QuickStrike ASOC Battlefield Simulation: Preparing the War fighter to Win

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ABSTRACT. The QuickStrike ASOC (Air Support Operations Center) Battlefield Simulation fills a crucial gap in USAF and United Kingdom Close Air Support (CAS) and airspace manager training. The system now provides six squadrons with the capability to conduct total-mission training events whenever the personnel and time are available.

When the 111th ASOC returned from their first deployment to Afghanistan they realized the training available prior to deployment was inadequate. They sought an organic training capability focused on the ASOC mission that was low cost, simple to use, adaptable, and available now. Using a commercial off-the-shelf simulation, they developed a complete training system by adapting the simulation to their training needs. Through more than two years of spiral development, incorporating lessons learned, the system has matured, and can now realistically replicate the Tactical Operations Center (TOC) in Kabul, Afghanistan, the TOC supporting the mission in Iraq, or can expand to support a major conflict scenario. The training system provides a collaborative workspace for the training audience and exercise control group via integrated software and workstations that can easily adapt to new mission requirements and TOC configurations. The system continues to mature. Based on inputs from the war fighter, new capabilities have been incorporated to add realism and simplify the scenario development process. The QuickStrike simulation can now import TBMCS Air Tasking Order air mission data and can provide air and ground tracks to a common operating picture; presented through either C2PC or JADOCS.

This organic capability to practice team processes and tasks and to conduct mission rehearsals proved its value in the 111th ASOS's next deployment. The ease of scenario development and the simple to learn and intuitive game-like interface enables the squadrons to develop and share scenarios incorporating lessons learned from every deployment. These war fighters have now filled the training gap and have the capability they need to train to win.

INTRODUCTION

The ASOC, a subordinate element of the Air Operations Center (AOC), is the principle command and control (C2) node in the close air-ground battle. It is the senior air C2 node aligned with the Army, (typically co-located with the highest Army echelon in theater) responsible for managing air assets in support of ground maneuver and in the execution of Close Air Support (CAS). As such it plays a critical role in ensuring the Army and the Air Force operate effectively together. Recent experiences in Iraq and Afghanistan underscore the crucial nature of this role.

The ASOC environment is uniquely challenging and demanding. Fighter Duty Technicians (FDTs) and Fighter Duty Officers (FDOs) work in a dynamic and fast-paced setting where communications expertise, tactical knowledge, planning ability, weapons systems knowledge, coordination skills, and teamwork all play a significant role. Situational awareness (SA) of the ground battle and the air picture is essential. FDO/FDT performance is critical in getting bombs on target quickly and safely, providing direct support for Joint Terminal Attack Controllers (JTACs) or ground forces in contact with the enemy.

1. BASELINE EXPERIENCES

Following a combat deployment, the 111th ASOC completed a thorough internal debrief of all aspects of the deployment from preparation through execution and re-deployment. One of the most important debriefing items was the inadequate operations spin-up training. From the perspective of the FDOs and FDTs operating in the Joint Operations Center (JOC), pre-deployment preparation had significant flaws that

were summarized in two broad categories: Focus, and C2 Tools.

1.1 Focus

Spin-up training was based on operational assumptions that were not valid in the current conflict. The conflict was non-linear and asymmetric. From an Air Force perspective this model of warfare combined with the theater's unique geography and infrastructure and friendly/enemy Order of Battle meant that CAS was the primary means of support to troops-in-contact situations. That is, there were often no other supporting arms options (artillery, naval gun fire, or army aviation) for troops that needed support. Due to the nature of the conflict, CAS coverage was required across the entire theater practically 24 hours-a-day.

While 111th ASOC spin-up training and standard combat mission ready training had been intense and rigorous, it had focused largely on a more traditional linear, symmetric fight. Over a period of time, the focus had slid into a familiar and comfortable rhythm of force-on-force war fighter exercises. This was the wrong focus for Afghanistan.

In hindsight, and assessing a more generic view of ASOC training, the major flaw was not that the 111th were focused on training for one model of warfare rather than the other; it was that the training curriculum and capabilities did not accommodate multiple models of warfare.

1.2 C2 Tools

In theater, the C2 systems and tracking mechanisms were significantly different to those the 111th had trained with during spin-up. The training had typically used large scale, customized C2 systems that covered all aspects of C2 from planning through execution (for example Theater Battle Management Core System – TBMCS). In theater, the tools were the product of networking technology and a blend of simple and flexible software applications. This patch-work C2 architecture was in place due to expediency, operational need, and some very talented individuals who found ways to add functionality and capability piece by piece to a baseline communications network.

