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JFETS



The Joint Fires and Effects Trainer System is a prototype immersive, location-based tainer designed to hone the skills of the urban warfighter.

By Scott R. Gourley



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In This Issue:

Training Advocate
 Major General Douglas L. Raaberg U.S. Air Force
 Director of Air and Space Operations, Headquarters Air Combat Command

Few training systems have generated more industry buzz in their first few months of operations than the Joint Fires and Effects Trainer System (JFETS), located at the U.S. Army's Field Artillery School at Fort Sill, OK.

JFETS was developed by a team that included the Program Executive Office for Simulation, Training and Instrumentation (PEO STRI), as well as Hollywood special-effects experts, to provide an immersive training environment that allows for the "suspension of disbelief" by soldiers undergoing the training experience.

While PEO STRI provided the overall material solutions, the special-effects elements were developed and constructed under the supervision of the University of Southern California's Institute for Creative Technologies (ICT), a University Affiliated Research Center established with the U.S. Army in 1999. Envisioned as a collaboration among the entertainment industry, academia and the U.S. Army, ICT is unique because it taps into creative expertise of both entertainment and computer industries to create simulation environments that surround the senses as they instruct the mind.

JFETS represents one of those environments, focusing on cognitive, rather than technical skills through the integration of environmental, video and sound to provide a high-tech simulation that puts the soldier into the action.

Although officially a prototype system, the JFETS program was quickly rolled out in an effort to meet the training needs of today's warfighters. The most recent enhancement to the prototype system occurred in September 2004 through the installation of the new Call for Fire Trainer (CFFT) element into the immersive environment.

PEO STRI's CFFT has evolved from an ongoing contract for the Guard Unit Armory Device Full-Crew Simulation Trainer II (GUARDFIST II). CFFT is described by Fort Sill representatives as a modular upgrade of the GUARDFIST artillery indirect fire mission-training device that will allow soldiers to train in adjusting mortar and naval surface fires and conducting some types of close air support (CAS) missions.

"The Call For Fire Trainer is the next quantum leap in simulation capability," explained Colonel Gary Kinne, director of Fort Sill's Joint and Combined Integration Directorate. "And what we're doing is taken that simulation and integrated it here. Then the Institute for Creative Technologies—these guys are state-of-the-art Hollywood sound stage effects experts—came in here. We gave them a vision and they developed this immersive environment to distress those junior leaders as we train them how to employ these fires and effects."

"We believe that the Joint Fires and Effects Trainer System is the linchpin, or key enabler, as we train junior leaders on how to properly plan, synchronize and execute joint fires," Kinne said. "What we can do is to replicate all surface-to-surface fires, including field artillery, naval and mortars. We can put an individual into what we call the open terrain module, [OTM] that replicates open terrain like you might see at the National Training Center. And then we have a separate urban terrain module, [UTM] that basically mirrors the contemporary operating environment."

That contemporary operating environment is an urban environment," he added. "Imagine the ability to bring to life urban rules of engagement and fratricide considerations—posing questions like 'How do you employ fires and effects in an urban environment?'"

(ACC)

AAI Corporation

Robert Peters Vice
President of Training
Systems

The Electric Trend

Motion systems inject an invaluable level of fidelity into a flight crew's simulator training experience. Dramatic advancements in performance, increased cost efficiencies and other developments have boosted the popularity of electric motion systems over their hydraulic cousins.

A Significant Improvement in the Way They Train

As a result of lessons learned in Operations Iraqi and Enduring Freedom, current and prospective joint terminal air controllers—the term that has evolved for forward air controllers during the two operations—will train with ever more capable training systems. As important, the versatile trainers will support other members of the combined arms team.

DoD has Made Great Progress in Live Training Capabilities

The department's initiative to better enable joint operations, modernize its training and test ranges, and protect its military ranges and operating areas from all manner of encroachment issues is on track. However, one area that would benefit from a focused DoD/industry partnership is the area of live instrumented training.

Command Profile

U.S. Marine Corps'
Program Manager,
Training Systems, Marine
Corps Systems Command

JFETS is located in a single facility in Fort Sill's I-SEE-O Hall, with both UTM and OTM accesses from a center corridor. The first stop for students, however, is the JFETS in-brief/after-action review module where students receive basic mission information before entering one of the two main training modules. A fourth module, now under development, is the fires and effects command module. Linked to UTM and OTM, the command module will allow battle staffs to direct action while the plan, synchronize and execute fires.

The UTM in-brief process includes a review of the rules of engagement, a situational map overview of the First Platoon forward observation location, a brief on enemy situation and capabilities, and the commander's guidance for action.

