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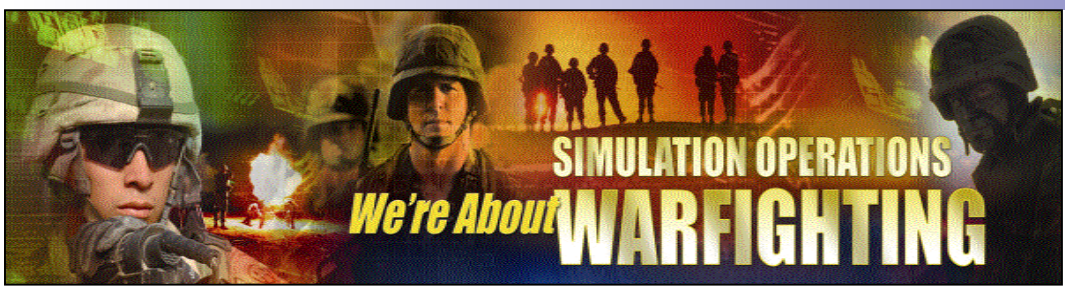

Simulation Operations Quarterly

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"Training effectiveness has become more aligned with operational effectiveness."

Transformation

Supporting Transformation

Providing Training Support for Operational Forces at War

By
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Our Army is undergoing a historic transformation. We are reorganizing, reequipping, and restructuring to better support execution of Joint operations while continuing to develop capabilities essential to providing ready, responsive, and dominant land power forces. This revolutionary transformation is being executed while at war in the complex, uncertain, and dynamic 21st century security environment. Providing a campaign-quality Army with a Joint and expeditionary mindset enables combatant commanders to meet the strategic mandates framed within our National Security Strategy.

Transformation includes the full range of actions across the spectrum of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). Many of the required actions must be executed immediately in order to maintain readiness and sustain the operational forces at war. Because our security environment is not "business as usual," the measured approach to change has, in many instances, been replaced by rapid fielding initiatives, spiral development, and rapid resourcing of capabilities to both deployed and deploying forces. Transformation crosses the institutional, operational, and self-development training

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In Step with Training Transformation and Joint Interoperability

by
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The Joint National Training Capability—Horizontal Event (JNTC-HE) was all about TEAMWORK. The fact that the Army's National Training Center (NTC) enjoyed such a successful distributed Live-Virtual-Constructive (L-V-C) rotation was mainly due to the hard work, dedication, and vision of a collection of technical experts and trainers who understood the application of models and simulation for both training and military operations.

Both the Commanding General and the Commander of Operations Group (COG) at the NTC understand the value added and power of bringing together L-V-C, and linking other sites

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In Step with Training Transformation…

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to a Live NTC rotation. It is important that Senior Trainers in the Army and all the services, recognize this clearly and align their resources to link to any Live NTC rotation in order to enhance and meet training objectives and improve their go-to-war battle drills. After the JNTC persistent architecture is in place in FY04, the art of the possible will only be limited by the Operational Tempo.

Briefings for the JNTC-HE visitors usually start in the Army Force (ARFOR) Response Cell where they receive a combined overview, which included portions from Joint Forces Command (JFCOM), ARFOR, as well as a briefing by the Army technical control group from the National Simulation Center (NSC). Next, they move to the NTC Operations Center to see how the "current fight" of the live Brigade Combat Team (BCT) is unfolding. This includes a tour of the Division Tactical Command Post (DTAC), the Air Warrior Measurement and Debriefing capabilities, and the simulation room that brought L-V-C all together.

The L-V-C entity counts for the JNTC exercise included:

- 1220 live entities - fully instrumented and portrayed position locations, firing events, and entity state (alive or dead, as well as catastrophic, mobility, or firepower kill),
- 5198 constructive entities - maneuvered by Joint Conflict and Tactical Simulation (JCATS) analysts at the NTC, and
- 10 virtual entities – seven AH64A, one UH60 Battlestaff Training Simulator (BaTS), and two Unmanned Aerial Vehicles (UAVs).

Blending it all Together

The lines between Simulation (L-V-C) and Communications blurred over three years ago at the NTC. With the tools we have been given, we build a training environment that starts with the live instrumented force to feed the simulation. This information is translated and then stimulates the C4I devices of the BCT in the live maneuver box with the appropriate real-world information. In order to properly expand the battlespace beyond the 640K acres at the NTC, we are unable to separate our simulation and the stimulation functionality of our infrastructure. Because of the level of fidelity required, one cannot survive without the other and still have a true seamless training environment for the soldier on the ground and allow the training audience to train as they would fight.

Communications

Communications proved the biggest challenge during JNTC-HE. With a great foundation of basic understanding and assistance from the NTC, Director of Information Management (DOIM), as well as support from Fort Rucker, the exponential learning curve went absolutely through the roof.

Once the majority of the hardware and infrastructure was delivered, it required several months to establish the required communications. Supporting the first JNTC exercise required the NTC to install, operate, and maintain a large, multi-faceted, non-doctrinal (for the NTC) communications network. NTC was connected via OC3 link to Suffolk, Virginia and we installed two encrypted T1 lines to Fort Rucker Alabama in support of the Virtual Aviation missions. The T1 lines provided flow of TACLAN data, simulation (L-V-C) data, FM traffic via ASTi Synapse radio equipment, and Video Teleconferencing (VTC) capabilities to communicate with the virtual commander at the distributed site. The doctrinal NTC linkage was created via a Small Extension Node, which transmitted data from all over the JNTC network to rotational unit C4I devices in the maneuver box. The NTC communications network was expanded with never-before used equipment to enhance the information traffic flow between the sites. A new addition to the network, ASTi Synapse radio equipment, pushed actual FM traffic from the rotational unit in the box out to all of the JNTC locations. The ASTi equipment was also capable of receiving traffic from Live Joint Surveillance Target Attack Radar System (JSTARS), and of pushing the FM traffic to the Common Ground Station at the Brigade's Tactical Operations Center (TOC) in the live maneuver box. The traffic for the Navy's Virtual EP3 was transmitted and received through the ASTi equipment. The VTC capability came in the form of the SCOTTY box, a hardened, field expedient VTC in a briefcase. The SCOTTY box enabled the virtual commander at Fort Rucker to communicate with and fight the battle at the NTC. In future applications the SCOTTY box will be taken to the field and

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"Supporting the first JNTC exercise required the NTC to install, operate, and maintain a large multi-faceted, non-doctrinal (for the NTC) communications network."

Soldiers using the AT-4 anti-tank weapon during training with the Engagement Skills

Supporting Transformation...

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domains in which the Functional Area (FA) 57 officer pays a significant role, particularly in supporting the operational domain.

The operational domain includes unit training at home station, combat training centers (CTC), and while deployed. Changes to our proven training doctrine include implementing methods to best utilize emerging live, virtual, and constructive training techniques and enablers. The FA57 officer is first and foremost a war fighter and trainer who understands a commander's requirements and intent. His challenge is to integrate live, virtual, and constructive training opportunities to support the commander's training and operational missions.

Training effectiveness has become more aligned with operational effectiveness. The efforts of the FA57 community to meet this challenge have contributed directly to the creation of training that improves Soldier and unit lethality, mobility, and force protection. There are many examples of these contributions.

Fort Lewis home station training for the second Stryker Brigade Combat Team (SBCT-2) incorporates lessons learned from the initial Stryker Brigade (SBCT-1) operations in Iraq. Actual operational situations from SBCT-1 are transmitted back to the Battle Command Training Capability (BCTC) at Fort Lewis immediately following the action. These situations are then integrated into the battle staff exercise scenarios giving them the character of mission rehearsals, which enables SBCT-2 commanders and battle staffs to hone their warfighting skills.

Fort Hood III Corps and Division FA57 officers were instrumental in preparing both Active Army and Reserve Component units at home station for deployment to Operation Iraqi Freedom and resetting after deployment. They adapted and integrated the capabilities of the resident training enablers, Battle Simulation Center, BCTC and virtual simulations (i.e., Close Combat Tactical Trainer, Engagement Skills Trainer, etc.) to provide the tough challenging training required by commanders.

When Improvised Explosive Devices (IEDs) became a threat to convoy operations, the FA57 staff developed a Warrior Skills Trainer utilizing virtual and constructive tools they had available. This provided over 4,000 deploying soldiers with critically needed training on convoy operations as well as reaction to ambush and IED detection tasks. The FA57 staff also designed and managed Mission Rehearsal Exercises that implemented new or modified simulation architectures to meet new Tactics, Techniques, and Procedures and assisted in the implementation of new C4ISR systems for the 1st Cavalry Division's use of the Command Post of the Future. Further, they developed and implemented a gated training strategy to support regeneration of the 4th Infantry Division, testing new digital systems and serving as the division's lead for systems integration and training.

Now more than ever, the FA57 officer also fulfills a critical role at our CTCs. The Army's experience with integrating the live, virtual, and constructive environments into the CTC scenarios has been instrumental to the Department of Defense Training Transformation (T2) effort to develop the Joint National Training Capability (JNTC). The first JNTC Horizontal Training Event conducted at the National Training Center in January 2004 demonstrated our capability to conduct seamless live, virtual, and constructive training that integrates Joint forces simultaneously participating in separate and geographically disparate service exercises. The exercise provided situational wrap-around for the live unit training in the maneuver box and integrated Army training with a higher Joint headquarters training event. The exercise featured the integration of constructive simulations in a federation to provide stimulation of digital C4ISR systems and included simulated intelligence, Joint Surveillance and Target Attack Radar System and Unmanned Aerial Vehicle feeds. The Army will continue to lead the JNTC effort in future exercises and must depend on the experience and expertise of the FA57 officer to optimize these events.