Most notably, Internet Relay Chat (IRC) was the primary method of communication in theater. In addition, Excel spreadsheets and common mapping tools such as FalconView added vital elements. The unit was familiar with the Excel and mapping tools but IRC posed new challenges: learning a new shorthand 'chat' language and a need for transmitting time critical C2 data in (real-time) text format rather than through voice.

Also, operators had to develop softer skills such as an ability to lead and execute the CAS fight appropriately through a text interface. This meant interacting with and coordinating with a wide range of C2 agencies in a distributed, stressful and sometimes confused C2 environment using text alone. This required a unique combination of tactical and doctrinal knowledge, coordination capability, leadership, motivational ability, and of all things, typing and prose capability! The 111th learned to use IRC the hard way – on the job training while in theater.

Following redeployment and debriefing, Squadron leadership began formulating a solution to the training environment so that follow-on deployments had the right training focus and exposure to the correct C2 tools.

It is also significant to point out that during debriefing positive aspects of training were also identified. Defining what went well provided squadron leadership with valuable reference points on areas of training that needed overhaul. Most notably, operations personnel pointed out that training in CAS doctrine and the overall CAS process was sufficient and useful even in the asymmetric, non-linear arena.

2. REQUIREMENTS DEFINITION AND PRELIMINARY DESIGN

Squadron leadership made a simple but far-reaching request following the debriefing sessions: "Find a way to capture the experiences we learned in theater so we can prepare better for the next time." In addition to this top-level challenge, the squadron was charged with developing a way to improve training focus specifically for pre-deployment spin-up and to include training on IRC and the associated applications. The challenge was issued with one caveat: ensure that the resultant approach was flexible enough to allow for a variety of warfare models, not just reactionary effort to the Afghanistan experience.

Squadron personnel looked at a variety of responses to these challenges. Briefings, computer based training and specific (stand-alone) applications training were considered and

assessed to be a valid way to prepare for a combat deployment. However, the operations section began to look at live constructive simulation and quickly assessed them as the most effective method to create the desired training environment. Through simulation, an accurate, holistic, immersive training environment could be created, presenting a realistic series of decision points to be resolved by the ASOC crews. Squadron personnel anticipated that this simulation environment, if properly constructed, would be broadly capable in terms of the warfare models used and would be extensible and flexible in terms of C2 tools that may be used in the future.

2.1 Preliminary Design

The preliminary simulation design was outlined in a PowerPoint briefing and endorsed by squadron leadership. The initial design included a simulation engine (yet to be defined), mIRC (a shareware IRC program), and Excel spreadsheets for Air Tasking Order (ATO) breakouts.

A preliminary design review presented a variety of simulation frameworks that could be applied, ranging from commercial-off-the shelf (COTS) simulations to research and development efforts that involved intelligent agents. Due to squadron cost and schedule constraints the decision was made to pursue a COTS solution.

Based on this framework, the next decision was the choice of a suitable simulation engine. Because this was an unfunded Air Force effort being undertaken at the squadron level, there were three characteristics to be optimized: cost, usability, and classification level. The ideal simulation engine would be cheap to purchase, would require no ongoing contractor support, could be operated by an average squadron operator, would be unclassified and, as a result, easy to field, maintain, and store.

2.2 Screen Available Simulations

Available simulations were down-selected to thee potential products. These three simulation engines were functionally tested by squadron staff. The three simulations were:

Decisive Action, a simulation by Jim Lunsford, published by HPL. A Division and Corps level simulation that depicts combat with maneuver brigades and battalions along with supporting artillery and air strikes. This game was used by US Army Command and General Staff College as a training tool for officers.

Joint Conflict and Tactical Simulation (JCATS), developed by the Lawrence Livermore National Laboratory. An interactive simulation tool sponsored by U.S. Joint Forces Command and managed from the command's Joint War fighting Center. The military uses JCATS for training, analysis, and mission planning and rehearsal.

Battle Command and its follow-on USAF version, **Quickstrike**, were developed by MÄK Technologies, now VT MÄK. Battle Command was designed with a game-like feel to support Army battalion and brigade commands and their staff officers in preparing and executing operation orders. The simulation is a military tactical trainer that allows commanders and their staff officers to practice planning and execution skills in a simulated environment.

3. ASOC BATTLE SIMULATION DESCRIPTION

Following functional evaluation of the alternatives, Battle Command was chosen as the best initial fit for the simulation engine. The system was already owned by the Air Force and so was freely available. It was unclassified, and it was very easily operated with little instruction required. With a minimum of familiarization training, squadron staff could "drive" the simulation as well as design and create new scenarios. Based on discussions with the contractor, the 111th anticipated swapping out Battle Command with a more air-orientated follow-on (QuickStrike), once that product had finished development. QuickStrike was based on Battle Command but specifically designed for the US Air Force. It accurately portrays a variety of tactical situations, stimulating staff interactions and the rapid decision making needed for successfully conducting mission-essential tasks. QuickStrike supports individual student training and more dynamic multi-player team training events. It is HLA compliant and has the capability to integrate with larger distributed exercises.

