

WHO

SYSCOM: NAVAIR

Sponsoring Program: NAVAIR

Transition Target: PMA-205, NAWC-TSD

TPOC: (407) 380-4773

Other Transition Opportunities: FAA, Academia (Aviation Degree Programs), Industry (Flight Schools)

Notes: STTR work on this project is conducted in partnership with Oklahoma State University.



SD-SAT: Comprehensive SD Skills Evaluation

WHAT

Operational Need and Improvement: Spatial Disorientation (SD) is a contributing factor in many fatal aircraft accidents, resulting in significant loss of life and equipment. Improved SD training has the potential to significantly reduce aviation accident rates and the associated human and economic costs. To support evidence-based decision making regarding the procurement and deployment of SD training programs, it is essential to clearly define the objectives of a training program, and to effectively measure improvements relative to these objectives. In the solicitation for this topic, the Navy identifies a lack of well-defined Knowledge, Skills, and Abilities (KSA) targeted by SD training programs and a lack of validated tools to measure these KSA as important barriers to deploying effective SD training.

Specifications Required: Any decision support tool product must enable a standardized, reliable, and valid measurement of SD-hazard-mitigation KSA. For validity, it must be shown that these KSA correlate to improved pilot performance at managing SD hazards in the relevant environment. Hardware and software must meet DoD accreditation and certification requirements to support processing approvals for use through the policy cited in Department of Defense Instruction (DoDI) 8510.01, Risk Management Framework (RMF) for DoD Information Technology (IT), and comply with appropriate DoDI 8500.01, Cybersecurity.

Technology Developed: BAI's Spatial Disorientation Skills Assessment Tool (SD-SAT) is a portable, low-cost tool that will provide validated measures of pilots' KSA related to SD hazard mitigation. SD-SAT is primarily a software tool and leverages low-cost COTS computing and virtual reality (VR) hardware. The tool includes a diverse set of written, oral-exam, and VR-based criteria that span the cognitive, affective, and psychomotor domains of learning. Extensive human participant tests will support psychometric validation of the tool. A motion simulator will provide a "gold-standard" measure of pilot performance in a realistic environment capable of stimulating key SD illusions, and human-participant tests in this simulator will be a key aspect of SD-SAT validation.

Warfighter Value: Reducing SD risk in aviation operations through training is proven to save lives and protect assets from costly mishaps. SD-SAT will enable evidence-based decision making related to SD training procurement and deployment, leading to improved training methods, fewer accidents, and enhanced operational effectiveness, a significant win for both DoD and civilian aviation.

WHEN

Contract Number: N68335-24-C-0188

Ending on: Jan 29, 2026

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Comprehensive Set of SD criteria developed	Low	Candidate criteria developed.	2	3rd QTR FY25
Alpha Version of SD-SAT Software	Low	Software prototype complete	3	2nd QTR FY25
Beta Version of SD-SAT Software	Low	Software prototype complete	4	2nd QTR FY26
Psychometric validation	Medium	Supporting evidence gathered and validation completed	3	2nd QTR FY27
Human participant testing	Medium	Human testing completed	6	2nd QTR FY27

HOW

Projected Business Model: BAI has a collection of technologies to enhance the safety of air vehicle operations, many of which relate to human-machine and human-automation interactions. We intend to continue establishing ourselves in emerging air vehicle markets, especially Urban Air Mobility, as a supplier of technology to address emerging safety challenges, especially as more highly automated vehicles are operated by individuals with less training than current commercial pilots.

Company Objectives: Barron Associates Inc. provides innovative solutions to improve performance, safety, and efficiency by employing intelligent and adaptive technologies to measure, model predict, and control complex systems. BAI addresses many critical challenges in the Defense, Aerospace, and Healthcare sectors.

Potential Commercial Applications: We anticipate this technology will be extremely useful to the Navy and other stakeholders in aviation training acquisition (university flight training programs, commercial flight schools, airlines, etc.) by evaluating the effectiveness of various SD training programs.

No pilot is immune to SD, and current training is considered a perishable skill, so continuous improvement of existing SD training regimens is recommended to improve pilot safety, student retention, and make training programs more efficient and cost effective.

Contact: Alec Bateman, Principal Investigator
bateman@bainet.com (434) 973-1215