The enemy situation, for example, notes, "Remnants of the 133 d motorized rifle battalion (MRB) are currently defending the city of Chaitan. This unit's expected strength is estimated to be 5 BMP-1s, 2 ZSU-23-4s, and 1 dismounted infantry company. The 133d MRB is expected to have a company-size combined-arms reserve at strength of 8 BMP-1s. Most wear solid OD uniforms and black berets. Several combatants have donned civilian clothing in order to blend in with the local population."

Moving down the hallway and entering the UTM, the student walks up a flight of stairs to enter the trainer. The immediate surroundings are a small, furnished apartment kitchen and living area with a layer of sand and a few broken dishes marking its abandonment.

The walls can be arranged in several different configurations with multiple window options opening onto a projected image of downtown Chaitan. Environmental controls include multiple daylight options, the ability to heat the room to 130 F, and wind gusts that can be seen moving curtains, hanging laundry and smoke columns in the city scene. For soldiers who remain too long in the window, enemy snipers in the "city" can provide a number of realistic rifle shot sounds.

Looking out at the city scene, Kinne observed, "We can train a variety of skills depending on what it is you want to get. We can train individuals on how to take down a room. We can train them on how to establish an OP [observation post]. There are a number of indicators in the urban scene where we can have an individual up here just collecting information. You will see things like a dog walking in a yard. You can see which way the wind is blowing by things hanging out on clotheslines. How does that impact if you employ smoke? Why is that dog barking? In one scenario he's barking because there are insurgents up on the roof. So there are indicators there that you can use to train that forward observer to notice—to collect intelligence—more than just calling for fire."

"You can see we have a number of targets," he continued. "And many of them are strategically located. For instance, we have very restrictive rules of engagements around mosques and there you can see a ZSU-23-4 [anti-aircraft weapons system] sitting right next to the mosque. So what are you going to do now, forward observer? If he's firing at "friendlies," can we employ fires against him? If, in the case where we are going to do that, what do we do? Do we fire a 'battalion one' or should we use close air support with a precision-guided munition? So you can see the dynamics that this brings into play as we deploy fires and effects in an urban terrain."

"One of the things that we've got here is the authenticity that it brings," added Scott Dallam, director of JFETS for TELOS OK, the local contractor that operates the facility. "We've had folks from Iraq and one of the things we've noticed is when we've brought soldiers back from Iraq in here they've said 'You've got it right.' The other day we had some NCOs in here and when the

The mission of the command is to improve the warfighting effectiveness of the MAGTF and globally deployed maritime expeditionary forces by providing training support and developing and sustaining training systems and devices.

sniper sounded they all just dropped to the floor.”

According to Dallam, the software that controls the unfolding UTM scenario includes three different scenarios with random play possible within each one. Specific actions, like sniper intervention, can also be interjected within each scenario to provide for a combination of controlled and random events. More than two-dozen sensors mounted around the room track every action of the soldiers, with their M22 binoculars and other observation devices modified to remote the exact image that they see to the controller monitoring their action.

“At the same time, at our mission editing station, while the soldier is doing his mission, we’re recording everything that’s going on in there: every fire mission, every piece of voice traffic, everything. If we’ve got a fire mission and we see something that he doesn’t see, but should see it, we can set a time mark on our review and when it’s time for the AAR [after-action review] we can fast forward our mission review up to that point. We can then, once we’re done editing down this system, put it on a DVD, hand it to him, and have him take it back to his unit to learn more from his mistakes or share the good stuff that he did,” he said.

Across the hall, the OTM presents observers with one of seven different panoramic views of mobile battlefield environments. Soldiers climb into a HMMWV mounted in the middle of the room and use a vehicle mounted observation device to designate targets in the open terrain.

“Ultimately we’d like to be able to integrate this with some of our national reconnaissance capabilities and say ‘We would like a digital image of X-location,’” Kinne explained. “And we envision being able to get that, put it in here, and project it onto this simulation. So individuals could train on the actual terrain that they would occupy someday—maybe in a future theater of war. Now that is a long time coming— - we continue to work toward that but there are some significant challenges.”

According to Kinne, one of the most significant near-term challenges concerns the need to expand training throughput.

