Department of the Navy SBIR/STTR Transition Program

Topic # N181-026
A-PuMPS: Aircrew Performance Measurement and Proficiency System
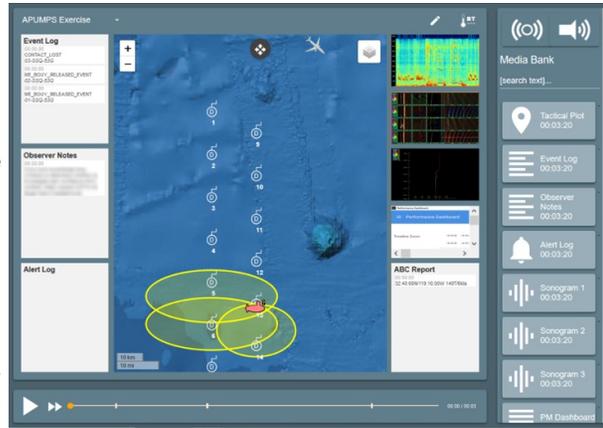Aptima, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Naval Air Systems Command (NAVAIR)

Transition Target: PMA-290 (P-8A Fleet Replacement Squadron, Maritime Patrol and Reconnaissance Weapons School), PMA-205, PMA-264

TPOC:
(407)380-4773

Other transition opportunities: Navy Domains such as Surface (PMS-339) and Sub-surface communities (SEA 07TR) would benefit from A-PuMPS' capabilities. Other Services such as Air Combat Command (ACC) communities like the Combat Air Force, would benefit from the ability to replay a "live" mission and display sensor data associated with a tactically significant event.

Notes: The accompanying image provides a snapshot of one component of the solution in action: the After-Action Review (AAR) AAR tool (a.k.a. Debriefer). The channels in the Media Bank each represent a different (temporal) source of data, and each may be dragged and dropped onto the main panel for display, and then resized, relocated, removed, or swapped as desired. Here, the central panel depicts a tactical plot bordered by logs as well as renderings of acoustic signals. Importantly, all channels synchronize to the playback timeline at the bottom of the user interface, where tick marks indicate "significant events" identified and described by observers.

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WHAT

Operational Need and Improvement: Experiential training intended to improve operational crew performance depends on timely post-mission After-Action Reviews (AARs). Comprehensive AARs of live training or operational missions (real-world rather than simulated missions) require time and effort to create, which access to sensor data associated with critical or "bookmarked" events complicate. Warfighters' memories of their behaviors during a mission-critical event quickly fade post-mission.

Specifications Required: The solution requires (1) data interfaces for consuming and processing of a range of disparate data sources used in LVC training system sources, (2) an architecture and process for linking available data sources to tactical aircrew performance for data synthesis informing performance assessments (semi-automated), calculating automated performance metrics, or both, (3) scalable functionality supporting individual, team, and multi-team aircrew compositions/mission sets; and (4) an intuitive human-machine interface providing visualization tools to facilitate data synthesis by human-in-the-loop users and display automated data outputs.

Technology Developed: Our solution addresses the operational Warfighter needs during a "live" event by (1) harvesting multiple-sensor systems data and presenting those data in a consolidated user interface in formats familiar to operators, (2) delivering AARs within 24 hours of mission completion by combining data associated with significant tactical events, and (3) incorporating observer notes when "ground truth" is unavailable (unlike synthetic events). In addition to the AAR tool, our solution features a mobile, hand-held, multi-observer-based note-taking application permitting the "bookmarking" of significant events and scalable qualitative assessment of individual or crew performance, which assessments can tie directly to training curricula to facilitate follow-up.

Warfighter Value: Shortened turnaround times for AARs of "live" events mean Warfighters can receive critical post-mission information within a compressed delivery timeline, enabling an increased mission success probability of subsequent events. Such capabilities promote force proficiency and force lethality by (1) helping Warfighters understand and learn from the effects of their actions, (2) better understand the teamwork requirements for success, and (3) identify the most relevant and useful tactics, techniques, and procedures (TTPs) for effective mission execution. Our solution applies to "live" training events as well as operational missions.

WHEN

Contract Number: N68335-19-C-0439   **Ending on:** June 26, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Build-out of the data processing pipeline that conveys observer notes and mission data to the AAR tool	Low	Demonstration of data flow, end-to-end	4	November 2020
Attaining Risk Management Framework certification for authority to operate	High	Authority to operate A-PuMPS within operational as well as training environments	5	March 2022
Identification of user roles and the mechanism for user authentication	Med	Implementation and demonstration of privileged application access	4	March 2021

HOW

Projected Business Model: Aptima aims to build a baseline capability for Fleet use with current platform systems. Baseline capability would include an ability for the user to author (create, update, or modify) performance measures. A licensing agreement would address enhancements, modifications, and improvements per emerging Warfighter needs and requests. The licensing agreement would provide added engineering support and performance assessment measure development to ensure maintenance of the authoritative standardization of the measures through proper Warfighter Authoritative approval.

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: Our solution is not merely an event replay tool, but a means to construct meaning from multiple streams of diverse inputs in an understandable and timely manner. In a single interface, individuals, groups, teams, and crews can see and experience the context of events in unprecedented breadth and depth. Our solution is well-suited not only for improving training (through instructor-led briefings), post hoc, but for improving situational awareness and providing actionable intelligence, ad hoc. Potential commercial applications include markets such as (1) professional sports leagues and teams, where integrating data that quantify athlete performance allows team owners and managers to make more informed decisions while scouting, (2) homeland and cybersecurity, where data from multiple different sources help analysts differentiate patterns of life in busy, congested areas, and (3) financial security, where fraudulent transactions become better understood by depicting the interplay among events.

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