The way ahead for the Army continues to be rapid adaptation to the conditions of the contemporary operational environment and the continued exploitation of every means available to provide Soldiers and leaders with the requisite skills through the training. As the Army continues to engage in the Global War on Terrorism, the entire FA57 community will remain key to shaping the adaptive training and leader development processes already underway and increasing training capabilities through the integration of live, virtual and constructive environments in support of commanders. The FA57 community is key to maintaining the readiness and effectiveness of our combat formations.

"As the Army continues to engage in Global War on Terrorism, the FA57 officer will remain key to shaping the adaptive training and leader development processes already underway."

Bradley Fighting Vehicle in Iraq

"The NTC communications network was expanded with never-before used equipment to enhance the information traffic flow between the sites."

In Step with Training Transformation…

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enable the BCT commander in the box to communicate with distributed sites in the exercise design. Difficult lessons were learned in building the network, including equipment placement and bandwidth versus data traffic issues. This was a Joint Team effort between JFCOM, FORSCOM, and the NTC, to develop, enhance, and build the largest and most complicated network that NTC has ever established.

Simulation

Usually the first step in developing an exercise is ensuring training objectives are achievable. In this case, we chose three missions that all occurred prior to a traditional battle day that the BCT was conducting. All distributed missions with the Virtual Aviation were flown in what we call the "constructive wrap" or outside the live maneuver box. The simulation portion of the exercise (in some respects) was the easiest. The fact that the Army's National Simulation Center (NSC) was present in force was a testimony to their thirst for knowledge as technology continues to outgrow the recognized requirement. It was because of countless hours at planning conferences, technical rock drills, and being "on site" during the exercise that made the simulation transparent to the training audience. "We're not in Kansas any more" was one thought that ran through our heads during the planning conferences for this exercise. The plan was ambitious and the scale was huge - run an integrated training event that included L-V-C forces from the Army, Navy, Air Force, and Marines from distributed locations across the continental United States. While each of the Services was very comfortable with their normal way of conducting training and simulations, this was not business as usual. Through the dedicated efforts of everyone involved, we not only conducted a successful exercise, we may have illuminated the way to the future of Joint training exercises.

One area of concern was that we were not providing the unit in the maneuver box with simulation and stimulation from all of the tools that we usually provide during a normal rotation. There were a lot of things that could have had a negative impact on the training unit. Some of the systems that we normally replicate were being controlled by their parent Services or were participating live. This required more coordination than normal, but the information that the unit received was more detailed and more realistic than we could normally provide. In the end, the exercise ended up enhancing the rotation instead of detracting from it. This is the way any good simulation center should be able to function. When assets are not available…simulate them; when they are…use them to their full capability.

Virtual Integration

One of the highlights of the exercise was the Virtual Integration of Army Aviation.

We were fortunate enough to have the 1st Squadron, 113th Cavalry from the Iowa ARNG deploy to Fort Rucker, Alabama with seven AH64 crews and one UH60 crew that flew in the reconfigurable virtual helicopters. The Combat Aviation Virtual Simulation (CAVSIM) Facility at Fort Rucker is a product of the Simulation Network (SIMNET) experiment from the 1980s, with follow-on efforts under the Aviation Networking (AIRNET) program in 1989. Continuous technology updating ensures the currency and relevancy of the capabilities these multiple airframe devices provide. Though the cockpits were used in the AH-64A configuration, they can also be reconfigured to replicate UH-60A/L, CH-47D, OH-58D(KW), and AH-1 airframes. If close air support is not provided by an Air Force Distributed Mission Training site, a generic fixed wing device is available within the CAVSIM that can be configured as an A-10 or F-16 to provide a close air support role. These devices are not intended to be high fidelity crew trainers; but more of a medium fidelity collective trainer. These have been extremely effective in the *leader development* role not only during Professional Military Education (i.e., aviation officer basic and advanced courses) but also during pre-deployment Aviation Training Exercises for deploying units (Bosnia, Kosovo, Afghanistan, and Iraq). The (BaTS was delivered to Fort Rucker by CAE USA prior to this JNTC event. It was designed to provide a high fidelity non-motion based UH-60L virtual collective task training simulation device. It contains UH-60L Blackhawk flight stations and controls for a pilot and a co-pilot, as well as 12 station intercom system (ICS) positions in the cargo area. Though not used for this exercise, a crew compartment is provided to permit the BaTS to function as an Army Aviation Command and Control

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In Step with Training Transformation…

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System (A2C2S) and can be configured with the full Army Tactical Command and Control Systems. This could enable training of the digital Battle-staff in any future exercises.

All of the L-V-C elements integrated seamlessly behind the scene to allow the unit to train as it would fight. One L-V-C highlight was when the Division Virtual UAV called a successful indirect fire mission from an MLRS battery on an Opposing Force (OPFOR) target array. Information from the instrumentation systems on the OPFOR vehicles populated the simulation with their position locations. The Division G2 section flew the virtual UAV in the simulation from a control station that looks, feels, and operates exactly like the actual control station. The operator identified the OPFOR vehicles in the blended L-V-C environment and executed a call for fire mission. The fire mission traveled through the real-world communications systems to a live multiple launch rocket system (MLRS) battery that was out in the training area. The MLRS battery conducted their firing procedures and fired the mission. The data was communicated back to the Fire Support Training Analysis Facility (TAF) where it was fired constructively in the Core Instrumentation System (CIS). The CIS transmitted the results of the fire mission back to the training area where live OPFOR vehicles were adjudicated. While this particular vignette was not technically a "Joint" event since it only involved Army assets, it certainly could have been if other participants had been involved.

Other important lessons learned were:

- Walk through, in excruciating detail, all operational "threads" from initiation to completion prior to the exercise. Identify exactly which messages go where and how they are processed (e.g., calls for indirect artillery fires, intelligence spot reports, radar acquisitions, etc).
- Keep records of all hardware and software settings. There will be a million and one adjustments that need to be made to get everything running. You will need the original settings to understand why changes were made and you will need to record the final settings so you know how to do it again in the future.
- Control access to your network and settings. Simulation exercises of this scale require the efforts of a large technical team to keep them running. When more than one person starts making undocumented changes, problems arise.

It is well within the realm of the possible to have multiple Services involved in each other's training events on a regular and continuing basis. The JNTC-HE demonstrated a way ahead for the future. Given sufficient communications pipelines, all Services can participate in a Joint exercise through a blend of L-V-C forces. These forces can interact with each other and train on Joint operational and tactical tasks as well as meet their own Service-specific training goals. This will help to enhance the training events, increase interaction and interoperability between the services, and aid in transformation to a relevant and ready land force for Joint Commanders.

Instrumentation

Due to the high visibility of this particular exercise, we had our share of external agencies plugged into our normal infrastructure. The focus of this exercise was to narrow the horizontal gaps that existed between us. By using the JNTC motto of "think big, start small, and evolve", many gaps were closed. JNTC-HE took away lessons learned for application during follow-on exercises.

NTC-Core Instrumentation System (CIS) The NTC-CIS transfers live instrumented range data via voice and fiber optic networks to the NTC Operations Center. From the NTC Operations Center the range data is passed through a Distributed Interactive Simulation (DIS) translator as it enters into the simulation world. The NTC-CIS uses commercial-off-the-shelf (COTS) hardware and software configured to collect, report, store, manage, transmit, process, and display over 1,200 live entities (with the capability to expand to 4,000 instrumented ground and air players). It provides position location, weapon systems events, and entity state.

Air Warrior Measurement and Debriefing System (AWMDS) The AWMDS interacts with the NTC-CIS, making it possible to conduct realistic air-to-ground and surface-to-air combat training, as well as the conventional air-to-air MDS training capabilities. The AWMDS and the NTC-CIS continuously exchange all participant and engagement related data (e.g., position location, weapons type and status, engagement events and results, etc.) via communications links

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"Walk through, in excruciating detail, all operational "threads" from initiation to completion prior to the exercise."

Soldiers on patrol in Iraq.

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between Nellis AFB and the NTC. The AWMDS consists of a Tracking Instrumentation Subsystem (TIS) array (at the NTC), the Control and Computation Subsystem (CCS), Display and Debriefing Subsystem (DDS) consoles (at both Nellis AFB and the NTC), and Aircraft Instrumentation Subsystem (AIS) pods that are installed on fixed wing aircraft flying out of Nellis AFB.

"This is the way any good simulation center should be able to function. When assets are not available…simulate them; when they are…use them to their full capacity."

Digital After Action Review Tool (DAART) DAART provides non-intrusive digital data collection from multiple networks, real-time presentation of the digital messages, situational awareness data, and automated After Action Review (AAR) products. The NTC used this data and products for training analysis and feedback and the generation of AARs used to provide training assessment and take-home packages. The data collection configuration to support the JNTC exercise was significantly challenging with respect to the required player unit's tactical networks and associated message protocols. During this rotation, we learned that DAART does not have the required protocols to reassemble the digital messages from multiple systems brought to the NTC; however, NTC is working with material developers to ensure Post Production Software Support (PPSS) includes the different message protocols utilized by other Services. DAART successfully collected and recomposed over 350 tactical digital messages presented in real time and archived to support training analysts' AAR products. With DAART the observer controllers (OC) were never digitally "blind" to the data transmitted. DAART has proven it can provide a unique solution to the training needs of not just the Army, but other Service components as well.

