Topic: N112-111

BGI LLC

Landing Signal Officer - Data Analysis Toolkit (LSO-DAT)
LSO DAT transforms text-based LSO carrier landing evaluations to allow machine learning to reveal evidence-based insights, optimizing training while reducing workload. Prototyped for the LSO School, embarked air wings, and aviator training units, it applies advanced data science to identify and highlight trends and areas of concern in performance. Handwriting recognition (OCR) allows LSOs to maintain their familiar CONOPS while gaining benefits from the tools. Collaboration with the user community has created familiar and intuitive visualizations. LSO DAT provides improved capability to the fleet as a standalone tool, and is ready to be integrated into data analysis suites and enterprise data systems. BGI is an innovative veteran-owned business that merges expertise of engineers, data scientists, and operational analysts to provide key innovations to the warfighter.

Technology Category Alignment:
Machine Perception, Reasoning and Intelligence
Information Collection/Management
Synthesis/Analytics/Decision Tools
Collaborative Analysis and Decision-making

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Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0083

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2019-944

Topic # N112-111
Discretionary PH II - Landing Signal Officer - Data Analysis Toolkit (LSO-DAT)
BGI LLC

WHO

SYSCOM: NAVAIR

Sponsoring Program: Naval Air Warfare Center Training Systems Division (NAWCTSD)

Transition Target: Landing Signal Officer (LSO) School, NAS Oceana

TPOC:
(407)380-4722

Other transition opportunities: Applications requiring sophisticated information extraction from natural language inputs can benefit from the technology underlying LSO DAT, including any training or operational environment in which instructors or evaluators make hand-written or verbal records of performance or issues noted. These can include military or commercial applications. LSO DAT includes no ITAR-restricted technology, so international applications are possible.

Notes: LSOs ensure the safe recovery of aircraft, through both interaction with the pilot during landing and post-flight debrief. During the fast-paced recovery, brief shorthand notes are collected to capture pilot performance and allow the debrief to highlight areas for improvement. Outside LSO-DAT, there is currently no way to mine these historical notes for trend analysis, platform comparisons, or other data mining activities.

Image provided by BGI, LLC, 2019

WHAT

Operational Need and Improvement: Today, the Navy and Marine Corps average more than 1 million flight hours combined annually, much of it at sea. Though performed frequently and routinely, recovery of aircraft to a carrier is a challenging and dangerous task. In addition to assisting with recovery, LSOs assess pilot execution and provide feedback for improvement. Assessments are captured in shorthand comments that are managed in a simple database (the Automated Performance Assessment and Remedial Training System (APARTS)). LSO DAT dramatically extends APARTS by transforming the shorthand and applying advanced data science techniques to reveal evidence-based insight into aviator performance, improving training quality while reducing the associated LSO workload.

Specifications Required: LSO DAT ingests hand-written records via Optical Character Recognition (OCR), and creates APARTS data records. This supports the familiar CONOPS on the platform. LSOs can verify the records and make any desired corrections. LSO DAT applies advanced data science techniques to highlight trends and areas of concern in aviator performance. Advanced visualizations allow identification of trends across multiple landings for individual pilots or operational units. Machine learning techniques extract additional issues or correlations not apparent from the visualizations.

Technology Developed: Past efforts to bring technology to the recording of LSO comments on the carrier platform (e.g., use of a tablet) have not gained acceptance of the user community. The environment of the platform drives a preference for "old fashioned pencil and paper." LSO DAT leaves that familiar paradigm in place, but applies modern technology for all the subsequent steps of the process. OCR technology adapted to LSO shorthand on standard "cut sheets" removes the time consuming data entry phase. Transformation of the comments into forms compatible with machine learning allows the tools to find and highlight trends and areas of concern. Reporting formats developed in collaboration with the LSO community expedite communications up and down the command chain.

Warfighter Value: Aviator training is both critical to safe operations and costly to perform. The ability to continually assess performance and training effectiveness is critical to establishing the proper balance. Advanced technologies, such as Precision Landing Modes, impact training requirements, but those impacts must be identified and quantified to properly adapt training policy. LSO DAT provides insights not previously available to keep naval aviation safe and effective.

WHEN

Contract Number: N68335-18-C-0083   **Ending on:** March 23, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
OCR at acceptable accuracy	Low	Cut sheet translation 90% accurate	6	September 2019
Data Analysis Toolkit deployed	Low	DAT in use at LSO School and operational Units	7	December 2019
Ingestion of simulator data	Med	Aircraft and ship data from flight simulator integrated into analsysis and reporting	6	March 2020

HOW

Projected Business Model: BGI is an innovative, veteran-owned business, merging the expertise of engineers, data scientists, and operational analysts to best support the warfighter. While the LSO DAT is precisely focused on a particular user community, the technology components that underlie the functionality (OCR, transformation of plain language to quantifiable data, and advanced data analysis) have much broader application. BGI is seeking additional users with whom to collaborate and bring any or all of these components to a wide range of military and commercial customers. BGI features an extensive roster of military and commercial aviators, engineers, and data scientists to apply to solving challenging problems of transforming human-entered data to allow machine learning techniques to extract knowledge and improve the effectiveness and efficiency of operations.

Company Objectives: BGI has a demonstrated capability to collaborate with end-users to understand operational problems and then develop optimized tools to address them. BGI is seeking to expand LSO DAT into a family of tools to address the needs of multiple domestic and international military and commercial users.

Potential Commercial Applications: The process of subjective evaluations, captured in hand-written or spoken notes, is not at all unique to military applications; neither is the challenge of transforming those natural language or shorthand notes into quantifiable data suitable for analysis by machine learning technologies. Commercial enterprises in training or performance evaluation can benefit equally from LSO DAT technology.

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