

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2020-0413

Topic # N181-061

Total Infrastructure and Mission Planning Suite

Scientific Systems Company, Inc

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS TM

Transition Target: AN/UYQ-100 Undersea Warfare Decision Support System (USW-DSS)

TPOC:

Other transition opportunities: ASW mission planning and execution tools similar to USW-DSS.

Notes: Image shows part of a theater-scale TIMPS ASW mission plan using both manned and unmanned assets.

Note #1: potential target track in red; Note #2 (a,b,c): stationary and mobile unmanned sensor assets; Note #3: tripwire performance plot; Note #4: TIMPS-proposed manned asset prosecution tracks in green; Note #5: unmanned aerial assets for communications relay (blue triangles).

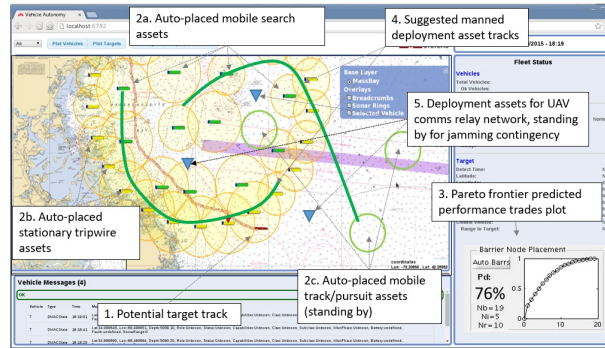


Image courtesy of Scientific Systems Company, Inc., 2020 (Geographic Location: Massachusetts Bay)

WHAT

Operational Need and Improvement: Augment human-driven theater-level mission planning with an automated toolset to plan large numbers of autonomous assets while integrating with existing tools. Operational needs are identified in (1) Chief of Naval Operations Adm. John Richardson, "The Future Navy", U.S. Naval Institute document, 17 May 2017 and (2) Commander's Intent for the United States Submarine Force and Supporting Organizations, March 2018, including theater anti-submarine warfare, C2 & decision, defensive anti-submarine warfare, and USW on-demand battlespace shaping.

Specifications Required: Develop a theater-level ASW planning toolset that is mission-, infrastructure-, and adversary-aware, and scalable to reactive replanning for large numbers of autonomous assets for theater ASW C2 and communications resulting in >10x accelerated planning time for >30 ASW/comms assets, in representative simulation.

Technology Developed: The Total Infrastructure and Mission Planning Suite (TIMPS) is a theater-level ASW planning toolset that augments human planners with an automated system for planning missions that utilize large numbers of autonomous assets, i.e., greater than 30. It is mission-, infrastructure-, and adversary-aware, and scalable to reactive re-planning for large numbers of autonomous vehicles, included UUVs and UAVs. This technology benefits the warfighter by improving theater-level search coverage and infrastructure availability (comms, supplies, retrieval, engagement), resulting in equivalent, or better, performance than human-generated theater-level plans for teams of autonomous vehicles. Operators using this technology can expect superior plans that are generated at least 10 times faster than human-generated plans with at least 10 times better coverage.

Warfighter Value: Improvement in theater-level search coverage and infrastructural availability. Equivalent performance or better than a human-generated theater-level plan for large asset counts (>30). Key metric: Plans done in >10x less time, or done in comparable time with 10x fewer infrastructure gaps.

WHEN

Contract Number: N68335-19-C-0657 **Ending on:** July 29, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Build initial feature-complete optimization pipeline	Med	Coverage and infrastructure plans achieved	4	August 2020
Assess automated planner performance relative to notional baseline scenario	Med	Coverage and infrastructure availability equivalent or better than human plans	4	August 2020
Improve optimization pipeline for plan quality and re-plan stability, and to handle larger scenario variety	Med	Plans improved over previous milestones, re-planning achieved	5	July 2021
Demonstrate on realistic contractor-generated scenario data	Med	Availability better than human plans in semi-realistic mission scenario	5	July 2021

HOW

Projected Business Model: TIMPS is a software application that will be sold directly to the Government.

Company Objectives: Scientific Systems Company, Inc. (SSCI) will coordinate with U.S. Navy and Industry stakeholders to develop this technology in concert with the Navy's roadmap for large-scale unmanned system integration into the Fleet. Understanding the Navy's vision and roadmap for unmanned systems is key to successfully developing and transitioning this technology. SSCI will identify other mission planning capabilities available to the Navy Enterprise and pursue opportunities to collectively advance this technology for the benefit of the U.S. Navy. SSCI specializes in applying artificial intelligence to autonomous unmanned systems for complex, collaborative missions. Our goal is to integrate and transition this technology into government and prime contractor systems to realize unmanned systems as a force multiplier.

Potential Commercial Applications: Commercial applications for TIMPS include applications where unmanned systems work in coordination with human operators to optimize search coverage and infrastructure availability including security, law enforcement, disaster relief, salvage & rescue operations, and scientific exploration.

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