Test and Training Enabling Architecture (TENA) The OSD-developed TENA architecture was used as a basis of the JNTC Live Systems and provided both the data description (object model) and the means of moving the data (middleware). Live participants' system interfaces were implemented and supported by NAVAIR (the JNTC Range Integration manager), USMC support contractors, Nellis Air Force Base staff, and NTC instrumentation team. TENA collected and distributed all live data using object-oriented data distribution through the JNTC infrastructure and JNTC exercise object model. This live data distribution enabled exercise control, pairing, and adjudication of fires. Live systems data was merged into the L-V-C event using a Live-to-Simulation (TENA to HLA) Gateway at the Joint Training, Analysis, and Simulation Center (JTASC). This gateway provided live exercise data stimulus for use in the JTASC HLA simulation federation. The NTC is currently conducting a study to determine the feasibility of developing an organic TENA interface to replace the current NTC gateways that will support current and future NTC Instrumentation Systems as well as future JNTC events.

Common Data Link (CDL) – This capability, part of the One Tactical Engagement Simulation System (One TESS), was provided by the Operational Test Command (OTC). The CDL showcased geometric pairing that enabled both Ground-to-Air engagements and indirect fire using M203 grenade launchers. Geometric Pairing simulated both direct and indirect fire and provided information on who-shot-whom. The basic concept of Geometric Pairing is the calculation of the point of impact or detonation of a round based on knowledge of the position of the shooter and target, the time of trigger pull, the orientation vector of the weapon, and the characteristics of the weapon and round fired using GPS position location and pointing sensors to calculate and evaluate likely target engagement probabilities. This demonstrated capability is a step in the right direction for integration of current and future Instrumentation Systems.

Advanced Range Data System (ARDS) ARDS provides extended coverage for the NTC and USAF Air Warrior (AW) training instrumentation systems. The extended coverage areas stretched north to Las Vegas / Nellis AFB, west to Edwards AFB, and south to the Yuma and the Twenty-nine Palms USMC operation areas. NTC successfully integrated this last minute instrumentation effort along with ARDS Team and JFCOM. The use of JNTC Live architecture was based on TENA with the ARDS, NTC-IS, and Air Warrior enhanced geographic play area. ARDS was provided by a Joint Team-consisting of White Sands Missile Range, Edwards AFB, NAVAIR, and Eglin AFB.

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In Step with Training Transformation…

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The ARDS Team supported approximately 400 sorties with a 99.5% effective rate.

Blue Force Tracker (BFT) – Special Operation Forces (SOF) Blue Force Tracker (BFT) enables the Joint Exercise Control Group to locate forces on the ground and accurately track them through the Common Operational Picture. SOF BFT provides a better appreciation for the battlefield environment, adds a level of protection against fratricide, allows timely and accurate tracking, and, when needed, facilitates the rescue of SOF personnel operating deep inside enemy territory through the use of satellite data links.

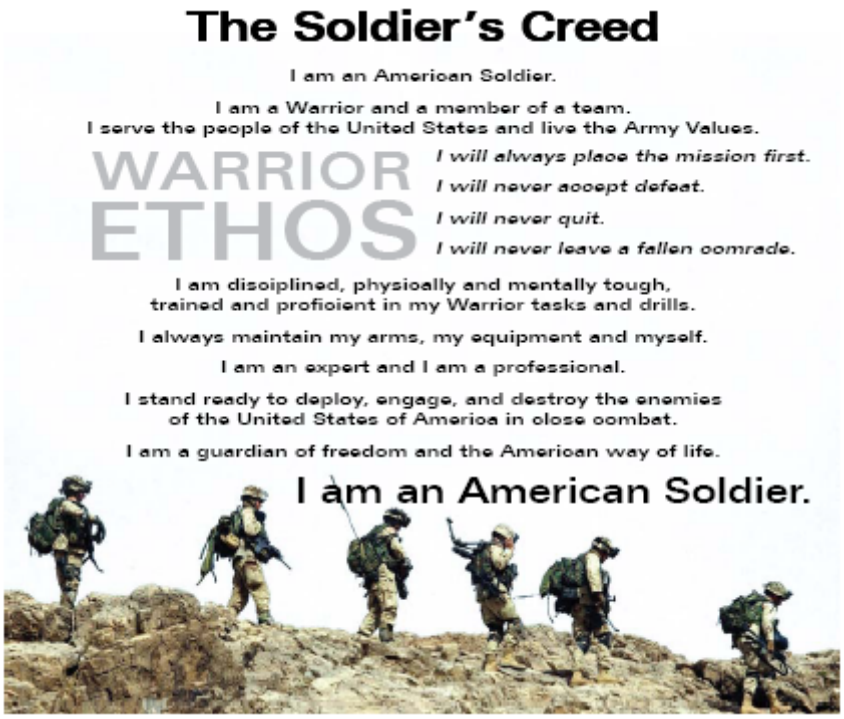
Multiple Launcher Rocket System-Trainer (MLRS-T) MLRS-T, by Inter-Costal Electronics, provides OCs a real-time monitoring capability of MLRS Position Location, keystroke-by-keystroke data, and records this for playback during AARs. The MLRS-T operates on tactical launcher software and fully supports all available munitions within the MLRS Family of Munitions. All AAR data was displayed using a COTS Windows 2000 operating system. The display showed message traffic received by the launcher; specific keystroke operations conducted at the Fire Control Panel; and also graphically portrayed munitions trajectory and impact points.

Conclusion

During JNTC-HE, the NTC team continued stretching our L-V-C capabilities. We were able to leverage our current mix of live, virtual, and constructive capabilities to support achievement of training exercise objectives. We resolved to start with a "good enough" technical solution for a successful first-step forward as we integrated virtual aviation and linked to a distributed site. We have most of the required tools to continue the attack. Fusing many years of knowledge and expertise that the collective Team brought into one seamless training environment was instrumental in the success of JNTC-HE and demonstrative of the art of the possible for training the current force and the future force.

Train the Force!!!

Blue Force Tracker mounted inside a Blackhawk helicopter.



Using Innovative Approaches with Constructive Simulations to Train for War: New Avenues in Preparing for Operation Iraqi Freedom

By
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7th ATC Directorate of Simulation

Urban Operations in Iraq

"The mission was to search for and capture a belligerent cleric, a leader in the loyalist resistance movement."

The nature of the ongoing war on terrorism requires commanders to execute mission rehearsal exercises (MREs) that are innovative and replicate the conditions of the contemporary operating environment (COE) as closely as possible. These exercises will be joint and combined, and are paramount to the success of any unit rotating in support of Operation Iraqi Freedom (OIF). They allow commanders and their staffs to integrate all battlefield operating systems in order to maximize their effectiveness in a complex environment, to conduct force protection planning, and to practice acting on accurate and timely intelligence. Realizing the importance of the MREs, the 1st Infantry Division (1ID), executed a series of constructive simulation-based exercises in November and December of 2003 in preparation for deployment to the Iraqi theater of operations.

In partnership with the Battle Command Training Program (BCTP) and III Corps, the 7th Army Training Command's (7ATC) Directorate of Simulations (DOS), executed two combined training exercises: Danger Focus II and Freedom Resolve I. Danger Focus II was a United States Army Europe (USAREUR) sponsored exercise with participation of Polish forces. It served as the "ramp up" exercise prior to Freedom Resolve I, sponsored by Forces Command (FORSCOM) and included participation of Polish and British multinational partners, III Corps, 1st Cavalry Division (1CD) and 2nd Brigade, 25th Infantry Division.

Training Objectives

1ID's training objectives for Danger Focus II and Freedom Resolve I included protecting coalition forces and in-country assets, and conducting battle command using Army Battlefield Command Systems (ABCS). In order to accomplish this, it was essential that leaders had a common understanding of the COE, its terrain, enemy forces, former regime loyalists, foreign fighters, criminal factors, and internal ethnic rivalries. Finally, 1ID wanted to ensure the soldiers had the necessary skills to input data into both the United States and coalition forces Common Operational Picture (COP).

Exercise Design

After reviewing the diverse training objectives of the three major training audiences, it became apparent that there was not one simulation federation or model that could replicate the operating environment in Iraq. Freedom Resolve I would require a means of injecting multiple scripted events into the exercise, as well as a unique and ground-breaking combination of entity level and aggregate level simulations. A series of planning conferences resulted in the development of a simulation support concept, which included two different simulation federations being operated concurrently. This allowed for training stability and support operations up to a conventional high intensity conflict (HIC) event using a pair of geo-correlated, matching high resolution terrain databases. The Freedom Resolve exercise would be a distributed one with the training audiences participating from Fort Hood, Texas and Grafenwoehr Training Area (GTA) in Germany.

Simulation Support

The centerpiece of the simulation support plan revolved around scripted events or a Master Events List (MEL). The simulation models included the Digital Battlestaff Sustainment Trainer (DBST) with the Joint Conflict and Tactical Simulation (JCATS) as its maneuver driver and the Corps Battle Simulation (CBS) with the Tactical Simulation (TACSIM) providing high fidelity intelligence. Specifically, the simulation architecture consisted of DBST running from GTA in support of 1ID. An independent DBST federation ran from Fort Hood in support of the 1st Cavalry Division. An independent CBS and Tactical Simulation (TACSIM) ran from Fort Leavenworth and

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Using Innovative Approaches…

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was distributed to Fort Hood and GTA. CBS and TACSIM were used to support III Corps, to provide logistics support to 1ID and 1CD, and for the 1ID HIC spike.

