Air Control Squadron Mission Training System
Prepared for HQ ACC/DOY
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Overview

Senior leaders within the U.S. Air Force recognizing deficiencies in Command and Control (C2) training, activated programs such as Distributed Mission Training (DMT), Advanced Distributed Learning (ADL), Joint Synthetic Battlespace (JSB), to generate and implement solutions that will enhance force readiness. These programs target an increase in realistic training opportunities for the warfighter that cannot be achieved with forces in the field due to cost, safety, resource limitations and scheduling. A significant component within these programs is the use of simulation to represent the real world. This paper presents an affordable solution to create a simulation based training system for the Air Control Squadron (ACS), a C2 member of the Ground Theater Air Control System (GTACS) that functions as a Control and Reporting Center (CRC) during combat operations.

Background

HQ Air Combat Command (ACC) Director of Battle Management is responsible for training, organizing and equipping the GTACS elements through the authority of the ACC Director for Aerospace Operations. It was recognized in May, 1999, that ACS' needed to modernize the way they train and operate based on lessons learned from Kosovo, Bosnia and Middle East conflicts. A prototype training system, the Mission Training and Rehearsal System (MTRS) was contracted to provide operators and technical personnel with a review of today's technology to support training within the GTACS. Demonstrated in October 2000, a report was developed that listed several methods available today to improve C2 training at the squadron level in a stand-alone or distributed environment. The technologies and methods reviewed supported the USAF's goal for DMT, ADL and JSB initiatives mentioned earlier, as well as other Joint and DOD guidance.

Concept

Today, ACS training is typically conducted through academic learning and computer based instruction for procedural knowledge, and hands on practice with a Simulation Operator Module (Sim OM) or real world Operator Module (OM) for task, team and crew training. Each of these phases is accomplished in separate distinct locations or devices and rely on various resources such as instructor or contractor availability, aircraft sortie generation, and equipment scheduling of the Sim OM or OM. The MTRS demonstration combined academic learning, computer based instruction, and the Sim OM into one environment that potentially offers unlimited training opportunities supported by simulation and mission designed courseware. A new concept and the subject of this paper is the ACS Sim. It was derived from the MTRS demo and includes 4 desktop workstations that emulate the configuration within the OM to accomplish specified individual, crew, and inter-crew task training. Crews are currently configured with 12 duty positions that provide tactical level airspace control in support of the Joint Air Force Component Commander. The ACS Sim would provide hands on training for each individual position as well as training scenarios that escalate from a couple of duty positions to all 12 training together as a crew. Entity level simulation, which can represent individual forces such as a tanker crew, fighter aircraft, sensor platform, etc., is used to stimulate processes and procedural training. Each scenario is derived from master databases that can support infinite combinations of lessons at the Initial Qualification, Mission Qualification, and Continuation Training (IQT, MQT, CT) level. Multiple ACS Sims could be established to provide simultaneous crew training. It would require multiples of four desktop workstations and could reside in separate workspace areas. A simulation network can be established at each squadron and designed to support multiple ACS Sims as well as the DMT requirement envisioned in the future where elements outside the ACS such as fighter Mission Training Centers (MTCs), sensor or other simulators (JSTARS, AWACS, UAV, Global Hawk…) are expected to train.

Program Elements

The ACS Sim includes technologies that support the training and management of operator personnel. The art of creating a training system supported by simulation requires careful requirements definition for the obvious purpose of knowing what to build, and to balance constrained resources to achieve a system that produces the highest payoff for USAF investment. Each program area will be reviewed to highlight concerns and establish a baseline to determine a cost estimation. It is paramount to understand that a system built with spiral or iterative methods is critical to ensuring operator intent is maintained throughout the life cycle acquisition. This will require operator resources at various levels and duty position knowledge.

Training Shell

The operator navigates through the ACS Sim training system based on a desktop interface shell similar to web based browser selections. Operators will be interviewed to determine look, feel, color, depth, selection choices, text font, size, etc., that allows each duty position to navigate without the use of a manual. This intuitive-based shell provides a total look at all the elements for training and management desired by the squadron. As with almost all modules within the ACS Sim, it can be tailored to the squadron and incrementally added upon. It is cost effective to include placeholders for many future capabilities, which also serves as visual documentation for its intended training goals. An example would be to add a selection choice that connects to MTCs without knowing when or how they will be connected. The shell contains the unit data such as name, location, patch, as well as training program data such as elements of the IQT, MQT or CT mandatory requirements necessary for certification and upgrades. Training folders, unit reports, supervisor reports are included and allow access by permission to various levels of training information such as course or lesson, actual performance data, test scores and dates of achievement.

