

Systems Engineering for Air Force ITW/AA “Systems of Systems” and Global Strike Task Force (GSTF)

General Description of Programs and Projects:

Over the last 15 years CTA has provided a broad range of system and segment integration, installation, test and evaluation for the Cheyenne Mountain Upgrade (CMU) Integrated Tactical Warning and Attack Assessment (ITW/AA) System, a multi-billion dollar “system of systems” that continues today as the largest military communications network in the world. CTA has delivered a full range of system life-cycle products, ranging from early acquisition plans and strategies through final integrated and tested “turnkey” systems.

Throughout the life of this ITW/AA acquisition effort, CTA provided program management, systems engineering support, and implemented processes to (1) identify and resolve technical, cost, and programmatic “disconnects,” and (2) identify and monitor critical activities that might adversely affect the Congressionally-mandated schedule. CTA performed technology assessments and engineering evaluations of available hardware and software, developed training curricula for both classrooms and in the field (adopted by the Government for certification of individual test managers), and was recognized for being instrumental in reengineering Air Force acquisition policies and processes, thereby producing an Air Force-wide Best Practice for buying and building major information systems.

CTA provided a broad range of test and evaluation support, from DT&E of individual segments through OT&E of major CMU systems, interfaces, and mission strings within the ITW/AA system. Overall, this test and evaluation effort involved a worldwide network of sensors, communications systems, command and control centers, and correlation centers that included 30 mainframes, 20 networks, 4,000+ workstations, and more than 10,000 end users in over 100 operating locations. CTA developed and refined test processes that proved critical to completing test and evaluation safely, with due consideration of all security issues, and ahead of schedule. As one of only two contractors allowed to exercise control over Air Force systems during test, CTA produced approximately 75% of the Government-certified test engineers.

Concurrent with this effort, CTA supported (and supports today in the first instance) two Air Force Space Command (AFSPC) headquarters initiatives: the Requirements Directorate (DRN) Battle Management Command & Control (BMC2) and Information Technology (IT) project; and the Operations Directorate (XOS) Shared Early Warning System (SEWS) project.

- In regard to the first initiative, BMC2, CTA continues to provide technical and management support for evolving, modernizing, and transforming AFSPC BMC2 and communications systems into an effects-based operational and technical architecture. Employees assigned as project staff members analyze and document system operational requirements, plan the transitions from legacy to new systems, forecast the resources for successful operations, and assess the impacts of integration with other C2 systems.

CTA's system evolution *planning* balances available funding with existing and new NORAD/USSTRATCOM mission requirements, legacy systems' cost and capability projections, physical facility limitations, DOD system acquisition policy, and the dictates of commercial and government standardization initiatives, such as Defense Information

Infrastructure Common Operating Environment (DII/COE) and the recent Net-Centric Vision from DOD/CIO.

- In regard to the second initiative, the XOS SEWS project, CTA provided onsite support to develop operational requirements, followed by the design and development of an operational view (OV) of the architecture. The company authored the SEWS Concept of Operations (CONOPS), which was eventually merged into the Theater Early Warning CONOPS. This effort required continual interaction with theater warfighters and foreign partner-nations worldwide.

The CTA Integrated Weapons Systems Database (IWSD) is an integration of commercial off-the-shelf (COTS) system components developed to facilitate the management of system-level interfaces, data messages, mission strings, and legacy documents for the Strategic and Nuclear Deterrence Command and Control (SNDC2) System Program Office (SPO). It is a client-server information management system that stores document elements as information objects in a common database, allowing these elements to be shared and reused in multiple products. It supports objects of varying types and sizes, and manages a wide variety of text and other object types including SGML, XML, word processing files, text, tables, forms, animation, sound, and graphics. The IWSD uses a commercial product to automate production and delivery of documents and data via Internet and Intranet documents from a common database that supports other publishing functions across an organization. The CTA project staff currently provides all system administration and support functions.

In 1992 CTA was responsible for this system integration of COTS products and has continuously provided IWSD support to the government ever since (the contractual relationship today is through Lockheed Martin on the ISC2 contract). IWSD is the solution to the problem that ITW/AA system components, sensors and computers could not effectively communicate, and its continued use as the single source for ITW/AA system information is mandated by HQ NORAD instructions. CTA is presently focused on ensuring success of the technology refresh program.

Both classified and unclassified IWSD systems are housed in secure facilities, on secure networks, behind their own state-of-the-art firewalls, certified and accredited through the efforts of information security professionals. The system provides worldwide web browser access through password control for over 6000 modules of interface and message data to more than 355 active users of the system.

CTA supports AFSPC/XO on the Mobile Consolidated Command Center (MCCC) integration project. The primary goals of flexibility, interoperability and reduced cost of ownership for both NORAD/USSTRATCOM fixed and endurable command and control computer systems dictate compliance with the higher level DOD goals of integrated and interoperable systems. This CTA project provides systems engineering, integration support, migration applications for development and deployment, configuration management and training to meet the DOD guidance for implementation of MCCC programs. CTA's three tasks include (1) engineering and integration support for review, analysis and design evaluation activities for compliance with identified standard/common/migration applications, (2) operations support to provide MCCC training, requirements and configuration control support, and (3) relocation and transition planning management during MCCC relocation and transition to online operations.

In 2002 the company entered the space systems/intel market, and today provides expert space systems engineering and mission control system support to both AF/JPO space based radar (SBR) program and the NRO future imagery architecture (FIA) program in support of GSTF. Further, CTA is a key member of the GSTF net-centric surveillance and targeting (GNCST) contractor team, a classified effort automating targeting functions through the development and application of intelligent software agents to compress targeting timelines for the warfighter. To enable the deployment of this C2ISR architecture globally, within areas of interest for prosecuting time-sensitive targets, CTA is developing ontology-based software and associated GNCST agent infrastructure to facilitate more timely and efficient processing of the multi-sensor, net-centric targeting data and processes. These applications involve choosing the most appropriate algorithms and sensor data (to process) based on targets of interest, target priority, target/sensor observables, sensor observation opportunities, and other target characteristics. The intelligent 'smart' agents and support infrastructure further permit efficient utilization of ancillary intelligence and domain experts, otherwise extremely difficult to incorporate in a net-centric environment. A demonstration of CTA's software agents, and concomitant reduction in warfighter targeting timelines, is scheduled for early 2005.

CTA is also designing and building enterprise ontologies and related agent-based reasoning tools in support of "insider threat" detection under contract to NSA/ARDA. Several SETA tasks supporting DOD organizations have been recently awarded to CTA including:

- Support to the FIA and GNCST programs for data fusion and ISR tasking, processing, exploitation and dissemination efforts associated with space surveillance and battlespace characterization missions, as well as support of the MASINT S&TI mission. These tasks are accomplished by developing and exploiting information management (IM) technologies related to the system capabilities, with the goal being to substantially reduce the timeline from event observation to the reporting of actionable information, while reducing false detections and improving the accuracy of the reporting.
- Support to the SBR program for concepts, roadmaps, systems engineering, architecture studies, modernization planning; rapid prototype & demonstration, test & evaluation, configuration management, logistics, sustainment, transition planning, and O&M. Studies and analyses topics cover DOD/OSD, military Services, IC (to include NRO and the Space Architect), civil agencies (to include NASA), and industry.