Danger Focus II provided an excellent opportunity to train the 1ID commanders and staffs prior to Freedom Resolve I. It gave trainers and simulationists the opportunity to refine the procedures that they would be required to execute in the much more complex Freedom Resolve I exercise. In Danger Focus II, the role of III Corps was replicated by higher headquarters (HICON) made up of officers and NCOs from the USAREUR staff. A maneuver control response cell replicated the role of 1CD and other units. The 7ATC Combat Maneuver Training Center (CMTC) provided Observer/Controllers (OC) for the exercise.

The 7ATC Director of Simulation's intent for Danger Focus II was "to deliver a seamless simulation architecture in order to stimulate C2 systems and meet the 1ID's training objectives. To do this we will replicate as closely as possible the simulation architecture that will be used during the December MRX. The primary purpose of the simulation is to support the Master Scenario Events List (MSEL) and to provide data to the division's Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems. As such, the focus of the exercise will be MSEL injects using the Master Event Management System (MEMS). The training objectives for this exercise warrant an elaborate COE and robust digital stimulation for C4ISR training. We must ensure that the simulation provides accurate situational awareness and completely supports the "storyline" being portrayed by the exercise control."

To assist in the management of MSEL injects, the Warrior Preparation Center (WPC) provided the MEMS tool. MEMS is a software tool designed to meet the requirement of providing information management and information sharing during exercises. It is a secure, web-based collaboration and message passing tool that supports the planning, development, execution, and analysis of MSEL or MEL scripted events. MEMS improved information passage, and stimulated commanders to action. This tool, operated by Army trained subject matter experts, took real world intelligence and current events in Iraq, and "recrafted" them to fit into the simulations exercise. It set the conditions for the 1ID and other commanders and staffs to prepare for the crises and challenges of daily operations. MEMS messages spurred commanders to maneuver forces within the simulation.

Developed for Freedom Resolve I, (because it allows the use of real world detail and information), the particular JCATS/CBS constructive simulation environment was ideal in supporting the training of leaders on the protection of forces, infrastructure, and other Iraqi national assets. For example, a potential crisis such as a suicide bombing at a checkpoint can be modeled with real world terrain, troops and equipment. The scenario can be run, and the result will be determined by the actions of the soldiers involved.

If the car bomb is not prevented from detonation, the resulting explosion will have accurate effects, including damage to troops, civilians, and assets.

The behaviors of the simulated civilians can be altered to be more hostile or friendly to U.S. forces, depending on the success or failure of the soldiers.

Simulation Challenges

The most critical training event, designed as a capstone for the exercise, revolved around a period of high intensity conflict. The mission was to search for and capture a belligerent cleric, a leader in the loyalist resistance movement. Although both simulations ran concurrently during a majority of the exercise, individual units could only be represented in either JCATS or CBS. The 4ID units responsible for carrying out the HIC mission were transferred from JCATS to CBS. The transfer required the transition of the urban and other terrain displayed on the global and international COP. The transition was challenging, and required a highly trained and well-rehearsed team of experts to ensure the accuracy and fidelity of the composition of the unit in transition.

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"After reviewing the diverse training objectives of the three major training audiences it became apparent that there was not one simulation federation or model that could replicate the operating environment in Iraq."

Using Innovative Approaches…

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"The unique application of the simulations exercise design was an outstanding success."

The resulting CBS aggregates had to match the overall entity state of the JCATS units, retaining the equipment, vehicles, and personnel, as well as the number of casualties, logistics, munitions, and position of the original JCATS units. Further complicating this, the exercise did not pause in order to execute the switch. That meant the entire global training audience, as well as senior observers, and U.S. and foreign dignitaries would witness the transition as it occurred in the COP.

The COP operated through the use of the global Combined Enterprise Information Exchange system (CENTRIX). CENTRIX provided a secure coalition- only network, where the COP could be distributed, and also provide the architecture for secure messaging and web access. Sharing occurred with all members of the coalition, so both U.S. forces and other allied forces could act seamlessly. CENTRIX also provided a secure means for command and control messages and information passage to all coalition members. In doing so, the CENTRIX network integrated planning, execution, and an observation tool for the exercise.

The USAREUR commander, General Bell, directed his staff that there be a comprehensive set of tools to "monitor simulations and C4ISR systems… (tools) that have rapid fault isolation and robust fix-it capability." In conjunction with 5th Signal Command, the DOS achieved seamless integration of the signal network and exercise simulations by creating a Communications and Simulations Operating Center (CSOC). This capability allowed for the verification of use of C4I systems by the exercised units, accurately portrayed the validity of participation in the simulation, and allowed for rapid fault isolation and repair. The CSOC also allowed pattern analysis on simulations participation and C4I system utilization, which provided dramatically increased training benefit for the training unit.

The result of integrating all of these training tools and capabilities was a global training exercise that in many aspects mirrored the real world environment in Iraq. Freedom Resolve I clearly achieved its training objective of familiarizing the 1ID and its coalitional partners with the contemporary operating environment. The unique application of the simulations' exercise design was an outstanding success, and resulted in accomplishment of all of the 1ID's training objectives.

Stryker Brigade Operations in Iraq

Advancing Developments in the Joint and Combined Arena: ROK-US Combined Forces Command and Considerations of Effects Based Operations Assessments

by
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Much has been written, assumed, projected, and discussed in terms of Effects Based Operations (EBO). As most know, the concepts of EBO are not new, but in terms of the results of Desert Storm and transformation-related efforts championed by the Joint Staff and Joint Forces Command, EBO has become an increasingly important part of the vernacular used by today's warfighters. What is new is the use of modeling and simulation to identify the linkage between weapons systems and effects and, especially, in having some means to measure those effects (including those desired, those not desired, and those unexpected) in terms of the objectives desired. In short, EBO has the challenge of putting 'science' to what heretofore has been a subjective and far from exact process.

For the warfighting commands, EBO has special significance. They are at the cutting edge and the difference between computer-assisted gaming of training contingencies and computer-assisted gaming of operational contingencies may be indistinguishable. There is more. Projected conflicts do not occur in a vacuum; they occur in the context of a culture, a society, and a political reality. These, too, are part of EBO and pertain to both sides.

This adds further complexity to planning in an arena where military resources are of limited depth, growing complexity, greater interdependency, and demand increased skills for effective, efficient use. Thus, as EBO becomes a more commonplace term, it must develop in keeping with both its general environment and keep connectivity with the more modern maneuver theory and doctrine developed by the Army in the 1980s and employed with such success in the desert wars.

Yet, not all wars are fought in deserts (allowing high mobility); not all wars are fought against small or fragmented enemies facilitating friendly ability to mass at will); and not all wars are fought in isolation or with extensive advantages in mass or firepower (allowing us to force an enemy into a firepower disadvantage while remaining essentially invulnerable to the same). In fact, in Korea, the US & ROK forces face difficulties in all three of these particulars. Having chosen an overarching strategy of deterrence in Korea, we have foregone the strategic initiative of offensive surprise at the operational and tactical levels. This shortens our available reaction times and simultaneously demands a far greater accuracy in discerning how we may derive the greatest effectiveness and efficiency from limited resources. Thus, the challenge for EBO also becomes a technical one as capabilities and shortfalls in the simulations used can have dramatic impact on planning parameters and analytic results.

The dimension of combined operations must also be considered. We must remain aware that those difficulties as manifested in US/joint exercises become far more difficult when transmuted into combined exercises. Obviously, all military organizations want their elements fully, completely, and accurately represented. Yet, this poses additional challenges when representing (and implicitly evaluating and scaling) allied elements. We fight as we train, we fight in coalitions, and we are wedded to modeling and simulation (M&S) . Not surprisingly, we must keep our allies abreast of our use of M&S, and this explicitly includes EBO.

Significantly, many of America's potential partners cannot develop the sophisticated M&S applications (including the in-depth treatment demanded of EBO) at the speed of the US. The costs, infrastructure and maintenance requirements are simply beyond their capabilities. Thus, while the EBO assessment process in com-

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A paratrooper sets up a satellite radio during a dismounted patrol in Al Fallujah, Iraq.

"The concepts of EBO are not new… what is new is the use of modeling and simulation to identify the linkage between weapons systems and effects."

M1A1 Tank crewmen training at the Korea Training Center

Strykers speed out of the woodline toward their firing positions at the Rodriguez Range Complex in Korea to begin a capabilities

Advancing Developments…

(Continued from page 11)

bined arenas has the focus of operational planning and assessment, there also are associated and significant results in doctrine, R&D, manpower, and acquisition.

For Korea, the investigation into EBO has special import. Central to the ongoing service transformation is the concept of Rapid Decision Operations (RDO). This concept relies on the concept of speed, immediately overwhelming, focused firepower, and the forcing of a rapid decision (at operational and strategic levels). Yet, not all enemies or theaters are vulnerable to such concepts, and RDO may be forestalled by political constraints beyond the power of military commanders. Given the special conditions of Korea's armistice wherein very large forces in constrained, difficult terrain are poised in a very short notice environment, the fundamental premise of causing effects on the enemy that unhinge his decision-making cycle may be moot. Indeed, the whole notion of assumed levels of decision, and the options derived wherefrom, may be immaterial if the enemy ruthlessly operates from a rigid, pre-scripted offensive plan. Thus, EBO becomes far more important as the envelope and margin for error is thereby reduced significantly.

