Topic: N131-075

Knowledge Based Systems, Inc.

TraceLogic; Automated Rule Learning from Data Traces

KBSI's TraceLogic™ deciphers hidden rules or logic present in complex behavior such as carrier-deck operations. For more than 25 years, KBSI has specialized in advanced technologies for process improvement. Initially targeted for management of aircraft carrier deck operations, TraceLogic could be applied to management of any asset moved in groups subject to complex spatio-temporal-constraints. KBSI has the advantage of collaborating with Newport News, the aircraft carrier prime contractor. KBSI leverages Newport News' operational data and utilizes their "Virtual carrier" simulator. That collaboration along with development and evaluation of operational prototypes has substantially reduced innovation risks. Insertion of this technology into the prime contractor's development process will improve the design of deck operations. The Navy may also adopt TraceLogic for managing legacy shipboard operations.

Technology Category Alignment:

None
None
None

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SYSCOM: ONR
Contract: N00014-15-C-0078

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00014-15-C-0078

Department of the Navy SBIR/STTR Transition Program

STATEMENT A. Approved for public release; distribution is unlimited. ONR Approval # 43-1256-16

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TraceLogic; Automated Rule Learning from Data Traces

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WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 35 - Naval Air Warfare and Weapons

Transition Target: NAVAIR / NAVSEA

TPOC:
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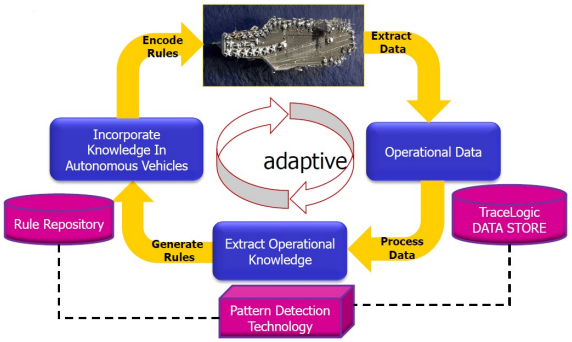
Other transition opportunities:
CVN 78 Program (PMS 378)

CVN 79/80 Program (PMS 379)

Carrier Unmanned Aviation program office (PMA-268)

In-Service Aircraft Carrier Program (PMS 312)

Program Executive Office Unmanned Aviation and Strike Weapons (PEO(U&W))



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WHAT

Operational Need and Improvement: Operations on aircraft carriers are often described as controlled chaos. Complex organizational systems, such as those that govern and effect aircraft movement on-board carriers, do not operate on predetermined low level rules but rather adapt and learn based on high-level guidelines.
The key challenge posed by this research is to discover and codify the rules of behavior "encoded" into the patterns of performance of aircraft handlers and their leadership. Our solution is expected to have significant long-term benefits for on-board carrier operations, addressing both technical and pragmatic problems and improving the performance and capability of our aircraft carriers.

Specifications Required: Aircraft handling aboard the flight and hangar decks of aircraft carriers is a series of complex processes in a constrained and chaotic environment. This includes recovery, refueling, payload loading, servicing and maintenance, manning, and positioning for the next launch. As unmanned air systems begin to integrate in greater numbers it will be critical to understand this traffic flow better to allow for the development of wholly new paradigms that can optimize the use of both manned and unmanned systems, and support the increased tempo of operations and higher sortie generation rate requirements of future carriers.

Technology Developed: KBSI has developed TraceLogic methodology, algorithms and a computer program that is a design exploration software tool for aircraft carrier operation optimization. Our software tool post analyzes Prime Newport News' "Virtual Carrier" simulator data.

Warfighter Value: Our technology fits in as a design exploration tool for aircraft carrier air operations optimization. The next generation carriers will have UAV's deployed alongside current manned operations. Understanding how to effectively integrate UAV's on a carrier deck is the long term goal.

WHEN

Contract Number: N00014-15-C-0078

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Research and Test Algorithms and Components	Low	Tests on Virtual Carrier Data	TRL 6	March 2016
Package TraceLogic Components	Med	Prime Customer Feedback	TRL 7	June 2016
Pilot Technology Validation	Med	Navy Customer Feedback	TRL 8	January 2017
Scale for Data Across Domains	High	Tests: Multiple Customers across Domains	TRL 8	June 2017

HOW

Projected Business Model: The TraceLogic methodologies, algorithms and software tool will be licensed.

Company Objectives: The ultimate goal of KBSI in this SBIR, is to develop methods, process and algorithms to decipher the hidden rules or logic of complex traffic patterns – traces of aircraft, people and equipment on Aircraft Carriers -- and demonstrate technologies for Automated Rule Learning from Data Traces. We call this system for automated rule learning from data traces TraceLogic.

The TraceLogic methodology, algorithms and computer program have a number of potential customers in the Navy community, the broader Department of Defense community and the commercial sector. The obvious Navy customer is PEO Aircraft Carriers and several of the activities within PEO Carriers, as well as their primary contractor, Newport News.

Potential Commercial Applications: Any operation that involves assets moving in time and space based on group constraints can benefit by this technology. TraceLogic extracts patterns of behavior from data and provide visual feedback to designers and operators with an aim to improving existing operations. TraceLogic technologies can be applied at airports, manufacturing shops and maintenance depots and even in theme parks tracking people moving in groups.

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