# Department of the Navy SBIR/STTR Transition Program

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Topic # N14A-T016

Detection Avoidance System for Submarines (DASS)

Daniel H. Wagner, Associates, Incorporated
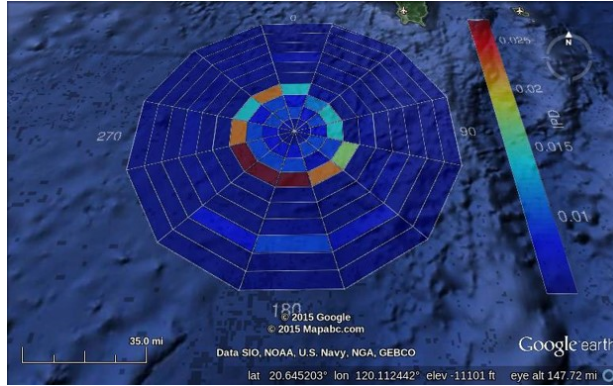
## WHO

**SYSCOM:** ONR

**Sponsoring Program:**

**Transition Target:** Advanced Processor Build (APB21) as a component of the Mission Planning Application (MPA)

**TPOC:**
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**Other transition opportunities:**

**Notes:** The image to the right shows a DASS tactical overlay showing vulnerability to passive sonar detection as a function of range/bearing.



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## WHAT

**Operational Need and Improvement:** Improve submarine vulnerability assessments with respect to passive sonar Anti-Access / Area Denial (A2/AD) threats.
Provide understanding of the temporal and spatial variations in underwater conditions, and their effects on vulnerability to counter detection.
Design a Tactical Decision Aid (TDA) that statistically evaluates detection as a stochastic process, while incorporating uncertainties in the environment, in sensor performance, and threat behaviors.

**Specifications Required:** Open architecture software that integrates with existing navy systems and databases.
Must enable real time threat assessment, and support mission evaluation and planning.

**Technology Developed:** DASS is a Tactical Decision Aid (TDA) designed to evaluate friendly submarine vulnerability to counter detection by A2/AD threats. DASS supports near real time vulnerability assessments to both known and unknown threats, and evaluation and recommendation of mission plans. DASS incorporates acoustic environmental data by using a new approach, developed by our STTR partners at the University of Michigan, called Area Statistics (AS) to quantify underlying measurement and modeling uncertainties and stochastic fluctuations. Further, DASS employs a statistical approach to the detection process, which allows DASS to provide insight in scenarios where enemy detection capability, location, and tactics are uncertain or unknown.

**Warfighter Value:** DASS provides enhanced situational awareness to friendly submarines by providing a comprehensive counter-detection vulnerability assessment against passive sonar threats. This real-time assessment specifies current level of vulnerability, and cumulative vulnerability over a window of time, alerting operators when risk is heightened or when short term projections indicate risk will be heightened. Additionally, DASS provides an Area Planning Mode (APM) that allows users to specify mission plans and objectives, and evaluates them with respect to counter-detection vulnerability. Further, DASS will provide recommendations that modify the mission plans to reduce overall vulnerability while satisfying stated mission objectives.

## WHEN

**Contract Number:** N00014-16-C-3009    **Ending on:** November 30, 2018

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|-----------|-----------|--------------------|-----------|------|
| Validation of AS in environments of interest | Med | Engineering level precision with >90% success rate | 5 | September 2017 |
| APB21 Step 1 | Low | Demonstrated benefit of DASS on classified data (threshold 25% reduced vulnerability in mission plans) | 5 | January 2019 |
| APB21 Step 2 | Low | Independent test and evaluation with real-world and simulated data | 6 | July 2019 |
| APB21 Step 3 | Low | Test and evaluation within submarine combat systems with real-world and simulated data | 7 | June 2020 |
| APB21 Step 4 | Low | Test and evaluation of DASS at sea | 8 | TBD |

## HOW

**Projected Business Model:** Daniel H. Wagner Associates will provide DASS functionality to the government as part of APB21, and further enhance DASS to support other applications. Since DASS is focused on minimizing acoustic vulnerability, the primary customers, in addition to IWS5A/PMS425/PMS401, would include DoD organizations developing undersea vehicles such as ONR, PMS406, and DARPA. We have extensive experience in technology transition, an example is N05-046, Multi-Sensor Data Fusion System, which transitioned search effectiveness optimization and evaluation modules into two programs of record (PoRs): Undersea Warfare Decision Support System (USW-DSS) (IWS5E) and Littoral Combat Ship ASW Mission Package (LCS ASW MP) (PMS420). In addition, we could license DASS for reducing acoustic vulnerability for surface ships and unmanned underwater vehicles (UUVs), as we have previously licensed data fusion systems for unmanned vehicles and border security (DFEN), and search optimization systems for mine warfare (MEDAL) and underwater search (MELIAN II).

**Company Objectives:** Daniel H. Wagner Associates is seeking to transition DASS into the submarine combat system as part of APB21.

**Potential Commercial Applications:** Daniel H. Wagner Associates is looking for additional applications of our technology and methodology to other similar technology gaps. In particular, DASS is applicable Unmanned Underwater Vehicles and surface ships looking to quantify and reduce their acoustic vulnerability.

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