# Department of the Navy SBIR/STTR Transition Program

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Topic # N141-010

Development of Analysis Techniques for Predicting Magnetic Anomaly Detection (MAD) Equipped UAV Performance in Naval Anti-Submarine Warfare Environment.

White River Technologies

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA 290, PMA 264

**Transition Target:** P8 ASW Squadrons.

**TPOC:**
(301)342-2552

**Other transition opportunities:**
National Oceanic and Atmospheric Administration (NOAA) tracking weather patterns.
Search and Rescue operations - specifically firefighters

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http://www.navy.mil/management/photodb/photos/140410
N-VD564-008

**Notes:** Two large and powerful trends are shaping the market place for Tactical Decision Aids for Magnetic Anomaly Detection applications. The first trend is the rapid adoption of low cost, unmanned aerial vehicles across the Dept of Defense. The second is the miniaturization of magnetometers using MEM manufacturing techniques which should result in a 100 fold decrease in cost, size, and power of magnetometers. Combined, these two trends will drive increased adoption of UAV based magnetometer missions which in turn will drive demand for Tactical Decision Aids (defense market) and survey planning tools (commercial market).

## WHAT

**Operational Need and Improvement:**
- Tactical Decision Aid (TDA) for ASW Mission Commander using UAVs equipped with magnetometers
- Provides Real Time assessment of Probability of Mission success
- Computes Probability of Detection of target submarine from magnetometer equipped UAV
- Lowers costs by reducing unnecessary UAV deployments

**Specifications Required:**
- Magnetic signature/movement of target submarine
- Geomagnetic and environmental background noise
- UAV capabilities such as speed, endurance, maneuverability and altitude
- Magnetic sensor characteristics

**Technology Developed:**
- Highly accurate, physics based model
- Explicit probabilistic modeling of target and background magnetic field signals
- Multiple complex environmental and mission related factors
- Actionable GO / NO GO decision data for Mission Commander

**Warfighter Value:**
- Increased Probability of Detection of submarines using UAVs
- Reduced Mission Commander workload
- Reduced reliance on MAD Operational Effectiveness (MOE) charts

## WHEN

**Contract Number:** N68335-15-C-0146 **Ending on:** May 30, 2017

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|---|---|---|---|
| Validate Noise and Target Simulations | Low | Successful validation and verification of individual models | TRL 3 | November 2015 |
| Develop Software Architecture | Low | Successful test of Modular Code Components | TRL 4 | March 2016 |
| Develop P-8A Integration Plan | Med | Navy accepts Plan | | August 2016 |
| Demonstrate Integrated TDA at PAX SIL | Low | TDA meets all requirements | TRL 6 | February 2017 |

## HOW

**Projected Business Model:**
- License MAD TDA software to prime contractor or designated subcontractor
- Provide support and software upgrades as UAVs, magnetic sensors are upgraded
- Upgrade software to accommodate new threat data

**Company Objectives:**
- License software and systems designs to DOD Prime contractors and related Subcontractors.
- Focus on innovation and leverage existing capability infrastructure of Prime and Subcontractor
- Deliver world class MAD mission planning tools and associated analysis and processing software

**Potential Commercial Applications:**
- UAV based Infrastructure Inspection market (II)
- Inspection of bridges, building, pipelines and other metal containing infrastructure
- Likely to be the first large, non-military, industrial UAV magnetic analysis application.
- We intend to pursue the commercial mission planning software market for magnetometer equipped UAVs.

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