Figure 1, Combined USAF and UK ASOC Training using the ASOC Battle Simulation

Between late 2004 and late 2006 the 111th ASOC assembled and embellished the ASOC Battle Simulation. Radios, Joint Automated Deep Operations Coordination System (JADOCS), Tactical Air Control Party Close Air Support System (TACP CASS) were added to provide more fidelity to real operations. Staff also experimented with comprehensive training programs and developed scenarios that provided operators with near-real-world experience, using unclassified real-world events as simulation events.

A variety of training frameworks were tried, ranging from zero preparation 15-20 minute fights to force-on-force scripted events lasting 8 hours. A variety of asymmetric, non-linear, symmetric and linear scenarios were developed and used. In addition, training objectives and debriefing templates were developed to help focus training events and capture individual training progress. Finally the unit experimented by using the simulation in conjunction with simulated JTAC training events in the field. Although there was no direct connectivity between the simulations, the scenarios were synchronized and information was passed via radio and data link from one agency to the other.

A significant benefit of the simulation was that it enabled the unit to train autonomously. Previously, the best way to train was as a supporting unit in large Army exercises. While these opportunities are still vital in terms of interaction and reciprocal learning and training with Army JOC staff, they were now no longer the only avenue to effective training. In addition, the ASOC Battle Simulation offers flexibility in terms of time, location, and pace of learning for ASOC staff.

In 2007, the ASOC Battle Simulation was adopted US Air Force wide. In 2008, the Royal Air Force (RAF) adopted the simulation to train its Air Operations Co-Ordination Centre (Land) AOCC(L) unit (ASOC equivalent organization).

4. CURRENT ASOC BATTLE SIMULATION CONFIGURATION

The ASOC Battle Simulation comes to the unit as a complete package of hardware and software, preconfigured and ready to operate. Network setup assistance as well as training in system operation, scenario development, and exercise development and conduct is also provided. The system is comprised of networked workstations and peripherals for the FDO, FDT, and INTEL (intelligence) seats in the training audience and additional workstations for the "Control Group"; those role-playing high control, low control, and lateral organizations. It is easily reconfigured for multiple versions of training audience command and control variations based on the mission. Many of the squadrons with the ASOC mission split up the FDO and FDT tasks due to increased mission complexity. Many now have a Joint Air Request Net (JARN) operator, an Airspace Manager (ASM), an ATO Manager (ATOM), and a Procedural Controller (PC) setup. A VOIP phone system is also provided to emulate telephone communications between the ASOC and outside organizations. The collaborative workspace MiRC chat is provided as well. The ASOCs provide their own radio communications equipment to enhance the realism of the event. A projector and high reflection screen for the display of the Common Operating Picture (COP) are also provided. All of the workstations are laptops making the entire system easily deployable. Currently, the COP is provided by Command and Control Personal Computer (C2PC) by way of an interface with QuickStrike. The investigation of integrating QuickStrike with JADOCS is currently underway. This setup was easily modified to meet the specific training needs of ASOC organizations with theater-specific requirements that drove unique configurations of workstations. As each ASOC has their own training philosophies and facility limitations, the system is flexible enough to be set up in a single room or in multiple locations, separating the training audience from the Control Group.

The "Control Group" runs the exercise and is organized and managed by a chief facilitator, or "Pit Boss". This facilitator is the individual

responsible for organizing control group personnel, designing and running the exercise, and facilitating the after-action review. Due to the intuitive game-like operation and interface of QuickStrike, a single operator can be trained in a matter of hours to manipulate every aspect of the simulation. Scenarios are easily developed from scratch or existing scenarios provided as part of the system can be modified to adjust to changes in procedures, processes, or theater operations. QuickStrike has an event editor built in to develop and manage the input of training injects into the training audience. This gives the Control Group the capability to develop a Master Scenario Events List (MSEL) imbedded in the scenario to provide timed or dynamic inputs at crucial decision-making times in the exercise to reach desired training objectives. As an integral part of the ASOC team, intelligence is crucial to overall situational awareness. To assist, the intelligence workstation has the capability to emulate the Predator or any other UAV view using the VT MAK Stealth 3D viewer, which is also provided in the training suite. The latest version of QuickStrike is Standard Desktop Configuration compliant allowing the software on any Air Force computer and is undergoing the formal USAF accreditation process.