Not surprisingly, US and ROK forces conduct theater effects assessment operations on a regular basis. The emphasis is on the practical. On the eve of battle, a US or ROK commander will have scant confidence in (and probably exhibit little tolerance for) assurances that the easily counted and measured factors are in good shape. He will be worried about *all* the factors that will determine the outcome. Specifically, he will want an assessment of whether the military operations being contemplated will be *successful*—with no waffling about the difficulty of knowing such matters. He will understand risks, and something of the 'fog of war', but he will want assurance that the operations contemplated have been planned in such a way as to be very likely to succeed *despite* the problems and uncertainties. Moreover, although he may tolerate uncertainties (e.g., the number of casualties or so-called collateral damage), he will want bounds on them. These are the questions that the EBO must address.

It would be comforting if the EBO assessment processes were well developed and had the suite of tools and personnel needed for producing definitive results. Unfortunately, this is a 'work in progress'. Fortunately, however, despite various detractors, this area shows promise in the M&S experimentation arena. Less comforting is the reality that as the field changes in its capabilities, so also do the requirements for trained personnel – implying the need for a 'continuing professional education program' that better links the M&S developmental and experimentation sub-communities to the warfighters and our allies. In this regard, we applaud the developments in FA57and the parallel ones in developing the CP36 program for civilians. They help bridge a gap very apparent from 'the ramparts'.

Comments or questions?
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Mission Planning and Rehearsal System (MPARS)

by
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Senior Military Analyst ~ Alion Science and Technology

In September of 2001, the Commanding General of the 101st Airborne Division (AASLT), then MG Richard A. Cody, saw the need to leverage emerging technology to help reduce the time necessary to conduct the Military Decision Making Process (MDMP). Specifically, based upon his experience in Desert Storm, he was looking for ways to reduce the overall time required to plan a brigade-level operation by 50 percent.

After investigating what was being developed and available in both the commercial and governmental communities in support of mission planning, it was determined that the rehearsal component of the MDMP process could be enhanced through the use of constructive simulation. PEO-STRI was developing the OneSAF Objective System (OOS) and was developing several tools in support of OOS that, when integrated, could provide extremely valuable tools in support of the MDMP.

In its original configuration, Mission Planning and Rehearsal System (MPARS) consisted of four integrated software tools developed in support of the work on OOS. These tools included the Military Scenario Development Environment (MSDE), the OneSAF Testbed Baseline (OTB), the PowerStripes After-Action Review (AAR) tool, and the AcuScene Stealth 3D viewer. It is important to note that OTB is not part of the OOS, but a legacy simulation owned by the U.S. Army and managed by PEO-STRI.

Military Scenario Development Environment

MSDE is the scenario development portion of MPARS that feeds the constructive simulation in OTB. MSDE permits the user to generate a detailed simulation exercise complete with exercise map and overlays. It provides a collaborative capability by allowing the principal planner to distribute and merge plans both horizontally and vertically across planning staffs and between echelons. The completed exercise file is then easily exported in a format compatible with military simulation applications such as OTB (and OOS when released) to conduct a simulation-based rehearsal.

One Semi-Automated Force (One-SAF) Testbed Baseline (OTB)

OTB software is used as the simulation for MPARS during the rehearsal phase. OTB is an entity-based legacy simulation that allows simulated units to execute a considerable number of actions as outlined by their preprogrammed behaviors with minimal human interaction. This is a legacy simulation that will be replaced by OOS at the beginning of FY06.

PowerStripes

PowerStripes is the AAR tool within MPARS. Similar to MSDE, it provides users with familiar interfaces for integrating simulation with the desktop, and allows the operator to greatly reduce the time required from the end of the exercise until the AAR can be presented. The PowerStripes application suite incorporates features that include:

- Allowing users to plan After Action Review topics and High Interest Events prior to exercise execution,
- Allowing users to build and use templates of topics and High Interest Events and automatically build PowerPoint Slides with products based data retrieved from the execution of an exercise, and
- Allowing products to be viewed during exercise execution, after the exercise, or as a stand-alone Take-Home Package in PowerPoint format.

AcuScene PC-based Image Generator (PCIG)

AcuScene is a PC-based Image Generator (PCIG) that allows an operator to view terrain in 3D dimensions. AcuScene provides the capability to vary the observer's point of view as well as maneuver either attached to a specific platform with that platform's eye point, or independent of a platform using a

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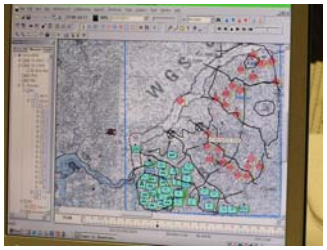
"[there is] the need to leverage emerging technology to help reduce the time necessary to conduct the Military Decision Making Process (MDMP)."



View of the MPARS Display

Mission Planning and Rehearsal System

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joystick controller or mouse. AcuScene is not a first-person shooter interface to OTB/MPARS; it is a fly-through capability designed to support Observer Controllers' monitoring of the battle and conduct of the AAR. AcuScene is the only part of the MPARS system that is not government owned software. It was a specific requirement for the 101st Airborne that may not be a valid requirement for the rest of the Army.

Training with MPARS

OneSAF Objective System (OOS)

Although not part of the current MPARS package, the OOS will eventually include all of the functionality currently available within MPARS with a greatly enhanced simulation capability. OOS will support both standalone operation and distribution as Federates in a High Level Architecture (HLA) Federation. In addition to greatly enhancing the number of entities and sides available to the user, OOS will offer greater composability. Additionally, through its technical architecture it will support wide distribution and federation capabilities and linkages with both Warfighters' Simulation (WARSIM) and Close Combat Tactical Trainer (CCTT) making possible a seamless, multi-echelon training capability.

"MPARS provides the Army with several capabilities not currently available through any other single system."

Combined Arms Planning and Execution Monitoring System (CAPES)

In January of 2003, based upon lessons learned during system fielding and training at Ft. Campbell, an Operational Needs Statement was approved by DA to provide funding for additional development and refinement of MPARS. It was determined that the best course of action in developing MPARS was to integrate CAPES into the MPARS suite of software. CAPES was a system developed by CECOM RDEC and used in several Advanced Technical Demonstrations (ATD) and Advanced Concept Technical Demonstrations (ACTD).

CAPES is a mission planning tool developed to provide detailed course of action analysis to the operational mission planner. It is a PC-based program designed to provide many of the tools necessary to allow tactical planners to develop courses of action, analyze courses of action, and aid in the MDMP process in a more automated environment. CAPES provides: an embedded 2D and 3D mapping capability separate and distinct from the capabilities that were already resident in MPARS; interactive Table of Organization and Equipment development; battlefield graphics development; Operation Order development, to include key annexes, automated terrain analysis, and MDMP development slides and outputs; and produces the output required to automatically feed a constructive simulation.

Key to the capabilities of CAPES are the abilities to collaboratively plan operations, both horizontally or vertically, as well as the ability to execute a course of action analysis in much faster than real time to provide vital decision making input to the MDMP process. CAPES is capable of developing courses of action structured from the corps to the entity level.

In addition to its planning capabilities, CAPES is a resident product of the Army Battle Command System (ABCS), providing planners with a direct link to the Joint Common Database and the ability to pass information from the planning tools to execution tools within an operational command. This link also allows CAPES to pull units and graphics from higher-level orders or the current situation for branch planning. The link exists between CAPES and Command and Control Personal Computer (C2PC), and is currently being developed between CAPES and Falconview/Aviation Mission Planning System. These vital links provide planners with additional flexibility in the integration of planning capabilities from different battlefield operating areas as well as jointly from other services.

With the integration of CAPES into the MPARS suite, a link was developed to enable a course of action developed in CAPES to be passed into the rest of the MPARS tools and the rehearsal capability resident within the constructive simulation of OTB/OOS. Other upgrades specific to the needs of the 101st Airborne Division were developed within the CAPES software, such as an automated air assault mission planning tool and vital output products associated with air assault mission planning.

In July of 2003, upon the completion of the work

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Mission Planning and Rehearsal System

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integrating CAPES into the MPARS suite of software, a highly successful test and evaluation was conducted under the oversight of the Battle Command Training Center at Ft. Hood.

Planning Using MPARS

MPARS has the capability to conduct basic planning functions up to corps level. These planning functions include the ability to construct an operations order with annexes and transmit the order out horizontally to the staff and adjacent organizations, and vertically to higher and lower echelon units. The output format of Microsoft Word allows planners to cut and paste integrated portions of the operations order to one document incorporating all inputs. MPARS can be used to construct and transmit the operations overlay with its associated graphics as well as the task organization for the operation. Staff, adjacent and subordinate units are able to import these graphics into their MPARS and then manipulate the data, making additions and appropriate changes, and then transmit the plan back to the originating headquarters where the operational plans (overlays) can be merged with the base plan. These graphics manipulations can also occur in real time through an open forum collaborative environment. Ideally, MPARS will operate off the same Compact Terrain Database generated from Digital Terrain Elevation Data as OTB uses; however, when this is not available, terrain can be obtained from scanning normal paper maps or other two dimensional digitized map products provided by the National Geospatial Intelligence Agency (NGA) (formerly NIMA) or other sources to execute planning to provide a 2D view. With the terrain development tool incorporated in CAPES, 2D and 3D environments for planning can be developed from NGA and commercial products. Subordinate units are also able to develop, from the higher headquarters plan, plans at their own level that can subsequently be distributed horizontally and vertically. There is no technical limitation on the number of times that a plan can be distributed or merged.

