TOPIC NUMBER:	SBIR INVESTMENT:	PHASE III FUNDING:
AF21A-TCS01	$796,577	$43,277,993

MACHINE LEARNING FOR LAUNCH ASSURANCE

Defense Unicorns developed an advanced air-gap software delivery tool to support sustainment and logistics for Navy submarines.

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THE CHALLENGE

As the Navy prepares to deploy the Columbia-class ballistic missile submarines (SSBNs),the DoD has a requirement to create and maintain a cyber secure, infrastructure agnostic, and air gap capable development, security and operations (DevSecOps) solution to facilitate their maintenance and sustainment. Air-gap software delivery—software delivered to a system that is completely or intermittently disconnected from the internet—is standard for Navy submarines but it complicates the timely delivery and installation of software updates. To address this need, Project Blue, a Navy innovation effort focused on digital transformation and design to support submarine sustainment and logistics, sought an air-gap software delivery tool to efficiently deploy cloud-based containerized applications for submarines.

THE TECHNOLOGY

Defense Unicorns developed Zarf, an advanced air-gap software delivery tool that improves on existing open-source solutions. Zarf simplifies the delivery of software by packaging the necessary internet files and dependencies an application requires to function. These packaged resources are made available in the disconnected, air-gapped environment, enabling the deployment of modern cloud-based capabilities without the need for internet access. Zarf also automates the software installation process, reducing the time and expertise required for submarine crews to complete software updates. Zarf forms one component of the Unicorn Delivery Service (UDS) software and updates delivery system deployed by the Navy.

THE TRANSITION

Defense Unicorns received an STTR Phase I contract from the Air Force to develop a secure continuous delivery capability for artificial intelligence/machine learning (AI/ML) tools to support launch assurance for national space missions. During the Phase I, in collaboration with the Air Force, Defense Unicorns partnered with the Naval Postgraduate School to conduct a feasibility study of

Zarf's effectiveness for submarine applications. With Phase II funding, Defense Unicorns adapted the technology to deploy defensive cyber capabilities for an Air Force customer. The success of these efforts led to multiple Phase III awards from the Navy, Army, Air Force and Space Force. Additionally, Defense Unicorns secured a General Services Administration (GSA) contract with a $300 million award ceiling, enabling the Navy, Air Force and Army to place orders for Zarf.

THE NAVAL BENEFIT

UDS, including Zarf, streamlines the delivery of cloud-based software applications to air-gapped systems. The tool enables efficient installation of software updates for submarines, supporting the sustainment of consistent software baselines across the lifetime of the Columbia-class submarine program. It will improve the mission-oriented suite of DevSecOps capabilities designed by Project Blue to support the SSBN mission. The tool's versatility makes it applicable to other Navy platforms, enhancing software delivery across a wide range of mission-centered programs. In support for the tool, Defense Unicorns has enabled a "Cert to Ship" capability, which allows for continuous accreditation of software from cloud environments to edge systems.

THE FUTURE

Defense Unicorns' technology supports the delivery and sustainment of the Columbia-class SSBNs. Scheduled to deliver the first of 12 submarines in 2028, the Columbia-class fleet is expected to remain in service through 2080. The Navy also uses Zarf to support maintenance and upgrades to the Ohio-class submarines. Through the Submarine Maintenance Engineering, Planning and Procurement (SUBMEPP) activity, the Navy plans to expand Zarf's integration across a wide range of submarine programs to sustain critical platforms. Additionally, Defense Unicorns worked with Project Blue to create the Unclassified Naval Nuclear Propulsion Information (UNNPI) network. This network, now housed within NAVSEA's government cloud environment, supports the Columbia-class submarine program by hosting mission-critical applications.

Published

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NAVSEA Approval ##2025-0077

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