As mentioned briefly earlier, VT MAK provides training on manipulating QuickStrike as well as training for Control Group personnel. Using a tried and true training approach, the Control Group quickly develops the skills required to conduct a training event and develop or modify scenarios. This capability enables each ASOC to design and run comprehensive training events in just a matter of days. Each ASOC is provided "turnkey" scenarios and terrain for both the Iraq and Afghanistan operations. VT MAK collects feedback from the ASOCs and has released several new versions addressing inputs from the field. Requested enhancements include developing a method to populate the QuickStrike air mission data base with all the air mission data from a USMTF TBMCS ATO and displaying all the graphics from the supporting Airspace Control Order, intended to greatly streamline the scenario development task and enable complete mission integration with other exercises such as Virtual Flag.

5. FOLLOW-ON DEPLOYMENT AND SIMULATION VALIDATION

The 111th ASOC deployed again in 2007. This deployment was in support of the International Security Assistance Force (ISAF) at Headquarters level. The ASOC was embedded in the Joint Operations Center (JOC), HQ ISAF, Kabul, Afghanistan. The initial advance team communicated operational conditions and operations tempo in theater to the home squadron. Training managers at the squadron easily updated QuickStrike scenarios to reflect current conditions, enabling realistic ASOC Tactics, Techniques and Procedures (TTPs) to be practiced. Operations personnel trained regularly using the simulation and were deemed combat deployable based on their simulation check-ride performance.

Based on this approach to manning the ASOC ISAF JOC, spin-up time in theater was minimal. New arrivals were already familiar with the toolsets, the operations tempo, and the processes needed to perform their duties quickly and efficiently. This resulted in minimum handover overlap and minimum unit changeover impact to the theater C2 network. In addition, as a whole, the response to Troops-in-Contact (TIC) situations was more standardized. In comparison to the unit's 2004 experience, the on-the-job learning curve was significantly reduced and the level of preparedness of the unit was vastly improved. This resulted in maximizing the impact of the ASOC in down-range operations.

One short-coming was the overly simplistic modeling of the complex NATO C2 structure in theater. Although the correct C2 nodes were used in our ASOC Battle Simulation, our interpretation of the C2 structure was based on a US doctrinal interpretation rather than the reality of the NATO C2 structure in Afghanistan. There are significant differences and understanding the finer elements of the NATO C2 structure and becoming effective coordinating between them took some on-the-job training in theater. In hindsight, the unit was constrained by role-playing in a stand-alone simulation rather than having the benefit of participating in an interactive exercise with other NATO agencies. A more accurate representation of the real-world C2 structure (either via distributed mission operations or role playing) would have been extremely beneficial to the FDOs and FDTs during spin-up.

6. CONCLUSION

Overall, the ASOC Battle Simulation has opened a new era in ASOC training. Its primary benefits are its flexibility, extensibility and game-like simplicity. The 111th has learned valuable lessons overseas that can be easily recreated with the simulation for training purposes. The future success of the simulation depends on two factors: how well the simulation is integrated into a broader simulation training environment, and how effectively unit training staffs employ the system. The 111th has identified five attainable objectives that will help guide the progression of the simulation over the coming years:

6.1 Match real world operations with simulation scenarios. This objective includes accurate modeling/recreation of the wider C2 infrastructure surrounding the ASOC as it exists rather than modeling an ideal doctrinal state.

6.2 Integrate the ASOC simulation in broader simulation-based exercises that incorporate the full range of C2 nodes. For example, linking up with the Air Operations Center (AOC), JTACS, various Army echelons, Control and Reporting Centers (CRCs), AWACS, fighter/bomber aircraft, and Wing Operations Centers (WOCs). With QuickStrike's HLA framework, this distributed simulation operation is technically attainable and will directly support Objective 1 by forcing staff integration of multiple agencies rather than relying solely on role-playing.

6.3 Use the ASOC Battle Simulation as a tool to expose non-ASOC personnel, such as Army JOC staff, and the AOC staff, to the complexities of applying CAS in the ground fight.

6.4 Incorporate both pre-planning and execution ASOC roles in the simulation. This may require minor software augmentation in order to stimulate a simulated Army Air Support Request (ASR) structure or in a distributed simulation scenario as suggested in Objective 2, the Army could provide actual ASR inputs.

6.5 Maintain a flexible outlook on ASOC operations, enabling training preparation for multiple warfare models rather than focusing on a single type of fight. Simulations are inherently flexible in this regard; the responsibility in attaining this objective rests with those charged with designing the training syllabus and the simulation scenarios.