Rehearsal Using MPARS

Once the scenario is completed in CAPES/MSDE, it is then exported into OTB to conduct a simulation-supported rehearsal. Although scanned maps can be used with MSDE for planning, a three dimensional synthetic terrain must be available in order to conduct a rehearsal in OTB. Currently, all tactical orders must be manually assigned to units in the simulation. There is no automatic transfer of any operational instructions other than positioning from CAPES/MSDE to OTB; there is, however, ongoing development at PMO OneSAF to provide this capability. MPARS can currently only simulate 600 entities for a brigade-level rehearsal in OTB that includes a large number of rotary-winged aircraft (the entity count is significantly greater without rotary-winged aircraft.). This constrained number requires users to budget the elements to simulate. In order to meet this requirement, the operation may need to be broken down and rehearsed phase by phase, initializing a new run of the simulation for each phase. Rehearsing the phases increases the overall preparation time for the rehearsal.

OOS will eliminate the entity constraints phased within OTB, allowing for a robust brigade-level rehearsal of an entire tactical operation. An automated transfer of operational orders and instructions from MSDE to OTB will greatly reduce the amount of time needed to prepare for simulation supported rehearsals as well as providing an automated means of validating the synchronization matrix.

The Future of MPARS

With the return of the 101st Airborne Division from deployment to Iraq, the division is undergoing a reorganization to include retraining and reconfiguration of the CAPES/MPARS suite of mission planning tools. These tools will be exercised in the upcoming Ulchi Focus Lens exercise and the division will play a key role in future development of the software tools and program as a whole. There is ongoing integration work being conducted with AMPS/Falconview and Simulation to C4I Interoperability (SIMCI) Battle Management Language (BML) to enhance the capability of the CAPES/MPARS tools. Future developments of the MPARS tools may include integration of BML to further enhance the ease with which operational plans can be rehearsed in a constructive simulation. The potential exists for

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M1A1 Tank crew on patrol in Iraq.

The sun rises behind a Soldier who scans the perimeter of Firebase Gereshk, Afghanistan.

Mission Planning and Rehearsal System

(Continued from page 15)

MPARS to be integrated into the Command Post of the Future program and to be fully incorporated within the ABCS program in a future release. It is the intent of the Army G3 to get this system into the hands of soldiers as quickly as possible to immediately enhance their operational planning capabilities as well as provide input and guidance into future program developments.

MPARS provides the Army with several capabilities not currently available through any other single system. Its ability to provide a collaborative planning environment through a user-friendly interface to conduct planning up to corps size and rehearsals of tactical operations up to brigade size is a capability of great interest Army-wide and provides an advanced look at some of the base capabilities that the OOS will offer.

Command Post of the Future

by

MAJ Stewart Liles

Battle Command, Simulation, and Experimentation Directorate (DAMO-SB)

Training, Exercises, and Military Operations Officer

Command Post of the Future (CPOF) is a collaborative battle command tool that enables distributed planning and execution. The CPOF software is rapidly gaining popularity in the Army and is currently being used with great success by the 1st Cavalry Division (1CD) deployed to Operation Iraqi Freedom (OIF) 2. Based on the success of the 1CD, the Army is fielding CPOF to one division scheduled for OIF 3 and another for OIF 4. The Army is also planning to transition the CPOF project to a formal acquisition program. CPOF is a Defense Advanced Research Project Agency (DARPA), that initially concentrated on how to improve the commander's understanding of the operational situation. The initial solution was a large command theater with oversized displays to present information to the commander. As the project evolved, the researchers discovered that tying the commander to a huge command post (CP) would rob the commander of his ability to circulate on the battlefield and could hamper his ability to command his unit since all the information required to prosecute the operation would be located in the CP. As Retired Major General Paul Gorman opined in his paper, "The Command Post is Not a Place;" the command post is wherever the commander is, and a large, physical command post could become a natural target for the enemy. These initial ideas pushed the team to investigate collaboration technology to facilitate a distributed command post.

Not only does this make available to the commander, wherever he is located, the information required to maintain his situational understanding, it also enables the staff and commanders to collaborate without being co-located. Using very flexible and composable user interface technology along with effective collaboration technology, the team created a system that allows commanders to collaborate in real-time with staff and subordinate commanders obtaining a more thorough understanding of the operational situation for the entire team. Three basic technologies were developed that concentrated on team collaboration to enable shared situational understanding. The most fundamental technology to the software is the collaborative technology that enables users to view other user's workspace and to transfer data from one view to another. Second, the CPOF developed technology allows users to create operating pictures that illustrate that user's view of the operational situation. Third, the team developed a very flexible and intuitive user interface. The three technologies resulted in a very effective tool that the Army sees as a way to provide the current force with a tool for commanders and staffs to effectively coordinate and synchronize its forces, and to inform the future force on collaborative battle command technology.

CPOF offers two distinct products, the software itself and the process. The software is considered by many to be a "leap-ahead" technology on which the current force can capitalize to inform the future force. The CPOF process is providing important information on how effective digital collaboration tools change the decision making process. Initial studies show that the decision cycle time is dramatically reduced because of the improved situational understanding and effective collaborative techniques.

In a break from traditional acquisition strategy, the Army is taking advantage of a useful commander's tool without explicit doctrine that spells out how the tool will be used. The traditional acquisition system demands that doctrine support the requirements of the item being procured. Since DARPA does not operate under these constraints, the developers and subject matter experts were able to design a system without an obvious connection to Army doctrine. CPOF already supports current Army doctrine, since staffs can execute the Military Decision Making Process (MDMP) that enables user feedback and in-

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Command Post of the Future

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put on what changes in the decision-making process should be designed into future doctrine (i.e., focuses the effort on future net-centric and commander-centric decision-making processes). Instead of trying to develop a system only for the current force, the team attempted to develop a system flexible enough to be adapted to any decision making process. It is this flexibility and collaborative technology that separates this system from the current systems and truly represents a leap-ahead for battle command technology.

Former commanders designed CPOF for current commanders. One of the weaknesses of current systems is that information is provided digitally to our commanders and staffs, but little capability is provided to help the commander integrate and synchronize his forces to accomplish the mission associated with the operational situation. The current battle command systems provide a measure of control of information collected for the commander, but they do not provide an effective tool for the commander to do something with the information that is collected. CPOF allows commanders to effectively coordinate the actions of their staff, adjacent commanders, subordinate commanders and superiors, allowing all users to "see" the plan as it evolves. This visibility allows the other players to anticipate their actions and responsibilities before receiving the formal order. This paradigm allows for shorter decision cycles and allows supporting players to recommend modifications before the commander finalizes the plan. For example, this allows the logistical supporters to integrate the support plan as the warfighter formulates the action. This enables "self-synchronization" during the planning phase and significantly reduces planning and the time required to coordinate the action of supporting organizations.

CPOF enables effective horizontal and vertical collaboration between commanders and their staffs at the same echelon and between higher and lower echelons. CPOF provides visibility of the work being done in any section to all who enter the system. This causes some cultural pressures because it is not normal for commanders and other sections to see plans in progress. The Army system, for example, generally demands that a staff section complete its portion of the plan before briefing the commander which results in a decision process that resembles a conveyor belt. As each section completes their piece of the plan they pass it on to the next section for work. The CPOF system resembles a network where all inputs are in-progress at the same time. By breaking these stovepipes, the CPOF allows other sections to see the works-in-progress of their sister sections. This concurrency provides an environment where the plan can be completed en masse, with each staff section completing their portion of the plan as the other sections are completing theirs. The obvious advantage is the ability to see the supporting sections' input and collaborate on its content and how it affects the commander's mission and intent. This idea works between echelons as well. As the plan evolves in the headquarters, subordinate and higher staff sections can see the work-in-progress allowing headquarters to begin work without a specific request from a subordinate or a higher directive. Once again, simultaneous visibility and effective communication facilitates the synchronization of plans as they are being developed.

CPOF enables a truly distributed command post similar to that described by MG Gorman. The situations previously defined allow the commander and staff to participate from distributed locations with no requirement for any participant in the planning and execution process to be located in proximity to each other. The CP exists in virtual space since the visualizations and communication available in the software provide effective situational understanding for all members of the command and staff team without regard to their geographic location.

CPOF is truly a "leap ahead" technology that is improving the current force and informing the future force. As Simulation Operationalists (FA57) our role is to integrate digital battle command tools into the command post operation. Further, the FA57s function as integrators in the command post for training in peacetime or operations in wartime. MG Chiarelli said that CPOF's ability to provide "improved situational understanding to the 1st Cavalry Division in Baghdad has saved lives." It was his

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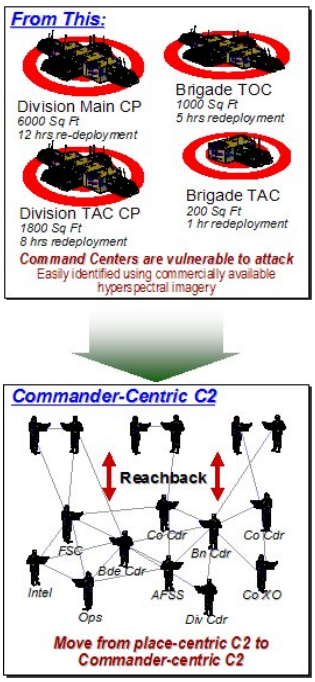

"The command post is wherever the commander is."

