELO tool is enhanced and able to work in the near realtime arena to make use of METOC and regional intel data, Lakota will have the ability to deliver the capability to Prime contractors associated with SEWIP and other electronic warfare battle management systems. HELO's open architecture allows for easy integration into those programs such as the Air Force's Next Generation Jammer and EW Battle Management.

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Milestone Risk Level Measure of Success Ending TRL Date Classification Low Achieve Classification Accuracy of the subscription of the subscription of the subscripticon of the

Classification Performance	Low	Achieve Classification Accuracy of greater than 0.90 (T)/0.95 (O), which is the ratio of correct classifications to total classification decisions.	6	November 2016
Solution Convergence Time	Med	Reduces time to create an optimized tactical EW reference library (including operator and algorithm processing) by 100x (T)/1,000x (O)	6	November 2016
Computational Scalability	Med	The algorithm run time scales as $O(Nm)$ and $O(Ts)$; where N is the # of emitters in the EW reference library, T is the # of truth-labeled classifier inputs, m < 3, and s < 2	6	November 2016

WHEN Contract Number: N00024-15-C-4016 Ending on: March 30, 2017