AFRL/IF Technology Transition to the Warfighter via the CAOC-X

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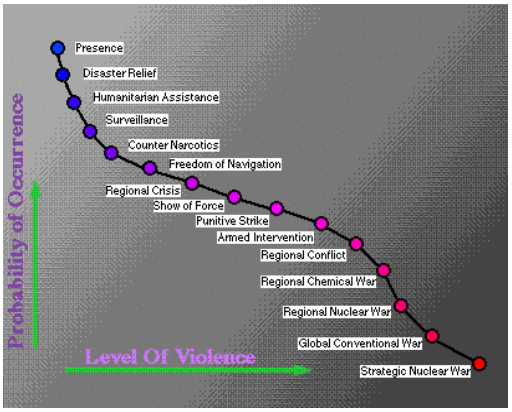
Abstract

The role of information technologies has played a significant role in conducting military operations since Operation Desert Storm. Over the past ten years, the Air Force Research Laboratory's Information Directorate (AFRL/IF) located in Rome NY has directly supported the warfighter by transitioning critical technologies through the Air Force Command and Control Intelligence, Reconnaissance and Surveillance Center's (AFC2ISRC) Combined Air Operations Center – Experimental (CAOC-X). The CAOC-X is part of AFC2ISRC's efforts to rapidly develop and field capabilities critical to the warfighter utilizing the spiral development model of system acquisition. These technologies are designed to support the warfighter through all phases of conflict as well as providing support to various Homeland Defense initiatives. This paper provides a short summary of each of the various technologies that have been transitioned since the CAOC-X's inception in 2000 as well as some near term candidates for transition in the future. The technologies discussed are: Broadsword, Adaptive Sensor Fusion, Cognitive Desktop Manager, Web-enabled Timeline Analysis System (WebTAS), Information Support Server Environment (ISSE) Guard, Trusted Transfer Agent (TTA), Master Caution Panel (MCP), and lastly, the Joint Targeting Toolbox (JTT) efforts that AFRL/IF has successfully transferred to the warfighter through the CAOC-X at Langley AFB, VA.

Introduction

The Air Force C2 Intelligence, Surveillance and Reconnaissance Center (AFC2ISRC), located at Langley AFB, VA, has developed a place and process to allow for the rapid prototyping and subsequent fielding of the AOC Weapon System, called the Combined Aerospace Operations Center - Experimental (CAOC-X).



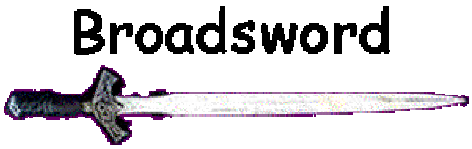
The purpose of the CAOC-X is to rapidly field systems to the warfighter to support all levels of conflict.

The CAOC-X allows for a steady flow of new capabilities for evaluation, feedback, and refinement by the operational warfighter. More importantly, it allows the User a place to evaluate products early in the acquisition life cycle. Ever since the CAOC-X was created by the AFC2ISRC, the Air Force Research Laboratory's Information Directorate (AFRL/IF) has been able to

rapidly transition its technologies directly to the warfighter.

Technology Transitioned to the Warfighter Through the CAOC-X

To date, many of the systems currently being tested within the CAOC-X have been developed by AFRL/IF. The following are examples of AFRL/IF's programs that have been, or will in the near future, transitioned into the CAOC-X.

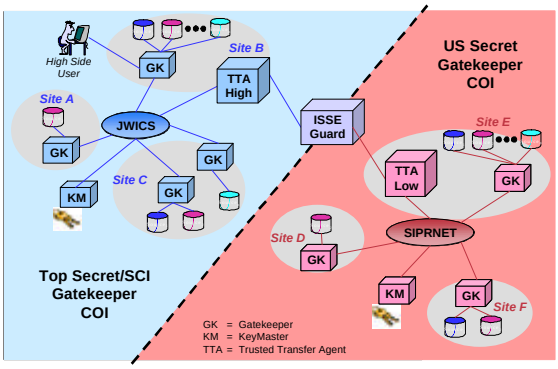


Broadsword
Broadsword provides a single, secure browser interface enabling access to information that can exist anywhere. Broadsword takes advantage of Internet technologies to allow for platform independence, access using any type/format along with COTS, shareware, or freeware.