The Tactical Operations Center of the 2nd UA, 3rd ID, set up in the Mohave Desert, has communications connectivity that allows virtual data to be linked to the NTC warfight.

Command Post of the Future

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assigned FA57, MAJ Craig Unrath, that initially ensured that the CPOF software was integrated into the 1CD's command post operation during their training sessions prior to deployment.

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"The CPOF process is providing important information on how effective digital collaboration tools change the decision-making process."

STORM— a Digital Synthetic Environment Supporting Operation Iraqi Freedom Testing and Training

by
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Program Manager, STORM

Situational awareness (SA) and digital battle command and control (C2) are crucial to the continuing success of the U.S. Army. Operation Iraqi Freedom (OIF) has clearly demonstrated that success on the battlefield is due not only to the skillful use of advanced weapons systems, but also to the effective use of digital battle command systems. The war has also highlighted the importance of using realistic synthetic environments for operational testing and training.

"STORM was recognized as a valuable tool for digital battle command training."

The U.S. Army Operational Test Command developed the Simulation Testing Operations Rehearsal Model (STORM) to provide a synthetic environment for realistic operational testing in an era of constricted resources (e.g., land, dollars, soldiers, enemy forces, and time). STORM is a federation of entity-based simulations that operates in a distributed interactive simulation environment. STORM fuses live players, role players, and simulated entities (vehicle or Soldier) to create a realistic battlefield by portraying higher, adjacent, and lower units. STORM uses tactical communications systems to digitally transmit and receive SA and C2 messages using the joint variable message format between live and simulation forces in real time, thereby providing a common operational picture.

STORM has been instrumental to the successful development of the Force XXI Battle Command Brigade and Below (FBCB2), providing a robust, synthetic environment for its developmental and operational testing. During its initial support of operational testing of the FBCB2 in April 2000, STORM simulated an armor battalion and a mechanized infantry battalion of an adjacent brigade combat team (BCT) to the live BCT of the 4th Infantry Division deployed in the field at Fort Hood, TX. Soldiers operating ten STORM work cells simulated the companies, scout and mortar platoons, and other elements comprising the two battalions of the BCT. Based on where the Soldiers operating these work cells positioned their forces within Janus, which was the combat simulation used to support the test, STORM automatically, and in accordance with FBCB2 rules, generated the SA messages that these units, if live, would have created. The STORM work cells also enabled the Soldiers operating them to exchange C2 messages with their battalion and brigade tactical operations centers (TOC). In addition, STORM provided a realistic threat environment, augmenting the live opposing armor battalion deployed to the field, to provide a division-sized opposing force. Counting both live and simulated units, STORM portrayed over 9,600 vehicle entities.

Because of its success in portraying a realistic synthetic

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STORM

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battlefield environment, STORM was recognized as a valuable tool for digital battle command training. Consequently, STORM supported numerous digitized training events, including the Joint Contingency Force (JCF) Advanced Warfighting Experiment at Fort Polk, Louisiana (September 2000), the FBCB2 Division Capstone Exercise at the National Training Center (NTC) at Fort Irwin, California (April 2001), and several 4th Infantry Division NTC ramp-up training events (October 2000 - April 2002). Since November 2000, I Corps has been using STORM at the Mission Support Training Facility (MSTF) at Fort Lewis, Washington to support the digital training requirements of its Stryker brigades.

In May 2003 as part of the Congressionally-mandated Certification Exercise/ Operational Evaluation (CERTEX/OE) for the Army's first digitally equipped Stryker brigade combat team (SBCT), the SBCT was required to demonstrate key operational effectiveness capabilities, including joint, multinational, and interagency interoperability at the Joint Readiness Training Center (JRTC) at Fort Polk. When U.S. Army Forces Command needed to simulate a digitally equipped Stryker battalion during the CERTEX/OE events, they turned to STORM as the solution. STORM supported all facets of the training leading to the CERTEX/OE and ultimately to the unit's deployment to Iraq. This training included Warfighter training (Sept-ember-October 2002) at Fort Lewis and training at the National Training Center at Fort Irwin (April 2003). During the CERTEX/OE, STORM stimulated the TOC of the 5th Battalion, 20th Infantry. This was accomplished with Soldiers operating six STORM work cells to simulate the three infantry companies, scout and mortar platoons, and logistical elements.

Due to land and other resource constraints at the JRTC, evaluation of the communications infrastructure of the entire SBCT would have been impossible without the message traffic provided by STORM. During the course of the 13-day event, over 3.5 million SA and more than 2,500 C2 messages were sent from STORM. Almost 700,000 SA and nearly 1,500 C2 messages were received by STORM. Thus, STORM provided a seamless digital battle command environment between the live and simulated forces, allowing the SBCT commander to exercise the C2 structure of the entire 3,600 Soldier brigade under deployment conditions.

A major enhancement initiated in 2003 was the upgrade of STORM components to handle the requirements of the satellite-based Blue Force Tracker (BFT) system in use for OIF. In February 2004, STORM supported the FBCB2-BFT Developmental Test/Operational Test. STORM proved to be essential to the test, providing the rigorous SA and C2 digital synthetic environment required to ensure that the best system is fielded to our Soldiers as they encounter the challenges of OIF.

STORM demonstrates innovation and achievement in advancing the state-of-the-art constructive simulations; synthetic wrap-around environments; and interoperability with live, tactical forces. STORM has proven the capability to meet all testing and training challenges. As the use of digital battle command expands throughout DoD, the upgrades and enhancements required to maintain STORM as a high-fidelity tool for developmental and operational testing also ensure its continued usefulness in the training arena. In November 2003, the Future Combat Systems Lead Systems Integrator officially requested that STORM be delivered for their use in February 2005. STORM has the capability to continue to support transformation to network-centric warfare, but, more importantly, STORM has proved valuable in preparing Soldiers to meet the demands of a hostile environment in Iraq.

For additional information, contact:
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"STORM has been instrumental to the successful development of the Force XXI Battle Command Brigade and Below (FBCB2), providing a robust, synthetic environment for its developmental and operational testing."

The Future of Simulation at the United States Military Academy

by
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"Using simulations to support military education and training is nothing new for the Military Academy."

DSAS Screenshot

"The current WARCEN cannot support a 130-cadet company during training time."

The United States Military Academy's Department of Military Instruction (DMI) seeks to improve the quality of the military training and professional education of its students through the use of simulations. The largest part of this effort is the proposed construction of a 38,000 square foot facility dedicated to the simulation of warfighting. Other areas where we seek improvement is in the delivery of compelling, interactive military science courseware, and in distributed, asynchronous simulation exercises run from each cadet's personal computer.

Using simulations to support military education and training is nothing new for the Military Academy. The Department of Military Instruction created a Janus lab in 1989, and has used Multiple Integrated Laser Engagement System (MILES) during summer field training for decades. The Department's Warfighting Simulation Center (WARCEN), formerly the Janus lab, transitioned to PC-based virtual simulations in 2000, as part of a study to support Land Warrior software development.

The Dismounted Soldier Acquisition System (DSAS), really a modified version of the Delta Force II game, was linked to the Land Warrior software to study the effectiveness and utility of the Land Warrior interface design, and the resulting advantage in soldier situational awareness.

The 1000+ cadets taking the freshman-level Military Science course conducted practical exercises using the software, and also served as experimental subjects for the study.

Changing to PC-based simulations added another dimension to simulation at the academy: Cadets could now run the programs in their rooms, on their own PCs. Cadets began to receive assignments to run selected simulation scenarios as homework. This model allowed instructors to assign simulation exercise (SimEx) preparation as homework, and reserve computer lab time solely for executions of collective exercises. Currently, the WARCEN supports five courses, cadet commander's time training, and the computer wargaming club with PC-based simulations. The simulations vary by course, and are Virtual, Constructive, and hybrid (Virtual and Constructive in the case of Steel Beasts 2).

Currently, the simulations include America's Army, Close Combat (USMA Version), Virtual Battlefield System 1 (VBS1), Steel Beasts 2 (Professional Version), BC 2010, The Operational Art of War, and Axis and Allies.

Together with learning management system delivered courseware, PC-based simulations can provide a practical exercise that tie learning objectives to realistic applications, and give the cadets a chance to apply their knowledge without leaving their room. An example is the virtual land navigation course (MS102/103) created on America's Army: Operations®, for that follows four modules covering map reading and land navigation. The courseware is remotely accessed on-line, while the simulation is resident on the cadet's computer. The Academy's Operations Research Center analyzed data from the above class last year to study the effectiveness of varying levels of multimedia in distance-learning education.

The current WARCEN facility is quite modest in size, and contains 60 PCs running either Windows 2000 or Windows XP. The current WARCEN cannot support a 130-cadet company during training time, when the cadets are presented with a tactical situation, and execute it in a chosen simulation either against artificial intelligence, or against other cadets. In addition, the current WARCEN has no room for future simulations and training systems templated for fielding to the Academy, such as Engagement Skills Trainer (EST) 2000. Furthermore, the Academy must provide the Army with lieutenants who are mentally agile, and proficient in tactical drills. The current WARCEN is not large enough and does not have the necessary tools to accomplish this vital mission.

