Department of the Navy SBIR/STTR Transition Program

Topic # N131-078
Adaptive Gaming Environment - Submarines (AGE-S)
In-Depth Engineering Co

WHO

SYSCOM: ONR

**Sponsoring Program:** SBIR Program Office

Transition Target: Submarine BLQ-10 EW System or Schoolhouse EW Training

TPOC:
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Other transition opportunities:
PEO IWS-5: SQQ-89 Sonar System Operator Adaptive Trainer, Combat System Adaptive Trainer
PEO SUB PMS 401/425, BQQ-10 Sonar or BYG-1 Combat System Adaptive Trainer
Army, Air Force Operational proficiency training
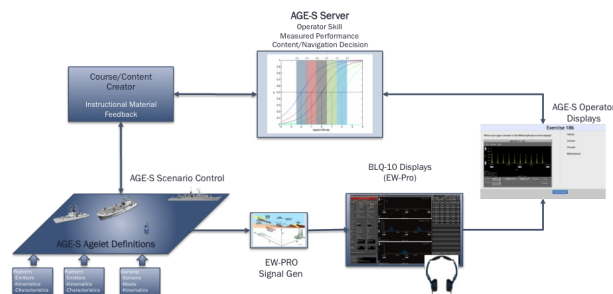
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WHAT

Operational Need and Improvement: State-of-the-art AN/BLQ-10 training devices are expensive, unreliable, and provide radio frequency emission output only. The training scenarios are inflexible, require the student to progress from easy to hard lessons with minimal feedback, and the AN/BLQ-10 training interface does not match the actual system. This training deficiency results in EW operators lack of declarative (knowing "that") and procedural (knowing "how") knowledge in operating the AN/BLQ-10 system which negatively impacts the submarine command team's decision making processes.

Specifications Required: The Next Generation Digital ESM Adaptive Trainer must create gaming scenarios that establish and maintain kinematics of the gaming environment and provide input to the individual subsystem processing algorithms to allow the electronic operator sitting at the AN/BLQ-10 workstation to manipulate the generated environment as he would if he was receiving RF from the environment. The training system must generate multiple training scenarios and support up to 2048 simultaneous digital emitter streams.

Technology Developed: The Adaptive Gaming Environment for Submarines (AGE-S) is designed to be a real-time adaptive competency trainer. AGE-S provides adaptive operator navigation through simulation-based learning environment using statistical computation founded in Item Response Theory (IRT). Initial target application of AGE-S technology will be an adaptive trainer for the AN/BLQ-10 electronic warfare system on United States Submarines. AGE-S technology, when completed and tested, should permit each trainee to learn underlying principles of domain-specific warfare area using tactical displays. IRT-based adaptive navigation technology, when completed and tested, should tailor navigation through course material to keep operators in the "flow".

Warfighter Value: The AGE-S adaptive trainer, when completed and tested, should provide trainers and sailors an optimized way to improve sailor competency; their declarative and procedural knowledge. Sailor competency and proficiency of our sailors in the operation of our sensor, combat and weapons systems is critical to our war-fighting effectiveness.

WHEN

Contract Number: N00014-15-C-0019   **Ending on:** July 30, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Proof of Concept	High	Adaptive Training Algorithm	3-4	July 2014
Phase II Initial Prototype Demonstration/Calibration Event	Med	Instructional Content, Remedial Content, Feedback	5	July 2016

HOW

Projected Business Model: In-Depth designed and built the Adaptive Training Server under this SBIR, and will deliver a prototype within the Phase II effort. The business model provides for derivative AGE-S products for new customers - based upon customers' curriculum, feedback, OMI and simulation environment. It is anticipated that by the end of the effort, minimal NRE will be required to develop derivative products. Nominal recurring costs are expected for modernization and upgrades.

Company Objectives: Objective is to complete the transition of this technology into the AN/BLQ-10. Actively engaged with the surface and submarine undersea warfare communities (sonar, imaging and combat systems) as straightforward transition targets. As existing providers of system software, we have critical knowledge of curriculum and system operations, and can provide closed-form solutions to these communities. Execution of additional Phase II efforts with these customers and transition into Phase III provides for delivery of products to each of these customers. Also pursuing the radar, missile and guns communities.

Potential Commercial Applications: Transition goal is to expand within Submarine and Surface Ship ASW (e.g., BQQ-10 and SQQ-89 CBT and IETM enhancement), AAW (e.g., SPY-1 or SPY-6 CBT or IETM enhancement) and Strike Communities – via direct contract with DoD customer or via subcontract with Prime contractor. Commercial applications of our adaptive training technology is focuses on very complex applications where mistakes are consequential and skill/proficiency retention is an ongoing challenge (e.g., nuclear reactor plant, airplane pilot).

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