Broadsword is composed of three elements: gatekeeper, keymaster and a client. The gatekeeper's function is to provide support for trusted and brokered login policies and to control login/logout, requests, product pulls, and administrative changes. The gatekeeper is a single application process interface (API) that is used to access multiple sources of information. The gatekeeper is a thin layer of code that audits all user requests and accesses, routes request to appropriate sources, combines all responses into a single unit, and provides an interface to specific sources performed by plug-ins. It allows both structured and unstructured formats and provides access to imagery, video, audio and text products.

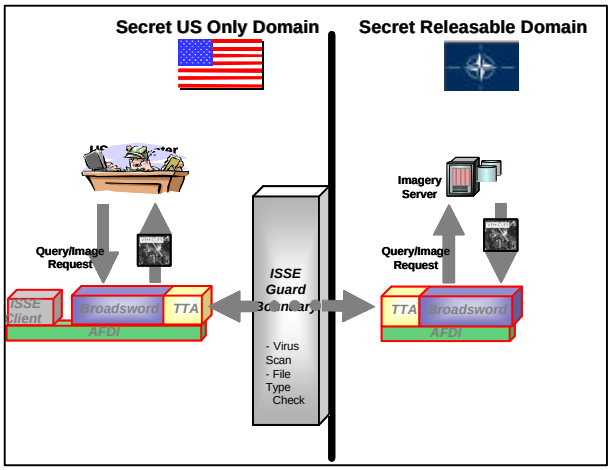
The second element of Broadsword is the Keymaster. Each Gatekeeper registers with the Keymaster for remote connectivity. The Keymaster distributes global maps and updates the network based on Digital Certificate Technology (X.509).

The third element of Broadsword is the Client: the end user of the system.



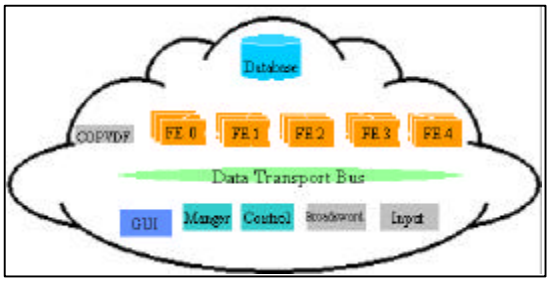
ISSE Guard and Trusted Transfer Agent
The purpose of both the Information Support Server Environment (ISSE) Guard and Trusted Transfer Agent is to allow for up/down information flow across security boundaries. Both programs have been certified by the Defense Intelligence Agency and are in use across the intelligence community. Currently ISSE Guard is fielded in over 100 sites worldwide. The ISSE GUARD is the security interface for the CAOC-X.

Joint Targeting Toolbox (JTT)
In 1999, AFRL/IF was chosen to further develop the targeting tool Rapid Application of Air Power (RAAP) into the Joint Targeting Toolbox (JTT). JTT will be the targeting package to be used by all the Services and our Coalition Partners. Version 1.0 of the JTT successfully was tested within the CAOC-X and was fielded last year. Currently, V 3.0 is currently being fielded within the CAOC-X.



Coalition Information Architecture

Utilizing Broadsword, ISSE Guard and the Trusted Transfer Agent within the CAOC-X, this allows for the integration of US and Coalition information into a coalition information architecture.



Adaptive Sensor Fusion

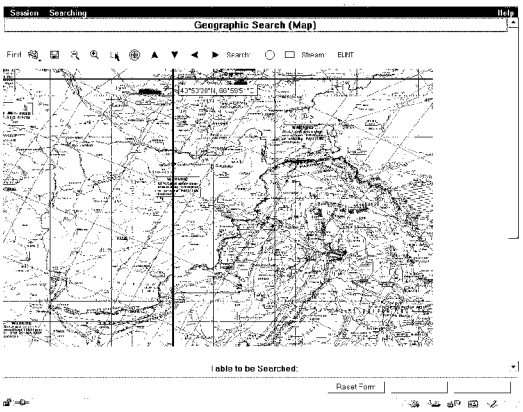
A fundamental element of the AOC Weapon System is that of "time critical targeting (TCT)". The cornerstone for TCT development is the Adaptive Sensor Fusion (ASF) Program; which is building an open, standards-based architecture for information fusion. The philosophy of the open, plug and play fusion architecture is to provide a system that provides standard data and application interfaces to maximize interoperability among different fusion systems. The fusion architecture includes an adaptive fusion manager that optimizes the performance of the selected confederation of fusion engines. Optimization and control of the fusion process will result in effective and complete use of the available sensor data. ASF is a framework that supports an automated implementation of domain-specific distributed object architectures. It produces loosely coupled systems, with support for incremental domain refinement, and system deployment. The ASF program will build an infrastructure that allows diverse sensors to inter-operate. The anticipated benefits including:

1) a distributed system that can respond to user needs or requirements by tasking multiple sensors over the network;

2) an environment and test bed that permits the evaluation and quantification of the performance characteristics (measures of effectiveness and performance) of fusion components;

3) a system design that not only reduces life cycle costs but also supports system evolution of both the data ontology and the middleware COTS components for data transport and database technologies; and,

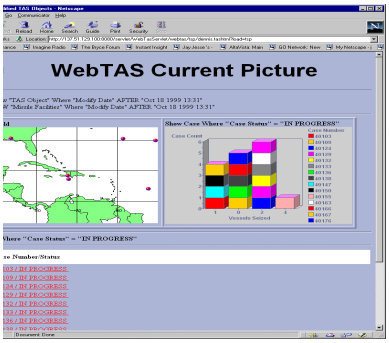
4) a data ontology technology that promotes interoperability between heterogeneous software components that encompasses the realm of C3 software requirements.



Cognitive Desktop Manager

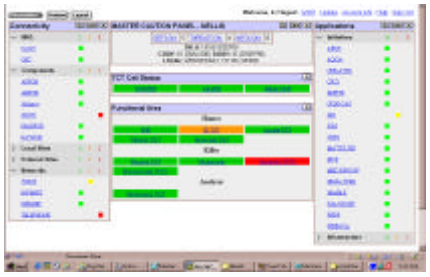
The objective of the Cognitive Desktop Manager (CDM) is to develop a set of automated tools to manage multiple sources (e.g., NIMA's Image Product Library), multiple formats (imagery, maps, and text), and improve the analysis and decision making process. At the heart of the overall architecture is a robust, thin layer of middleware software which performs a variety of internal functions, including processing user's queries and retrieval; auditing (secure infrastructure);

communicating with various sources; interconnecting with Broadsword sites; maintaining system status; and collection/compilation of results. Every command center performs four basic functions: monitoring the situation, assessing its progress against mission planning objectives and metrics, planning actions to accomplish the assigned mission, and executing plans in a dynamic environment. CDM provides the means to bring scattered intelligence information to the desktop of the warfighter. The warfighter will be able to devote more of their cognitive processes to the work of analyzing relationships between C2 and ISR data instead of just retrieving data.



Web Enabled Timeline Analysis System (WEBTAS)

The WEB enabled Timeline Analysis System (WEBTAS) is an expert system that inter-correlates events into a linear timeline. This enables a commander to rapidly view seemingly uncorrelated events and allows for more informed, decisions. The C2 Battlelab has incorporated WEBTAS on the DataWall, which is located within the CAOC-X to demonstrate the utility of this system in a large-scale visualization environment. The WEBTAS program will allow for the rapid infusion and display of information for the commander.



Master Caution Panel (MCP)

The Master Caution Panel is a system that monitors and reports on the status of an entire network environment, to include applications. It was first successfully demonstrated at the Joint Expeditionary Force Experiment (JFEX) 2000, a large scale Air Force experiment designed to prepare for the challenges of the 21st century expeditionary operations. The demonstration included an automatic display of the health status of the JFEX and the network management system used by the JFEX Networks Operation Center. AFRL/IF, working closely with the AFC2ISRC, developed user interface modifications in accordance with the Joint Battlespace Infosphere Management (JBIM) Process initiative. The MCP was highly successful and helped bridge the gap in capabilities to the warfighter by providing the Joint Forces Air Component Commander personnel with a tailorable, web-based application to manage C2 as a Weapon System. The Master Caution Panel has been selected to be included in the AOC Block 20 upgrade.

Interactive DataWall

The Interactive DataWall enables effective display & manipulation of large amounts of real-time, multimedia data in a Command and Control (C2) environment. The DataWall enables collaboration and interaction; a key to solving the information management problems facing the 21st century military commander. Fixed, portable, & deployable versions are available. Currently, a portable DataWall has been installed in the CAOC-X.

Summary

Over the past several years, AFRL/IF has provided significant technology to the warfighter, via the CAOC-X.

The goal of the CAOC-X is to rapidly field systems to the warfighter that will satisfy the following top-level requirements: reducing the large footprint, providing a distributed environment, providing reachback capability, multi-level security, rapid and seamless intelligence operations within the AOC, and, providing seamless interaction/integration among the essential elements within the AOC.

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