

Topic: N171-049

Innovative Defense Technologies

Cyber Resiliency via Virtualization for Combat Systems

Virtualization has the potential to increase cyber resiliency for Navy combat systems by providing flexible system configurations that can adapt to degraded performance conditions. Vendor and combat system agnostic virtual resource management and performance analysis tools are necessary to reach this potential. Innovative Defense Technologies (IDT) designs, develops and delivers solutions that enable the rapid delivery of warfare capabilities for the DOD. A sustained competitive advantage is achieved through vendor-agnostic management of virtual resources and reliable, real-time performance assessment capability that is normalized on system events, configurable to any combat system. This technology will be applied to AEGIS and SSDS to validate the innovation by 2021, available for transition to government and contractors desiring to leverage virtualization for increased cyber resiliency.

Technology Category Alignment:

Human Computer Interfaces (HCI) for Decision Making

Assuring Effective Missions

System Interfaces & Cognitive Processes

Modeling, Simulation & Test Infrastructure

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SYSCOM: NAVSEA

Contract: N68335-19-C-0149



Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0149



Tech Talk: <https://atsi.adobeconnect.com/pmoraagrx7zz/>

Department of the Navy SBIR/STTR Transition Program

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WHO

SYSCOM: NAVSEA

Sponsoring Program: Program Executive Office Integrated Warfare System (PEO IWS) 1.0 – AEGIS Combat System; PEO IWS 10.0 - Ship Self Defense Systems (SSDS)

Transition Target: Future Aegis Combat System leveraging Virtualization BL (FY23+)

TPOC:

Other transition opportunities:

Complex sensor-shooter programs: Examples include Ship Self Defense Systems (SSDS), Army Integrated Air & Missile Defense (IAMD), Terminal High Altitude Area Defense (THAAD), Ground Based Midcourse Defense (GMD), etc.

Notes: IDT supported the successful live-fire from the AEGIS Virtual Twin in March 2019 and continues to push how virtualization can be used tactically on-board a combat ship. In future AEGIS baselines, the need to efficiently manage the virtual builds and rotate the system under test in the virtualized environment will be required.



USS John Paul Jones (DDG 53) launches a Standard Missile (SM) 2 during a live-fire test of the ship's Aegis weapons system on Feb. 8, 2014. US Navy Photo

WHAT

Operational Need and Improvement: Cyber resiliency, which enables a system to combat or fight through a cyber-attack, is essential in today's cyber environment. It is paramount that systems have the ability to protect, detect, react and restore themselves after a cyber-attack, or accidental or malicious events. In computing, virtualization refers to techniques that abstract hardware from software and create virtual instantiations of systems, hardware, storage, or networks that operate independently. Use of virtualization to implement cyber resiliency capabilities can help manage a cyber-attack and will be a new capability for AEGIS and SSDS.

Specifications Required: Virtualized Combat System Resources. The solution assumes no changes are required to existing builds and therefore able to deliver this capability directly to the Navy, as an integrated software product, provided IDT has access to the certified build of the Navy or DoD system.

Technology Developed: Helms Wheel software, with Real-Time Risk Assessment (RRA) and Revolving Defense Attack Surface (RDAS) software components, integrated for Aegis and SSDS.

Warfighter Value: Improved cyber resiliency minimizes the time spent recovering and restoring the system from a cyber-attack and maximizing the time spent with full mission capabilities. Through distributed allocation, the ability to operate the system from different physical or logical locations reduced the impact of system degradation at any one location. Maturing this capability onboard a ship will maximize the potential for tactical use and improved cyber resiliency once combat ships are being deployed with builds run on a virtualized platform.

WHEN

Contract Number: N68335-19-C-0149

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Component proof of concept for RRA and RDAS	N/A	Design, use cases, and requirements reviewed for RRA and RDAS	3	January 2019
RDAS and RRA component validation in a lab environment	N/A	RRA: Access to VM health and status reported across hypervisors throughout rotation RDAS: "hot swap" of hyper-visors without system downtime	4	June 2019
RDAS and RRA component validation in a relevant environment	Low	RRA: Access to AEGIS VM health and status reported across hypervisors throughout rotation RDAS: "hot swap" of hypervisors without AWS system downtime	5	March 2020
Helm's Wheel prototype validation on AWS	Low	Perform system\subsystem operational mode rotation; completes within minutes; confirm mission capability Turn-key virtualized system performs with increased resiliency across each	6	November 2020

HOW

Projected Business Model: IDT intends to offer the Helm's Wheel capability as a software license deliverable with associated customized services in order to integrate this system resiliency capability with the target mission critical system. The primary source of revenue for Helm's Wheel will be in the associated services where the software will be offered royalty free to the government, and for a fee to industry. IDT also expects to receive development funding from specific customer sin order to add additional features to Helm's Wheel.

Company Objectives: IDT is interested in partnering with other DoD programs that have mission critical systems of systems such as combat systems, mission control systems, and fire control systems. IDT will initially be transitioning Helms' Wheel to NAVSEA IWS 1.0 Aegis, and NAVSEA IWS 10.0 SSDS, and would like to speak with other SYSCOM's programs as part of the STP program and FST event to identify additional opportunities for transition.

Potential Commercial Applications: Helm's Wheel is ideal for mission critical systems that reside on limited and/or sensitive infrastructure, where resiliency is needed. This includes power grid, oil & gas, transportation, material shipping shipping, and commercial space markets.

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