OM Emulation

The Switch Action Catalog (SWAC) and Display Indicator Catalog (DIC) are the primary references for completing the ACS Sim OM emulation. Requirements and implementation evolution should be established that support high mission payoff areas and over time will replicate the entire functionality of the system. The Subject Matter Expert (SME) operators, who assisted in the development of the MTRS prototype, endorsed this approach. Mission areas and individual task lessons will be addressed and a corresponding list of switch actions and display functions recorded to determine development cost and time. Other interface areas such as replacing the 21" touch screen with a larger screen, the track ball and special keyboard layout, should be addressed early. Current implementation can deliver a working system with off the shelf components; however, long-term implementation should strive for interface features similar to the OM. Voice interaction with the simulation entities is approaching a new level of maturity. The current voice engine used IBMs Via Voice® and is limited in capability but presents a workable solution. A more robust voice engine is under beta test and will provide more capability and fidelity that is well suited to this task. Determining the best voice engine should be accomplished within 60 days of start date.

Area of Responsibility (AOR)

Each AOR of interest determines the simulation terrain database, weather models, type and size of forces, eligible unit designations, and command structure, and must be considered before a generic ACS Sim is built. The current implementation uses Joint Semi-Automated Force (JSAF) as its entity level simulation and is adaptable to many force structures. The terrain available for this simulation is Southwest Asia (SWA), limited Kosovo/Bosnia, Nellis AFB and parts of southern California. As additional terrain databases are designed, they will be incorporated into the ACS Sim. US Joint Forces Command maintain configuration management control over JSAF and would be consulted for addressing advanced work on terrain, forces and weather capabilities. It is within the scope of this effort to complete required terrain databases if funding is made available.

Lessons

The power of the ACS Sim is to offer one training location for IQT, MQT and CT lessons. A lesson may be comprised of a very short tutorial on the functions of the OM, the processes used to link to sensors or within the CRC, or the prelude to understanding a combat mission such as Suppression of Enemy Air Defense (SEAD) and its tactical and operational significance. The first year's use of the ACS Sim would include leveraging any government academic information and if necessary, reducing it to the need to know information at the unit operator level. Follow on years would draw from the ACS community and focus on standardized lessons that are derived from theater operations. Lessons could be tailored to an AOR and would allow an investment to payoff analysis before funds were obligated. The lessons would be built in an authoring format suitable for standalone or web based delivery. It is possible at this time to serve government CBITS lessons available through HQ ACC/DOY, onto the ACS Sim training system. Lead-time to complete mission lessons is dependent on the depth and available materials but is estimated at 30-60 days. A mission lesson would include its description, forces used, impact to overall warfare objectives and use of available graphics.

Missions

The following missions are conducted in JSAF and can provide a baseline of scenarios for CRC training:

a. Offensive Counter Air (OCA)
b. Defensive Counter Air (DCA)
c. Close Air Support (CAS)
d. Search and Rescue (SAR and Combat SAR)
e. Suppression of Enemy Air Defense (SEAD)
f. Time Critical Targeting (TCT)
g. Theater Missile Defense (TMD)
h. Military Operations Other Than War (MOOTW) (limited)

Each mission area would be analyzed to extract the role played by the CRC and a list of practice sessions increasing in complexity, designed as selection choices within the ACS Sim shell. Each lesson will contain the duty position(s) and functional objectives based on operator requirements such as Mission Essential Task Lists (METLs) or annual proficiency requirement training. It is primarily focused at the positional skill training level.

Team Training

Similar to missions, this capability of the ACS Sim will require specified duty positions to train together to achieve an overall CRC mission goal. It can record the success of these events for purposes of achieving annual requirements.

Crew Training

The design of scenarios will require selected duty positions that meet the requirements of crew training. The objectives are related to C2 tactical or operational success within the theater and would involve the JFACC's intent and supporting information from units outside the CRC. Mini Joint System Training Exercises (JSTEs) would fit this category.

Delivery Timeline

HQ ACC/DOY dialog is required to determine the necessity of an Initial Operating Capability (IOC) in less than one year. If so, the following guidelines should be used based on the information described above. The ROM provided is very soft due to unknowns in the depth of scenario development, number of practice session types, additional sensor (JSTARS, UAV…) for simulation, etc.,. The data is provided as a recommended budget that should yield a very useful IOC deliverable for the first unit. Trade-offs can occur that adjusts capability and requires the moving of funds to different development categories.