

Transition

SBIR Topic Number:
AF06-077

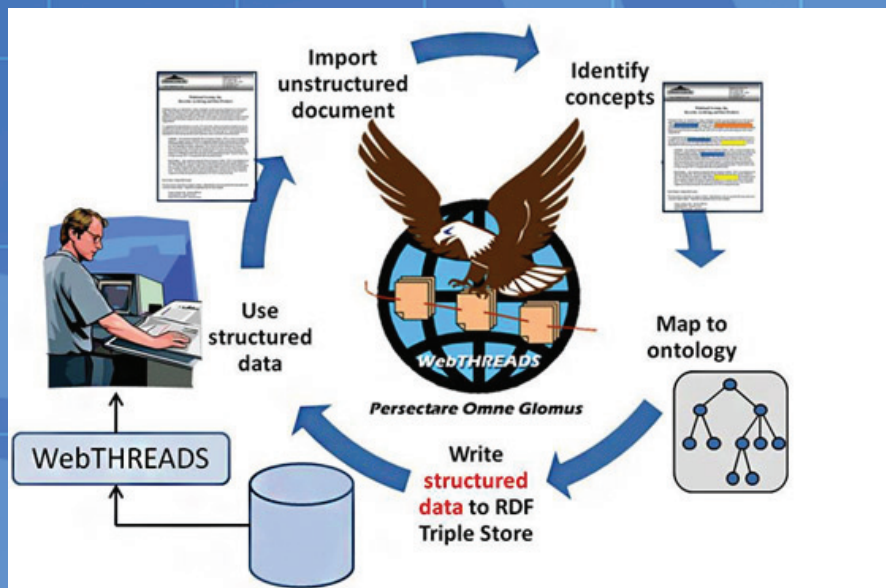
SBIR Title:
Decision Explanation
Engine Platform

Contract Number:
FA8750-07-C-0040

SBIR Company Name:
Modus Operandi, Inc.,
Melbourne, FL

Technical Project Office:
AFRL Information
Directorate, Rome, NY

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.



Decision Explanation Platform Semantic Enrichment Process

Decision Explanation Engine Platform

- There is a need to develop a decision support capability using information integrated from structured and unstructured sources
- Modus Operandi's (MO) technology developed under its Decision Explanation Engine Platform (DEEP) SBIR project semantically enriches information for decision support applications
- The technology developed on the DEEP SBIR contract uses Natural Language Processing (NLP) and text analysis techniques to improve the information retrieval results from unstructured human intelligence data
- In an extension to the DEEP Phase II SBIR contract, MO integrated its technologies into the Web-based Threat HUMINT (HUMAN INTELLIGENCE) Reporting Evaluation Analysis and Display System (WebTHREADS) to associate intelligence reports with user-defined case folders

Air Force Requirement

Commanders are required to make mission-critical decisions based on information that is often distributed, non-integrated, and represented in many structured and unstructured formats (e.g., situation reports, database entries, voice, e-mail, etc.). There is a need to develop a method of semantically enhancing operational processes to improve stakeholder understanding and thereby improve a commander's decision-making ability, an overarching goal of the USAF 45th Space Wing's Knowledge Management Initiative.

SBIR Technology

Modus Operandi's (MO) technology developed under the Decision Explanation Engine Platform (DEEP) Phase II SBIR contract semantically enriches information for decision support applications. The basis of the DEEP approach is reasoning over federated persistent and real-time event data to support Air Force missions. The technology developed on the DEEP SBIR contract uses Natural Language Processing (NLP) and text analysis techniques to improve the information retrieval results from unstructured human intelligence (HUMINT) data. MO's semantic enrichment technology uses metadata to tag and transform unstructured text or raw data into meaningful and relevant content. A semantic filter examines these tags to determine if the content is relevant to the search. Using an ontology or semantic model of a domain, abstract concepts and relationships can be discovered.

Further, in an extension to the DEEP Phase II SBIR contract, MO integrated its technologies into the Web-based Threat HUMINT (HUMAN INTELLIGENCE) Reporting Evaluation Analysis and Display System, or WebTHREADS. WebTHREADS is an intelligence fusion application that allows rapid integration of multi-source data and the corroboration of information across the intelligence spectrum. The existing WebTHREADS system relies upon word lists, gazetteers, and dictionaries to find important pieces of information for the analysts.

The intent of this effort was to leverage MO's semantic technology capabilities to enhance the parser component of WebTHREADS, thus improving the precision and recall of the operational intelligence system. Parsing involves analyzing large amounts of unstructured reports and finding Essential Elements of Information (EEl)s, making the analysts' job much easier as they look for information that is relevant to the analysis they are performing. MO calculated the precision and recall by using a method called F-Measure, which was

developed and used by the National Institute of Standards and Technology (NIST) for information retrieval systems. Precision is the number of correct results out of all returned results and recall is the number of correct results out of the results that should have been returned. MO's NLP and text analytic technologies improve precision and recall by taking into account grammar, language constructs, and usage.

Transition Impact

The MO-developed parser and correlator were successfully integrated into a WebTHREADS software build. Although the MO parser and correlator improved the F-Measure on a subset of message types, there was not sufficient time or funding allocated to this effort to enable the processing of all required message formats. Therefore, the technology was integrated into a version of WebTHREADS but has not been deployed for operational use.

Even though limited resources prohibited further development of this technology for complete integration into WebTHREADS, this effort is considered a success by all involved parties. This effort proved that the DEEP technology does provide enhanced data mining through semantic technology and can be integrated into existing operational systems. Additionally, the DEEP technology was matured under this effort and is being integrated into other operational systems.

Since the technology itself is unclassified and most of extracted EEl)s types are not specific to the existing WebTHREADS system, it can be used in unclassified applications such as parsing and correlating information for Homeland Security operations as well as law enforcement. The technology also has potential commercial applications outside of the government, including healthcare, drug discovery, and wiki sites.

Company Impact

"This SBIR project has helped MO to mature the Technology Readiness Level of the semantic technology that the company has spent considerable research and development (R&D) time on," states Dr. Mark Heileman, MO Vice President, Advanced Programs. "The project resulted in adding the text analytics refresh product to the MO solution catalog. It is helping to shift the focus of the company from that of R&D to one of deploying tested technology that is ready for use to support the warfighter. Moreover, this project may lead to additional business for MO, as the company plans to use some of the delivered technology in other customer areas, such as the Distributed Common Ground Systems (DCGS) family of systems."



U.S. AIR FORCE

SBIR/STTR

Air Force SBIR Program
AFRL/XP
1864 4th Street
Wright-Patterson AFB OH 45433

AF SBIR/STTR Program Manager: Augustine Vu
AF CPP Program Manager: Richard Flake
Website: www.afsbirsttr.com
Comm: (800) 222-0336
Fax: (937) 255-2219
e-mail: afrl.xppn.dl.sbir.hq@wpafb.af.mil