“This was a prototype system that we’ve ‘moved to the left,’ if you will. We’ve taken it from a prototype system to actually conducting training three to five days a week for different training audiences. Now the biggest challenge we currently have is throughput capability. Obviously we have one open terrain module, one urban terrain module, and more students than we have modules in which to train them. We’ve identified that challenge. We’ve determined the need to expand this capability. Thus our concept for the Joint Fires and Effects Training and Simulation Center. This would be a new facility proposed to be constructed across the street. We’re looking at a rather large facility that has a number of bays. And we’re attempting to take what we have here—the open terrain, the urban terrain—and make them reconfigurable. So, if the focus today was on an urban environment we could set up a number of the bays to replicate an urban environment. And if the focus was that we need to work more on an open terrain type of environment then we could reconfigure those same bays into an OTM.”

As currently proposed, the Joint Fires and Effects Training and Simulation Center will be a 177,000 square foot facility projected for the fiscal 2010 budget at a cost of approximately \$65 million.

However, more near-term plans call for expanding UTM and OTM capabilities at the current site.

“We have a bay open in the next building over and we’re looking at building additional modules

there—on the order of about three total modules in which we can increase our throughput,” Kinne added.

He also referred to several ongoing technology initiatives with PEO STRI and ICT, ranging from the introduction of smell to the UTM to the development of a new Type 1 CAS trainer.

“As you look at the qualification and certification of terminal attack controllers, simulation is not currently a viable option,” he said. “The only option is to actually drop training ordnance or live ordnance for certification. What we’re proposing is that maybe we need to look at simulation. Can we push that within the realm of realism so that we might be able to relieve some of the challenges we have in terms of resources, numbers of sorties or quantities of munitions that it takes to qualify and certify [Joint Tactical Air Controllers]? Couldn’t we possibly develop a simulation that would assist us in that certification/qualification procedure? There is not one that exists, right now.

However, we believe, as we leverage the great capabilities of the Institute of Creative Technologies and what we have right here at Fort Sill, that we could develop that Type 1 CAS simulator that would give us that ‘over-the-shoulder’ capability. Type 1 CAS requires an individual that can have eyes on the aircraft and also eyes on the target. Obviously, it’s the most restrictive employment of close air support. That’s why the Air Force says that the only person who can do it is the joint terminal attack controller—because it’s a highly skilled requirement.

Well, we don’t have a simulation right now that can replicate being able to look over the shoulder, identify that aircraft, see what direction the nose is pointed, and be able to bring it in all the way to the target. So that’s what we’re proposing—to work with ICT and our Air Force counterparts to leverage our technology and see if we can possibly develop such a simulation.”

ICT representatives acknowledge the ongoing investigations.

We’re very excited because we’re just starting the next cycle of development of a Type I CAS trainer for JFETS,” said James H. Korris, ICT’s creative director. “And this CAS trainer is a novel design. Initially people said there are some CAS trainers around in planetariums with domes and stuff. We kind of looked at those a little bit and thought, ‘This is the Institute for CREATIVE Technologies. We’re not going to get something off the shelf.’”

Although unable to provide full specifications at this time, Korris noted that the trainer “will have a 300-degree field of view around you and a full overhead field of view. And the part that’s surrounding you will actually have six edge-blended graphical channels. So, that means there will be very high-resolution data around you. The other thing is—and that this is unique as far as I can tell for CAS trainers—is that it’s all rear-projected. So there’s no equipment in the trainer room. It’s got an extremely directional 10.2 sound system [10 loudspeakers plus two low-frequency subwoofers used to create a realistic audio environment.]. It also has this cognitive loading. There will be nothing like it—anywhere.”

In terms of the cognitive loading aspects he noted, “If there’s a single hallmark in the work we’ve done it’s that we have focused as much as possible on cognitive loading. By that I mean that when you go into the urban terrain module out at Fort Sill, you look out the window and see a big, busy city. Now, applying indirect fires and effects in the close, urban fight is hard enough. But doing it when you have to figure out where the enemy is and what their intent is—is that an ambush or are those just people waiting for a bus? Where are the IEDs? How do I

protect the convoy? It's hard. And the goal was to make it just as confusing as real operations are."

"The entire group at Fort Sill has just been sensational to work with," he added. "They have an open mind about all this stuff and they have been very supportive and very encouraging. They made it possible for us to deliver a small miracle. After 10 months of development we were training soldiers. And all I get from those people is a passion—a deep-seated need—to advance the state-of-the-art."

From Fort Sill's perspective, that deep-seated need seems to come from a concern about their soldiers.

"We're able to train individuals here and allow them to make mistakes in a virtual environment before they actually put boots on the ground and have to execute that in harm's way," Kinne enthused. "We're really excited about it. It's just a phenomenal capability."

Editor's note: For more about PEO STRI's Call for Fire Trainer program please see ["Bringing on the Firepower" in MT2 Volume 9, Issue 4.](#)

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