

Topic: N17B-T032

Aptima, Inc.

Techniques to Adjust Computational Trends Involving Changing Data (TACTIC-D)

TACTIC-D is a “big data” analytics solution predicated on improving force proficiency and readiness despite changing tactics, techniques, and procedures (TTPs). TACTIC-D’s creator, Aptima, is a human-centered engineering company dedicated to augmenting human capabilities. TACTIC-D uses probabilistic graphical models and machine learning to represent and determine the relationships between TTPs, performance measures, and knowledge, skills, and abilities (KSAs). This approach facilitates detection and understanding of changing tactical behaviors. Advanced data visualizations make the results of mathematical modeling understandable, facilitating identification of opportunities for training interventions, and helping decisionmakers understand the source of variability in their data. Aptima seeks support for TACTIC-D to access multiple, diverse, and associated data sources (such as sensor readings and mission reports) that could inform measures of force proficiency and readiness.

Technology Category Alignment:

Command, Control, Communications, Computers, & Intelligence (C4I)

Human Systems

Engineered Resilient Systems (ERS)

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SYSCOM: NAVAIR

Contract: N68335-19-C-0133

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0133

 Tech Talk: <https://youtu.be/fQDoOFH96yk>

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2020-716

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TACTIC-D II: Techniques to Adjust Computational Trends Involving Changing Data
Aptima, Inc.

WHO

SYSCOM: NAVAIR

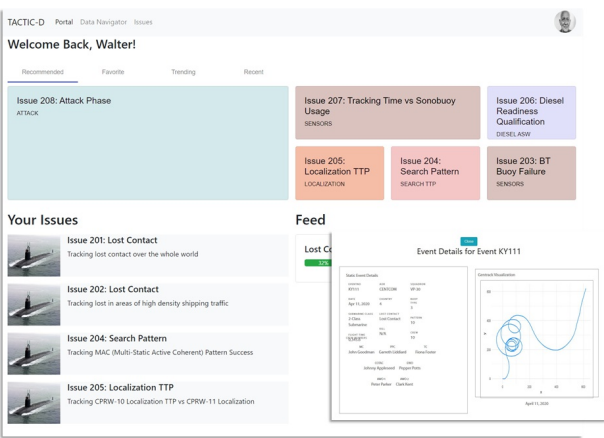
Sponsoring Program: Naval Air Systems Command (NAVAIR)

Transition Target: Commander Patrol and Reconnaissance Group (CPRG), PMA-290, PMA-205, PMA-264, PMA-299, PMA-275, PMA-265, PMA-231, PMA-298, PMW-750, and PMS-339

TPOC:
(407)380-4672

Other transition opportunities: The big-data analytics capabilities of TACTIC-D may be relevant for planning events in general. Tactical Training Group Pacific and Atlantic, as well as CSG-15, would have applications of this capability relevant to mission planning or Contingency Plan development activities. Air Force applications throughout the various platforms would be able to capitalize on the pattern detection abilities of TACTIC-D and be able to apply relevant tactics, techniques, and procedures to future missions, increasing mission success probabilities.

Notes: The accompanying image depicts the TACTIC-D portal in the background, and one possible characterization of an ASW (Anti-Submarine Warfare) event (here, a GenTrack or inferred track of submarine behavior) in the foreground. In this example, we understand that Walter's interest lies in ASW generally, and "lost contact" specifically. Issues of interest to Walter created by others appear in different colored cards at the top of the display. The Feed (partially hidden) provides analyses of trends in the features among Walter's "issues."



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WHAT

Operational Need and Improvement: The US Navy recognizes the potential for "big data" to facilitate force readiness. However, the analysis of such data presents numerous challenges, among them, (1) the evolving nature of Navy tactics, techniques, and procedures (TTPs), hindering apples-to-apples comparisons, (2) the presence of many interdependent platforms, making data complex, and (3) presenting analyses to humans, making understandability relevant.

Specifications Required: TACTIC-D must (1) implement statistical or computational methods capable of comparing measures of performance or proficiency continuously, as new data become available, (2) harvest data from multiple different sources, and (3) and present results to humans, across echelons, comprehensibly.

Technology Developed: Unlike competing approaches to comprehensive data analysis, our approach to TACTIC-D uses personalized issue tracking as its foundation and plug-in capability for its data analytics. The plug-in technologies (such as those supporting effects analysis, causal reasoning, predicate induction, and time-invariant skill trend analysis) provide different complementary lenses by which the user may explore and experiment with the data of interest. These technologies also mitigate the risk of TACTIC-D's technological obsolescence by allowing the plug-ins to evolve without affecting the supporting framework or workflow.

Warfighter Value: TACTIC-D is a tool (1) meant to fuse training and operational data from multiple different sources and (2) designed to encourage data exploration and critical thinking about issues related to force readiness and proficiency across echelons in the military establishment. Among other things, TACTIC-D allows users to test the effect of possible interventions without committing to an implementation of those interventions.

WHEN

Contract Number: N68335-19-C-0133 **Ending on:** February 25, 2021

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|------------|--|------------|----------------|
| Implement personalized issue tracking framework | N/A | Demonstrate an interactive prototype that exercises the issue tracking framework | 4 | June 2020 |
| Implement effects analysis functionality | Low | Demonstrate TACTIC-D's ability to support interventions, in silico | 4 | March 2021 |
| Implement anomaly detection functionality | Med | Demonstrate how anomalies could be detected and tracked | 4 | July 2021 |
| Implement time invariant skill trend analysis | Med | Demonstrate how warfighters' knowledge, skills, and abilities (KSAs) can be analyzed by mission, phase, TTP, and performance measure | 4 | September 2022 |
| Access to relevant data sources | High | Demonstrate fusion of different sources of performance data across missions | 4 | December 2023 |

HOW

Projected Business Model: Aptima aims to build a baseline capability that enables the Fleet to utilize "big data" (data often characterized by its volume, variety, velocity, and variability) to (a) determine operational levels of effectiveness and (b) identify operational gaps that can be addressed through focused training events. TACTIC-D will have a predictive capability to analyze the probability of success of the recommended focused training events, without the Fleet having to commit to that training first.

Company Objectives: Aptima seeks to increase levels of Warfighter readiness and lethality by instrumenting Warfighters' environments with adaptive, scalable, technology-aided training. Aptima executes on the preceding---from the individual through integrated training, and across multiple functional areas---providing the precision to measure, assess, and adapt distributed training to support realistic, complex, and integrated training for the Naval Aviation Enterprise. Aptima's approach yields results that articulate readiness requirements---that define how readiness is measured, analyzed, integrated, and predicted to affect the DoD's return on its investments.

Potential Commercial Applications: TACTIC-D could help corporate managers evaluate the degree to which the expertise of the company's current employee population can perform successfully against the challenges of a different business model, to identify where training might be needed, and to prioritize training efforts to close these gaps in expertise. For example, TACTIC-D might have been a useful tool in forecasting the challenges of a corporate makeover involving a major US restaurant chain, in which the company rebranded itself as a preferred source for lunch and dinner rather than for breakfast alone. The challenge here is that the knowledge, skills, and abilities needed for making breakfast are not necessarily the same as those for making lunch or dinner, implying that gaps in skills and hiring could undermine the company's future success. A commercialized version of TACTIC-D could have been an aid to the company in planning its corporate makeover.

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