

Department of the Navy SBIR/STTR Transition Program

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NAVSEA ##2021-0366

Topic # N093-192

Real-time Decision Aid for Enhancing Ship's Self-defense

ASSETT, Incorporated

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 425

Transition Target: Submarine Combat System

TPOC:

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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.

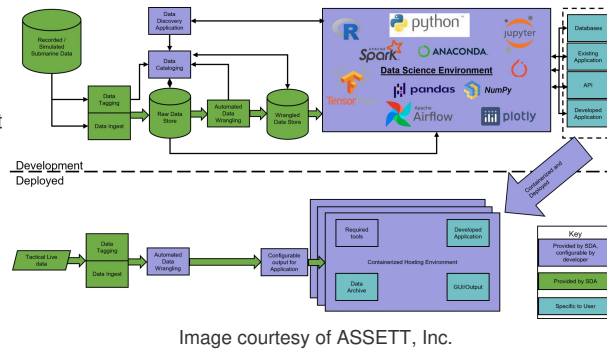


Image courtesy of ASSETT, Inc.

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.

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