

# Department of the Navy SBIR/STTR Transition Program

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SSP 10 Jan 2018

Topic # N132-144

Development of Novel and Emerging Technology for the Enhancement of Fault Diagnostics Intelligent Automation, Inc.

## WHO

**SYSCOM:** SSP

**Sponsoring Program:**

**Transition Target:** Electrostatically Supported Gyro Navigator (ESGN) Stable Platform and Housing (SP&H)

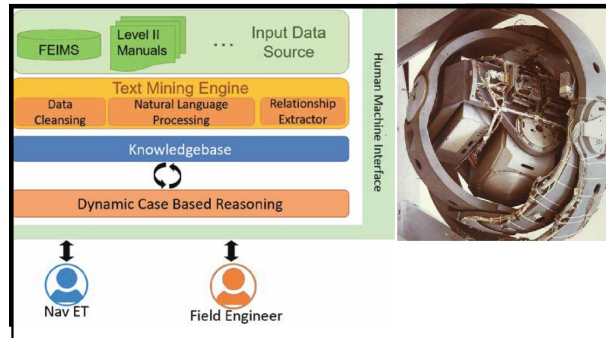
**TPOC:**

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**Other transition opportunities:**

This technology can also be used in any advanced system that requires maintenance, such as a commercial Autonomous Underwater Vehicles (AUV).

**Notes:** Our Adaptive Prognostics Tool (APT) employs a Dynamic Case-Based Reasoning approach which is a powerful technique for Fault Diagnosis and Prognosis. APT is a self-learning, adaptive software tool that quickly diagnoses and provides pertinent repair recommendations.



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## WHAT

**Operational Need and Improvement:**

Navy needs an advanced software tool to diagnose complex problems with critical submarine equipment like the Electrostatically Supported Gyro Navigator (ESGN) Stable Platform and Housing (SP&H). With a large number of complex sub-assemblies, it is difficult to troubleshoot ESGN system. The current approach can be improved significantly by using an advanced software tool like APT.

**Specifications Required:**

An advanced software tool running smart algorithms to recommend ranked best courses of action for any given troubleshooting scenario for complex submarine navigation system, ESGN.

**Technology Developed:**

An advanced software tool running smart algorithms to recommend ranked best courses of action for any given troubleshooting scenario for complex submarine navigation system, ESGN. The Adaptive Prognostics Tool (APT) mines vast quantity and variety of information from Field Engineer Information Management System (FEIMS) and Level I/II manuals so it can be used to guide Navy Electronic Technicians down the most probable repair path in order to reduce Mean Time To Repair..

**Warfighter Value:**

1. Improved maintenance efficiency by presenting accurate and concise troubleshooting recommendations
2. Self-learning tool allowing accumulation of experience from inclusion of the new maintenance cases
3. Simplifying the maintenance steps for complex failure cases and reduce system downtime due to maintenance activity
4. Eliminate expenses related to unnecessary part ordered due to tight maintenance schedule
5. Increased mission readiness while reducing Total Ownership Costs
6. Database of maintenance history of ESGN for the entire fleet

## WHEN

**Contract Number:** N00030-16-C-0003 **Ending on:** March 30, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
System test at ground based laboratory with Field Engineers (FE)	Low	Operational verification and results verified by FEs	4	October 2017
Achieve TRL 5	Low	Adjudication of Field Engineer's feedback from land based testing	5	February 2018
Conduct successful demonstration and testing in a relevant environment	Med	Successful demonstration of baseline version of APT	6	March 2018
Prototype APT deployed with Field Engineers and Navigation Electronic Technicians	High	Successful demonstration of troubleshooting improvement	7-8	September 2018

## HOW

**Projected Business Model:**

Efficient diagnosis of trouble scenarios is key to the efficient maintenance of complex equipment. A smart tool like APT is system agnostic and can learn about failure patterns for any system. This technology is applicable to maintenance of any complex commercial system. The specific need of these systems will be incorporated in this technology and licensed to specific users.

**Company Objectives:**

IAI is a technology innovation firm that matures concepts to functional prototypes, productizes its prototypes, and commercializes its innovative products through extensive government and industry partnerships. The APT technology is a fundamental component to many government and industry needs and will be used across our products to the benefit of our government and industry customers.

**Potential Commercial Applications:**

APT is applicable to any complex system with or without user in the loop. The state-of-the-art prognostic-diagnostic system we have developed learns from component and system behavior in the past and fault tree to trouble shoot any failure case. From historical and reliability data, prediction of future degradation and failures can also be made. Any system that has past data and/or fault tree and want to improve maintenance efficiency can benefit from APT technology. The commercial application is virtually any complex commercial equipment/system.

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