The WARCEN Future, a planned 38,000 square foot

(Continued on page 21)

The Future of Simulation…

(Continued from page 20)

facility, will house current and future simulations and training systems. The purpose of the WARCEN Future is to provide a facility on the USMA grounds to enhance Military Science education, and unit training. The center allows cadets to concentrate on warfighting skills and also allows the Army to showcase new technology and gather data for research efforts. It will house marksmanship and engagement training systems such as EST 2000 and Laser Marksmanship Training System (LMTS), a 130-system PC lab for PC-based simulations, a Flatworld technology immersive environment lab to simulate Military Operations on Urban Terrain (MOUT) environments, and a Call-for-Fire Trainer (Formerly named GUARDFIST IIA). The center will also house or accommodate weapon-system specific systems to both familiarize cadets with the different branches of the Army as well as to help First-Class cadets (Fourth-year cadets) gain specialized knowledge in their chosen field. Some branch specific systems will be permanently housed inside the facility (Avenger and Stinger Trainers), while space and electrical infrastructure behind the facility can accommodate periodic visits from mobile systems such as the Relocatable Advanced Gunnery Training System (RAGTS), Close Combat Tactical Trainer (CCTT), Aviation Combined Arms Tactical Trainer (AV/CATT), and other such trailer-mounted systems for which a permanent installation cannot be justified.

The facility will also house server rooms that will host distributed simulations accessed from either inside or outside the facility, a snack bar, and a mission planning and rehearsal area which doubles as a study room and professional library. The Academy envisions the facility as a "Sports-Dome" type facility, where instead of playing interactive video games, cadets will spend their discretionary and free time using compelling, interactive simulations and training systems. It will be a place where cadets will want to spend time, a place that will make them familiar and accustomed to using technology, and a place that will enable them to better lead our Army into the battles of the future.

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"The center allows cadets to concentrate on warfighting skills and also allows the Army to showcase new technology and gather data for research efforts."

The Operational Art of War Screen Shot – Used by Cadets to execute a campaign exercise

Steel Beast 2 Pro Screen Shot- Used by cadets to execute Heavy Force Operations

The FA57 Officer Current and Future Force

by
MAJ Favio Lopez
Simulation Operations Proponent Office
FA57 Proponent Officer

In the last quarterly I asked a question about our role, and through your feedback we, at the proponent office, have put together a White Paper that talks about what we do today, and what we might do in the future.

Today we make up less than 1% of the total army field grade force structure but we are involved in the planning, preparation, and execution of every joint, multinational, coalition, and Army simulation supported exercise. In the coming months, at least one FA57 will be assigned to every Combined Training Center and every division will have two FA57. By the year 2009 we are projected to have a force structure that exceeds 200 in the active component, and a total force structure that exceeds 400. It is true that some force structure changes in the last several years were directed by the Chief of Staff of the Army, but today's changes are based on the requests and requirements being articulated by the field.

So what is your role as a FA57? The answer is, it really depends on the organization and its mission but what will remain constant is that our current roles, functions, and duties will not require drastic change. Learn, train, operate, and support actions will remain valid. In training, the FA57s will continue to support the commander and his staff by being an expert in integrating and linking Battle Command systems and Simulations, and in applying models and simulations to create the environments that prepare soldiers, leaders, and units for war. The FA57 will continue to plan and employ a mix of live, virtual, and constructive (LVC) simulations and embedded systems to support training and military operations. During military operations, we will continue to assist commanders and staffs in mission planning and mission rehearsal and ensure that collaborative tools, embedded simulations, and Battle Command systems are fully integrated with the reach (reach-back) network. Simply put, FA57 officers are the bridge between the Commander and the technology required for training and military operations.

The FA57 white paper is published on the website: www.fa-57.army.mil/proponent/Role-of-the-FA57. Your input and feedback on this paper is valuable; tell us what you think.

Force Structure Update

by
John Hammond
Simulation Operations Proponent Office
FA57 Force Structure Analyst

Simulation Operations force structure continues to grow! As the FY06 Command Plan process draws to a close, we can expect an increase of 15+ FA57 positions (FY05 to FY06). These include full Colonel authorizations in support of USAR Simulation Brigades in FORSCOM, in the TRADOC Futures Center and at Headquarters, TRADOC. It also includes additional Lieutenant Colonel positions at HQDA G3-Training, the Army War College, JRTC OPS GRP and USAG, Fort Bragg. Further, authorizations for Majors will be added in the TAC1/TAC2 CPs in 3ID (M), 10MTN and 101ABN (AA).

These positions set the stage for even more FA57 authorizations. The UEx design applied in the initial TAC1/TAC2 CPs will be extended to 1CAV, 4ID(M), 25ID(L) and 82ABN as those divisions move to the Army's newest force designs in FY06 and beyond. FA57s are also being documented as Assistant S3s in Aviation and Sustain Support Units of Action (SUAs) and will be included in Fires, RSTA, Maneuver Enhancement and other SUAs as they come on line.

Additionally, S7 Skill Identifier (SI) for Simulation Operations was applied to S3s and Assistant S3s (or equivalents) in the HVY BCTs Units of Action (UA) of 3ID(M) (approximately 70 duty positions). The S7 SI will also be applied to other INF and HVY BCTs as they are formed in 10MTN, 101ABN(AA), 4ID (M), 1CAV, 25ID(L) and 82ABN. Through FY06, this includes 7 of 10 active component Divisions and 30 of 43 projected BCTs under the Army's transformation and modularity force designs, with the remaining Divisions and BCTs programmed for FA57s and S7 SIs by the end of FY07.

What does this mean to us as a Functional Area? First, it represents a significant increase in our force structure. These actions add a second MAJ/O4 to each Division and move our S7

SI structure from one focused on heavy digital Divisions and Stryker Brigades (less than 200 positions) to one that covers all Divisions and Brigade Combat Teams in the Army (more than 400 positions thru FY05 alone!). Active component FA57 field grade authorizations are projected to top 200 by the end of FY07, up from less than 90 field grade officer positions two years ago! These new positions formalize our responsibilities in training and operations, particularly in the areas of pre-deployment exercises and certification, and on the operational side, in mission planning, course of action development, mission rehearsal, after action review and tactical battle command systems integration.

We are, and continue to be, a vital component of the 21st century Army!

CP36 Information

by
Dr. Thomas Lineer
Simulation Operations Proponent Office
Alion Science and Technology

Two years ago, the Proponent Office received the provisional designation of Career Program (CP) 36 for Department of the Army Civilian M&S professionals. During this period, there has been, and continues to be, significant and continuing proposed changes to the Civilian Personnel System. Consequently, the attainment of approval of CP36 has been delayed for a variety of reasons and issues. While the approval process continues, the development of the CP36 program is ongoing, for example, the Simulation Operations Professional Course (SOPC).

The SOPC is being developed to be a foundational educational experience for the civilian simulation operations professional, CP36. The SOPC consists of three one-week modules (40 hours per week), which are: (1) Fundamentals of M&S Program Management, (2) Technical Aspects of Simulations, and (3) Employing Simulations. The beta course is scheduled at the Korea Battle Simulation Center in September 2004. The schedule for future courses, at different locations, is being developed for FY05/FY06/FY07 and will be published in future newsletter editions.

Another part of CP36 development is the designation of spaces for civilians to attend the next Simulation Operations Course (SOC). This is a six-week course at Ft. Belvior, Virginia in the January/February 2005 timeframe. The SOC provides individuals with an understanding of the roles, responsibilities, practices, procedures, and concepts necessary to integrate models and simulations. Civilian personnel (GS 7-15) may attend the SOC, subject to approval by HQDA, ATTN: DAMO-SBP. To apply for the course, an application must be submitted in memo format (name, duty position title, duty functions, and justification for course attendance) with supervisor's endorsement no later than 3 December 2004 to: Gary.Dahl@hqda.army.mil (DSN: 664-0252; COM: 703-604-0252) or Thomas.Lineer@hqda.army.mil (DSN: 664-0258; COM: 703-604-0258)

In the next five years, the Senior Army Workforce (SAW) personnel initiative will most likely affect the CP36 program. It is envisioned that the SAW will consist of a core group of civilian grades GS 12-15 (and their pay-banded equivalents) who are team leaders, supervisors, managers and program managers. The key components of SAW are (1) Central Management, (2) Training and Development, (3) Multifunctional Career Tacks and (4) Competency-Based System. CP36 M&S leadership positions and personnel will potentially be included in the SAW.

Visit the SAW webpage: http://cpol.army.mil/library/sawmo

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It's About Warfighting

Calendar of Events 2004

EVENT	***DATE***	***LOCATION***
FA57 ACS Board	Sept 04	HRC
Infantry Conference	6-9 Sep 04	Ft. Benning, GA
Army Intelligence M&S Workshop	15-16 Sep 04	McLean, VA
National Guard Conference	14-16 Sep 04	Las Vegas, NV
LVC TEPR/Executive Council	27-30 Sep 04	Fort Leavenworth, KS
USAREUR Land Combat Expo	28-30 Sep 04	Heidelberg, Germany
FOUNDATIONS '04	13-15 Oct 04	Tempe, AZ
Huntsville Simulation Conference	20-21 Oct 04	Huntsville, AL
I/ITSEC '04	6-9 Dec 04	Orlando, FL

Persons wishing to provide comments or submit articles for publication should contact MAJ Favio Lopez ~ 703-601-0005 or e-mail: Favio.Lopez@us.army.mil

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