

# Department of the Navy SBIR/STTR Transition Program

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NAVWAR

Topic # N182-138

A Metadata Management and Visualization System for Radio Frequency Activity Modeling and Pattern Recognition  
Intelligent Fusion Technology, Inc

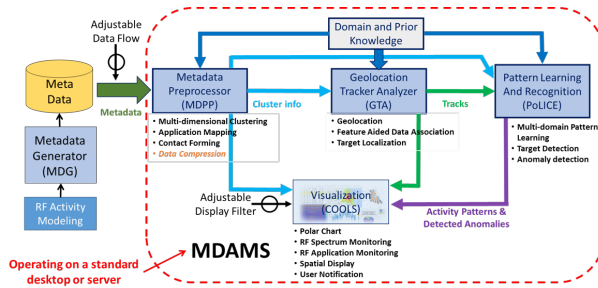
## WHO

**SYSCOM:** NAVWAR  
**Sponsoring Program:** PMW 120  
**Transition Target:** PMW 120

**TPOC:**  
(619)553-2344

**Other transition opportunities:**  
Distributed Common Ground Station (DCGS),  
Protected Tactical Enterprise System

**Notes:** The Metadata Management and Visualization System (MDAMS) we have developed enables the processing of huge amount of RF metadata in real-time using machine learning methods. The system is able to automatically learn the patterns of RF activities that happen around the Navy ship, and detect anomalies. The results are displayed to the operators via a user-friendly GUI. This new technology enables the RF situational awareness capability of the Navy's SSEE and helps the operators to better understand the situation around them on the battlefield.



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## WHAT

**Operational Need and Improvement:** The Navy SSEE operators demand software for their system to automatically analyze a huge amounts of metadata extracted from intercepted RF signals for RF situational awareness. The software should be able to learn the activity patterns from the metadata and detect anomalies in the metadata. The results should be displayed to the operators with a user-friendly GUI.

**Specifications Required:** It is required that the developed software should be able to automatically learn the RF activity patterns from the metadata stored in a database. The data processing should achieve real-time in order to finish the processing before the data is deleted from the database due to the storage limitation. The proposed algorithms should fit the performance of the hardware. The discovered information should be presented to the operators via a user-friendly GUI that follows the Navy's display standard.

**Technology Developed:** We have successfully developed a web-based software Metadata Management and Visualization System (MDAMS) that can achieve real-time metadata processing using machine learning methods to model the RF activity patterns and detect anomalies around the Navy ship. The results are displayed to the operators in various data visualization charts and tables to help the operator understand the situation around.

**Warfighter Value:** Our MDAMS is able to discover critical information about the RF activities that happen around the Navy ship, which can further reflect the threats and hidden targets in the mission area. With this capability, our product can support the Navy operators to achieve mission success.

## WHEN

**Contract Number:** N68335-20-C-0306 **Ending on:** September 29, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Concept Design	N/A	Design Documentation	TRL 3	February 2020
Develop and evaluate full-scope prototype in simulated environment	N/A	Performance evaluation of MDAMS with Navy Users	TRL 5	September 2021
Field test prototype on Navy platform in an operational scenario	Low	Achieve the desired performance criteria in the field test with real data.	TRL 7	November 2022
Product Integration and Transition	Med	Satisfy all desired requirements proposed by the customer after deploying onto the target Navy platform.	TRL 8	December 2023

## HOW

**Projected Business Model:** Intelligent Fusion Technology has over 10 years of steady growth providing innovative, cost-effective solutions through R&D. Over 50 IFT projects have produced a wealth of advanced-technology prototype software that can facilitate the rapid integration of critical technology into operational systems. IFT will license the MDAMS technology to large system integrators and integrate it into existing Navy platforms. The first near term DoD application target would be the Battlespace Awareness and Information Operations PMW 120, whose overarching mission is to deliver oceanographic and intelligence operational information, data, products, and services to sailors. Once integrated, IFT will provide users with full documentation on how to use the features of MDAMS and technical support on system maintenance and improvement.

**Company Objectives:** RF communication, signal processing, electronic warfare, and AI/machine learning are core business areas for IFT, making the success of this effort fall squarely within our corporate interests and competencies. IFT expertise will ensure the success of the innovations developed under the MDAMS program beyond the SBIR contract. In particular, IFT plans to pursue a multi-part plan to transition this technology to the U.S. Navy and other U.S. Government customers, as well as provide benefits to commercial markets and customers seeking to improve the operational readiness of electronic warfare systems with the capability of enhanced RF situational awareness and RF activity modeling.

**Potential Commercial Applications:** We expect the MDAMS to have immediate and tangible benefits for a number of commercial systems that require RF situational awareness, RF activity modeling, and anomaly detection in the signal domain, such as wireless technology, RF spectrum management, and RF device sectors. We will develop a broad commercial product to enable enhanced RF situational awareness and RF intelligence for both government and commercial partners in the RF communication-related areas.