

Transition

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.

SBIR Topic Number:
AF06-051

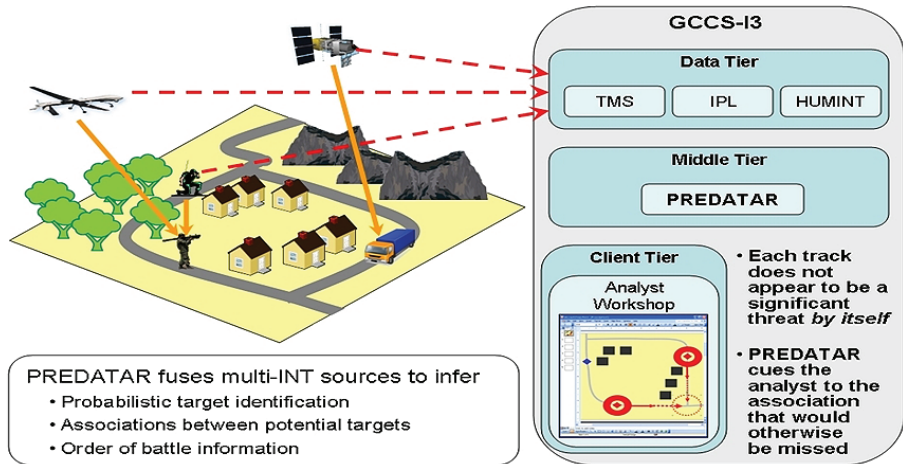
SBIR Title:
Track Type Predictive
Algorithm

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SBIR Company Name:
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Inc., Cambridge, MA

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Preemptive Actions with Dynamic Anticipatory Targeting (PREDATAR) Operational Concept (OV-1)



PREDATAR Operational Concept

Preemptive Actions with Dynamic Anticipatory Targeting (PREDATAR)

- The Air Force has a requirement to improve the dynamic targeting process of emerging, high-payoff, short dwell, or highly mobile time sensitive targets (TSTs)
- PREDATAR was demonstrated as an extension to the Global Command and Control System – Integrated Imagery and Intelligence (GCCS-I3) in the AF Air Operations Center
- Charles River Analytics, Inc. has developed PREDATAR to provide probabilistic identification of potential TSTs well in advance of their positive identification via the ISR process
- This novel approach to automated multi-source intelligence analysis using ontological reasoning has many potential applications in both the military and commercial arenas

Air Force Requirement

Positive identification (PID), a key step in the dynamic targeting process that determines the intent and target type of an emerging target, has become a bottleneck for prosecuting time sensitive targets (TSTs) in the Air Force Air Operations Center (AOC). TSTs are targets that are usually described as “emerging, perishable, high-payoff, short dwell, or highly mobile.” The importance of such targets has been met with significant improvements in the scope and lethality of air strike capabilities once they have been positively identified. Unfortunately, effective technology for PID of TSTs has lagged seriously behind the technology of the offensive platforms, frequently requiring far longer than the narrow window of opportunity available to strike the TST. The objective of this research is to alleviate this bottleneck in the dynamic targeting process by developing technology to predict track types of emerging, potential TSTs, thus making more opportunities available to successfully prosecute these TSTs.

SBIR Technology

Charles River Analytics, Inc. developed their Preemptive Actions with Dynamic Anticipatory Targeting (PREDATAR) system under this SBIR program in order to perform automated multi-source intelligence analysis for enhanced intelligence preparation of the battlespace (IPB). Positive identification of potential TSTs is difficult for human analysts due to the overwhelming volume of intelligence data from traditional and non-traditional intelligence, surveillance, and reconnaissance (ISR) sources, especially when there are thousands of potential targets being tracked over extended periods. PREDATAR addresses this problem by providing probabilistic identification (Probid) of potential TSTs well in advance of their PID eventually provided by the IRS process. The Probid for a TST represents the most accurate estimate available at any point in time for the target type of the TST, based on five criteria: 1) the (automated) expert knowledge of the AOC staff, 2) ontological reasoning about what sorts of targets are likely to occur in the campaign, 3) credibility checks designed to rule out obvious errors, 4) automated learning of the recent history of TST types occurring in the campaign, and 5) specific reasoning about critical target types, e.g. SCUD missiles.

Transition Impact

PREDATAR-enabled client systems will cue the analyst to potential TSTs and relevant relationships as determined by

the reasoning components. PREDATAR provides rationale in support of the hypothesis, allowing the analyst to make an informed decision using all available data. The result is increased overall situation awareness and improved tactical planning.

PREDATAR was evaluated as an extension to the Global Command and Control System – Integrated Imagery and Intelligence (GCCS-I3) environment for the AOC. GCCS-I3 is a Joint software initiative designed to enhance the operational commander’s intelligence situation awareness and track management through the use of a standard set of integrated, linked, software tools and services that maximize commonality and interoperability across the tactical, theater, and national communities. PREDATAR was implemented as a middle tier GGCS-I3 service that consumes multi-source information from the GCCS-I3 data tier and other middle tier services to support enhanced IPB. PREDATAR interacts with the client tier to cue the analyst to probabilistic identifications and relationships of potential targets. The forum for the demonstration and evaluation of the PREDATAR enhancement to GCCS-I3 was Empire Challenge 2010, the U.S. Joint Forces Command’s annual joint and coalition ISR interoperability demonstration held at Fort Huachuca, AZ.

Company Impact

Charles River Analytics developed a novel approach to automated multi-source intelligence analysis using ontological reasoning to maximize the evidential value of each intelligence product. This approach has application in a wide range of intelligence and information processing applications such as space object characterization or integrated intelligence analysis and collection planning. Commercial applications include a wide variety of contexts requiring identification of critical situations that might lead to catastrophic failures. These may include overall management of life and property in case of unprecedented weather emergencies such as hurricanes, wildfires or floods, outfitting operation centers for complex process control (e.g., nuclear power plants or water resource distribution), handling emergencies arising from terrorist attacks on utility providers (e.g., electrical power distribution or computer networks), road traffic management centers, and surveillance centers for law enforcement. PREDATAR technology also complements Charles River’s AgentWorks™ toolkit which allows users to design, build, and test complex intelligent systems via an intuitive graphical user interface without writing code.



SBIR/STTR

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