

Department of the Navy SBIR/STTR Transition Program

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NAVAIR

Topic # N182-100

Data Analytics for Navy Aircraft Component Fatigue Life Management
AVNIK Defense Solutions, Inc

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-276 H-1 USMC Light/Attack Helicopters

Transition Target: Decision Knowledge Programming for Logistics Analysis and Technical Evaluation (DECKPLATE), which is the next generation of Naval Aviation Logistics Data Analysis (NALDA) and will interface with Navy Enterprise Resource Planning (ERP) as the Naval Aviation Business Warehouse.

TPOC:
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Other transition opportunities: Other transition opportunities include DOD Navy, Army, and Special Operations rotary-wing and tilt rotor aircraft platform PMs, to include V-22, H-60 variants, H-47 variants, Future Vertical Lift, AH-64 Apache, and potentially Unmanned Aerial Vehicle (UAV)

Notes: Utilizing the Microsoft HoloLens and augmented reality (AR), AVNIK can produce 3-D renderings (holograms) of rotorcraft, which are digital twins of platforms in the field that allows an engineer and others to walk around and explore the potential problems. AVNIK can also develop operational maintenance and maintenance training applications, using an AR headset, keeping the maintenance artisan at the point of repair and allowing them to work in a "hands-free" environment.



<https://www.marines.mil/Photos/igphoto/2000951147/igcategory/Aviation>

WHAT

Operational Need and Improvement: Navy aircraft data are stored in several database management systems, both in digital format and paper records. Each of the Navy's type/model/series aircraft has its own data characteristics that depend on several factors such as (1) aircraft category (i.e., fixed or rotorcraft), (2) installed data recorders and sensors (such as the Integrated Mechanical Diagnostics System or the Vibration, Structural Life, and Engine Diagnostics System), and (3) any unique functional line duties and records that would be needed during maintenance service events (such as remove and replace, service fluids, inspection criteria, etc.).

Specifications Required: The analysis toolset needs to be: (1) able to handle structured and unstructured data; (2) able to identify and resolve data quality issues; (3) resilient to both data and processing faults; (4) quick (e.g., have a low latency retrieval of data ranging between 24-48 hours depending on criticality of alert or action needed); (5) based on modular, user-friendly, highly-customizable applications that will respond to different functional end-user needs; and (6) easily scalable. Lastly, the analysis toolset should be fully compatible with existing Navy and Marine Corps Intranet (NMC) and logistics enterprise systems, including but not limited to relational database management systems, open source architecture, Java, Python, web compatibility (e.g., ozone widget framework), and support for Public Key Infrastructure (PKI) certificate login. The solution must meet the system DoD accreditation and certification requirements as cited in DoDI 8510.01, Risk Management Framework (RMF) for DoD Information Technology (IT), and DoDI 8500.01, Cybersecurity.

Technology Developed: Software Automated Analysis Toolset System (SAATS) is a toolset to perform prediction and flag top degrading issues with sufficient advance notice for effective root cause analysis and corrective action. Engineering, logistics, and maintenance organizations, at all levels, use these data sets as inputs to guide decision processes about engineering and sustainment planning, forecasting supply chain actions, mission planning activities, and maintenance management.

Warfighter Value: A suite of novel data analysis tools, and the integration of data mining with physics-based models, will allow maintainers to quickly assess current rotorcraft diagnostic state, make predictive life analysis, detect and address anomalies, and provide a complete traceability of part history.

WHEN

Contract Number: N68335-20-C-0316 **Ending on:** March 10, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial Architecture and Software Development Process Set	Med	Shareable workflow	4	August 2020
First Minimal Viable Product - User interface with simple Queries	Med	User successfully requests and receives information	4	March 2021
Initial Fatigue Life Management Processes and Algorithms	Low	Identify component remaining useful life (RUL)	5	September 2021
Initial Predictive Analytics	High	Provide early warning of incipient failure	5	March 2022
Maintenance Optimization	High	Provide recommended maintenance based upon RUL and early warning of incipient failure	6	September 2022
Final Prototype version	High	Demonstration	6	March 2023

HOW

Projected Business Model: AVNIK Defense Solutions, Inc., a small business specializing in programmatic, technical, and logistics management services, was formed in January 2006, is privately held and classified as a Woman Owned, Small Business (WOSB), Sub-Chapter S Corporation. We anticipate offering the SAATS technology as a Software as a Service (SaaS), where we would also provide on-going support and upgrades. Other methods of technology insertion include plugins to existing systems.

Company Objectives: We would like to meet with those who may assist with the transition and integration of the SAATS data analysis toolset into Navy and other US Military branch logistics enterprise systems to use actual flight and fleet maintenance data to validate the SAATS technology. Also, AVNIK requires assistance with validating the production system functionality for Navy/Marine rotorcraft and/or fixed wing programs of record. AVNIK would like to engage with Maintenance, Operational, and PM Engineering and Logisticians and personnel associated with various fleet readiness centers, depots, and sustainment organizations to understand their needs and requirements for maintenance optimization, commanders situational awareness, and to anticipate logisticians supply chain actions.

Potential Commercial Applications: Successful technology development would benefit the data analysis industry as a whole, providing the private sector with tools to perform quality assurance, sort, reduce, transform, display, and make projections on multiple large datasets. Potential areas that can benefit include engine manufacturers; energy production, automobile, and medical industries; and the Department of Health and Human Services.

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