

Department of the Navy SBIR/STTR Transition Program

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NAVAIR Public Release 2021-900

Topic # N172-112

Smart Caching of Imagery for Carry-On System (SCICOS)

DZYNE Technologies Incorporated

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-281 (UAS) Strike Planning & Execution Systems

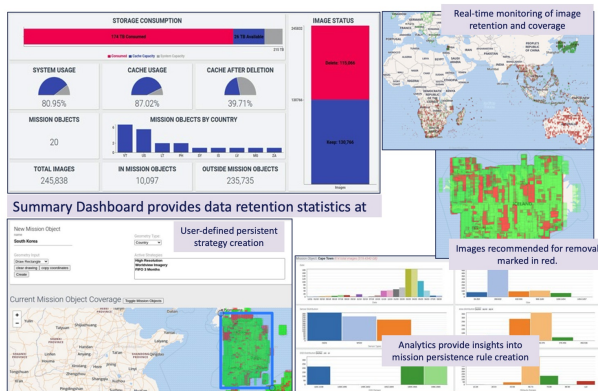
Transition Target: Theater Mission Planning Center (TMPC)

TPOC:
(301)757-1884

Other transition opportunities:

Numerous Navy/Marine Corps programs could benefit such as Distributed Common Ground System - Navy (DCGS-N) and Naval Air Warfare Center Weapons Division (NAWCWD) out of China Lake in addition to others in DoD and within the intel community.

Notes: On September 24th, 2020, AFRL and DZYNE Technologies resumed the ROBOpilot autonomous unmanned air platform's flight testing with the program's fourth flight. The test successfully accomplished all planned objectives and lasted approximately two hours. ROBOpilot is an applique kit that converts a general aviation aircraft into an unmanned aerial vehicle rapidly and affordably without making any permanent modifications to the aircraft. ROBOpilot interacts with the aircraft in the same manner as a pilot in that it "grabs" the yoke, pushes the rudders and brakes, controls the throttle, reads the dashboard gauges, etc. ROBOpilot has its own internal sensors, like GPS and an inertial measurement unit, for situational awareness. A computer analyzes all information to make decisions on how best to control the flight.



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WHAT

Operational Need and Improvement: Currently, imagery exploitation systems that are directly connected to streaming data feeds from larger, high-capacity imagery libraries quickly fill their available storage and either fail or begin dumping imagery using some very simplistic (often First-In, First-Out) management scheme. The imagery thus held at any point represents the result of this default imagery dumping strategy than it does the intended needs of the system operator or analyst; it does not account for users query and metadata filtering priorities, which can lead to loss of valuable imagery data as onboard storage capacity becomes limited. A capability should be created that allows the system to retain more imagery over areas, and of targets that are more likely to be of immediate need, while still retaining robust, or at least some coverage, over much broader areas of potential future need.

Specifications Required: Create an open, modular imagery metadata searching and screening engine " image management algorithms, using either existing metadata tags (e.g., National Imagery Transmission Format (NITF) headers, commercial data headers, etc.) or create new metadata tags based on user inputs employing a series of filters and logical rule sets that, when applied to imagery holdings in a given system, can optimize/prioritize its data retention strategies across a given storage capacity to meet the operational needs of that particular system. Incorporate innovative user interfaces for defining the operators data retention priorities, and the graphical display of these priorities.

Technology Developed: Smart Caching of Imagery for Carry On System (SCICOS) provides a scalable imagery management system. Our data retention strategy (imagery caching) leverages the users query and persistence rules to rank imagery priority; it maintains imagery retention automatically based on users interaction and configuration of the persistence rule set, which allows the user to focus on their mission operations. SCICOS supports (a) intuitive query and filter selection of imagery by metadata; (b) an automated imagery retention based on users usage and persistence rule definition; (c) a scalable framework for imagery management that automatically extracts metadata and imagery content to increase rapid search and retrieval.

Warfighter Value: The use of imagery is essential to the Navy's maritime domain awareness. Ability to retrieve relevant imagery and retain these data sets for exploitation drastically improves the Navy's ability to conduct Intelligence Surveillance Reconnaissance (ISR) operations.

WHEN

Contract Number: N68335-19-C-0044 **Ending on:** March 31, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
SCICOS prototype demonstration at WPC against operational data	Med	SCICOS must process 250 K classified imagery per week	6	April 2023
SCICOS distribution delivered to TMPC Integration Lab for cybersecurity and unit level testing	Low	SCICOS must process 4 petabytes per month SCICOS	8	June 2023
SCICOS and TPMC testing at WPC	Med	SCICOS must process 4 petabytes per month SCICOS	8	September 2023

HOW

Projected Business Model: DZYNE Technologies specializes in the rapid design, development, and production of advanced unmanned aircraft and analytic systems. We start from concept creation and rapid prototype development and carry it all the way through to delivery of operational systems. DZYNE Technologies has assembled a team proven in their ability not only to conceive of groundbreaking designs but also to deliver functioning systems based on those innovative designs. We house experts in many fields including aerodynamics, structural design, systems engineering, and flight test, as well as artificial intelligence, image understanding, and autonomy software. DZYNE will transition this capability to the TMPC workflow and seek other transition opportunities related to GPS denied navigation applications. In addition, DZYNE is transitioning this capability to multiple NGA programs in support of global scale monitoring and assessment.

Company Objectives: We would like to meet with the Tomahawk planning organizations of other services who may have similar workflows that might be made more efficient and less costly through the adoption of CASI capabilities that are being developed for the Navy under this effort.

Potential Commercial Applications: The imagery management service framework is also currently being leveraged by our work with the Defense Threat Reduction Agency (DTRA) to support and manage parametric threat simulation analysis for Weapon of Mass Destruction deterrence. Similarly, DZYNE continues to develop our expertise in metadata and image content extraction algorithms to support the DARPA program to develop the Cloud Analytics of Satellite Imagery for global situation awareness. The commercial sector in the area site surveys, resource exploration, and agriculture monitoring. Commercial applications include system architecture and software enabling information collection, analysis, and analysis product dissemination at the appropriate time scales required for application support.

Contact: Paul Brewer, Director, Image Analytics
pbrewer@dzyntech.com 703-725-3084