Topic: N141-028

ARiA

Environment for Surface ASW Interactive Learning (E-SAIL)
Expert anti-submarine-warfare (ASW) operators employ mental models to understand environmental conditions and target properties and select acoustic-sensor settings to optimize probability of detection (Pd) in target-specific missions. The Environment for Surface ASW Interactive Learning (ESAIL) helps sonar operators develop and maintain mental models that enable analysis and employment providing the highest Pd. ESAIL employs video-game interfaces to establish mission-relevant training environments from which operators draw connections between physical scenarios and corresponding AN/SQQ-89A(V)15 ASW Combat System displays. Leveraging ARiA's expertise in game-based learning and simulation-based training, ESAIL uses recorded tape data and real-time simulation to accelerate expertise acquisition. ESAIL implementation has been targeted for the AN/SQQ-89A(V)15 and employs a platform-agnostic build environment suitable for all Navy sonar-system variants. ESAIL is easily tailored to work across platforms and sensor types.

Technology Category Alignment:
None
None
None

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SYSCOM: NAVSEA
Contract: N00024-16-C-4019

Department of the Navy SBIR/STTR Transition Program

NAVSEA #2016-0614

Topic # N141-028

Environment for Surface ASW Interactive Learning (E-SAIL)

Applied Research in Acoustics LLC

WHO

**SYSCOM:** NAVSEA

Sponsoring Program: PEO IWS 5A

Transition Target: AN/SQQ-89A(V)15 Undersea Warfare (USW) / Anti-Submarine Warfare (ASW) Combat System, ACB19

TPOC:
(401)832-8579

Other transition opportunities: ASW Sonar Training for: Littoral Combat Ship (LCS)/Fast Frigate (FF) ASW Mission Package (MP); Acoustic Rapid Commercial Off-the-Shelf (COTS) Insertion (A-RCI) AN/BQQ-10(V); Integrated Undersea Surveillance System (IUSS) Integrated Common Processor (ICP); AN/SQQ-34 Aircraft Carrier Tactical Support System (CV-TSC) and AN/AQS-22 Airborne Low Frequency Sonar (ALFS) MH-60R; MH-60R, P-8A, and P-3C acoustic-processor weapons tactics trainers (WTTs) using Common Acoustic Simulation Environment (CASE); and AN/UYQ-100 USW Decision Support System (USW-DSS).

Notes: ESAIL has been prototyped and verified using a platform-agnostic build environment suitable to all Navy sonar systems and is well suited to training for other sensors such as radar.
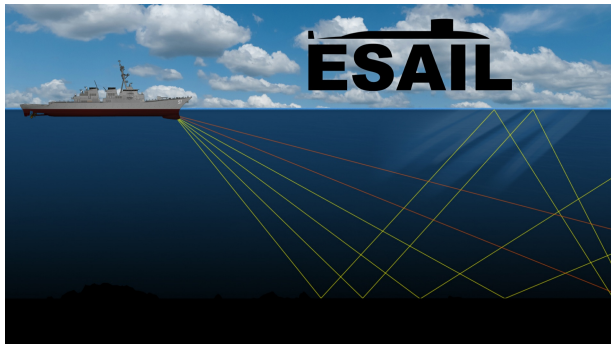
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WHAT

Operational Need and Improvement: The Navy has a need to improve both proficiency and training of operators within a constrained training environment. Effectiveness of current training has been degraded by compressed training cycles. The Navy requires an innovative virtualization software tool to enhance ASW proficiency through intuitive visual animations that use actual sonar, ground truth, and environmental data combined with sensor-performance modeling to provide understanding of complex environmental and tactical situations.

Specifications Required: Innovative reconstruction tools must work with sonar interfaces to provide an intuitive animated visualization that will:
• effectively communicate complex acoustic phenomena
• help sonar operators better understand how to improve tactical-system employment
• enable "what if…?" analysis
• enable manipulation of sonar settings, ship operations, and environmental conditions,
• enable interactive instructional playback of operational data or simulated training scenarios
• yield a 30% improvement in 6 month skill-retention levels
• yield a 25% reduction in training time

Technology Developed: Expert analysis and employment requires mental models relating displays to tactical scenarios. ESAIL helps sonar operators develop and maintain mental models by enabling interaction with the physical scenario corresponding to their display using a video-game interface. Leveraging ARiA's expertise in game-based learning and simulation-based training, ESAIL works with recorded tape data and simulation to accelerate acquisition of expertise by helping operators draw connections between displays and the physical world.

Warfighter Value: ESAIL accelerates learning by helping operators draw connections between displays and the real world. The result is increased operator proficiency, reduced training time, and increased retention, which overcome constraints on training and compressed training cycles.

WHEN

Contract Number: N00024-16-C-4019 **Ending on:** January 21, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Prototype Demonstration (ACB19 Step 1)	Low	Positive expert feedback on functionality and conops	4	May 2017
Independent Prototype Evaluation (ACB19 Step 2)	Low	Positive expert evaluation with real-world data	5	August 2017
Testing & Evaluation of Full Tactical-System Integration in a Laboratory Environment (ACB19 Step 3)	Med	Integrated ESAIL system, IA conformance, reduced training time, improved retention levels	6	December 2019
At-Sea Testing & Evaluation (ACB19 Step 4)	Med	Successful shipboard tactical integration	7	March 2019

HOW

Projected Business Model: ARiA plans to retain the SBIR data rights for ESAIL, working with Navy and large primes to integrate ESAIL into tactical systems for fleet use. ESAIL is targeted for an initial transition to the AN/SQQ-89A(V)15 USW Combat System in ACB19 with transition to related tactical systems to follow.

Company Objectives: ARiA's objective is to further investigate and develop Navy and DoD applications for ESAIL and its underlying technologies to enhance training for tactical sensor systems. ARiA intends to integrate ESAIL into the AN/SQQ-89A(V)15 USW Combat System in ACB19 as the initial application of this technology to tactical sonar systems and is looking for programs and prime partners working with other tactical sensor systems that can benefit from ESAIL's capability to enhance proficiency in tactical analysis and employment and improve development and retention of expertise.

Potential Commercial Applications: The technologies ARiA has developed for ESAIL can enhance training and aid operators in developing and retaining expertise in multiple domains for which a sensor system mediates the operators connection to the physical world as used in multiple industries. Immediate areas of application include training for commercial use of military sensing technologies such as sonar, radar, and lidar for search-and -rescue, and remote-sensing and mapping.

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