

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2021-0436

Topic # N181-031

AEGIS Combat System Optimization through Advanced Modeling of Software-Only Changes
OptTek Systems, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 1.0

Transition Target: AEGIS Weapon System's Combat System Test Bed

TPOC:

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Other transition opportunities: Other PEO IWS combat system development program offices such as the Littoral Combat Ship (LCS) - IWS 8.0, other Navy simulation test beds, or any DoD organizations that use modeling and simulation (M&S) for system design, engineering, and evaluation.

Notes: OptTek's industry-leading simulation optimization software technology integrates with existing simulations to quickly determine the system configurations that produce the best possible outcomes for the system or scenario being simulated. Therefore, it is ideal for M&S environments that are used for system design, tradespace assessments, and test and evaluation. This technology is integrated and verified with multiple DoD simulations and a version of the technology is also already in use commercially.



Missile Defense Agency photo, <https://www.defense.gov/observe/photo-gallery/igphoto/2002027343/>

WHAT

Operational Need and Improvement: Develop modeling and analysis software to optimize software-only changes in the Anti-Air Warfare (AAW) system design to address Anti-Ship Cruise Missile threats. Tweaks in AEGIS Combat System (ACS) design can provide quick software-only fixes that provide large gains in overall AEGIS performance. Current processes involve human-driven engineering analysis to determine the best options for inserting new upgrades or system improvements; however, this process is manual, labor intensive, and has inputs from disconnected sources slowing the timeline associated with analysis and decisions for software insertions. The Navy seeks to automate current processes and make them more data-driven to field capability more quickly, make the most optimal improvements to AAW within the capabilities of current weapons, and provide integrated data analysis to better integrate and ensure performance of future weapons.

Specifications Required: A software tool that integrates outputs of current and future models and uses goal-seeking behaviors to improve recommendations for software-only optimization of the AAW capability within the ACS. It will integrate with the AEGIS Combat System Test Bed (CSTB) to facilitate system evaluation against more advanced and prolific threats. This tool shall allow for small tweaks to current design parameters so rapid prototyping of AEGIS design and software upgrade recommendations can occur within days (currently takes weeks or months). Design parameters affecting performance metrics should be integrated within the tool to establish a direct link between software design modifications and system performance. The tool will need to run many simultaneous simulations and use that data to recommend optimized changes to software parameters for AAW design to improve performance metrics.

Technology Developed: Developed state-of-the-art simulation optimization algorithms and analysis software that integrates with the CSTB to optimize software-only changes in the AAW system.

Warfighter Value: This technology enables computer-aided optimization of AEGIS design and provides better capability from current designs, saving lifecycle costs for AEGIS in the future. This software allows ACS analysts to perform rapid analyses with better performance, design, and verification & validation results enabling the Navy to improve its developmental and operational test & evaluation capability and field new operational capabilities at a pace that counters the advancing technology of adversaries.

WHEN

Contract Number: N68335-19-C-0600 **Ending on:** August 6, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Simulation optimization software integration with Testable Component Environment (TCE)	N/A	Successful test and demonstration with TCE in Navy M&S environment.	5	July 2020
Simulation optimization software integration with CSTB Run Time Infrastructure (RTI)	N/A	Successful test and demonstration with CSTB RTI in Navy M&S environment.	6	June 2021
Simulation optimization software integration with CSTB high-performance computing (HPC) resources	Low	Successful test and demonstration with CSTB HPC in Navy M&S environment.	8	July 2022
Use simulation optimization software to evaluate a Navy-directed operational scenario	Low	Demonstrate optimization with 10 or more systems inputs to improve Anti-Air Warfare system effectiveness by 10% for a specified metric. Decrease time to complete analysis by 20%.	9	March 2023

HOW

Projected Business Model: This technology is a direct development for the Government. As such, OptTek will provide the developed state-of-the-art simulation optimization software to the Navy and supporting contractors without licensing costs to include a specifically negotiated license for our OptQuest commercial software, which is our core optimization algorithms technology. Beyond Phase II, OptTek intends to develop new integration software and maintain, support, and enhance the delivered software to support AEGIS and other Navy or contractor modeling and simulation tools.

Company Objectives: Computer simulation models are used widely in the government and private sectors to perform descriptive, diagnostic, and predictive analysis; however, these simulation models are rarely exploited to provide the prescriptive analysis that is possible using our developed technology. Therefore, our Forum for SBIR/STTR Transition (FST) objective is to meet and engage with Navy and prime contractor champions of modeling, simulation, and analysis. Our primary goal more broadly is to improve modeling, simulation, and analysis for government departments and agencies as well as private-sector corporations and companies that use large-scale constructive computer simulation models.

Potential Commercial Applications: In the commercial sphere, modeling and simulation is heavily used by organizations involved in manufacturing, energy, transportation, logistics, and health care. Industries like these could use this technology to find the best ways to configure and employ their existing resources to enhance the performance of their systems, products, and services. Using our developed technology would allow these organizations to get the most out of their current resources without the need for new capital expenditures. This technology is immediately transferable and available through a software license purchase agreement that includes maintenance and support options.

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