



U.S. ARMY

# Embedded intelligence

## Training tools let soldiers manage info collection on real thing

By MICHAEL PECK

**T**he benefits of embedded training can be regarded as a two-fer in that, instead of developing a system such as a tank or battle command gear by building the actual equipment and then a separate training aid, the actual equipment can also be the trainer.

The U.S. Army is already developing embedded training for its C4ISR systems. In what its developers describe as the first case of an intelligence system using embedded training, the Army has developed this capability for a new intelligence management tool.

"The advantage is that it sits within the project and doesn't require a separate application, so it's a seamless integration. As far as the trainee is concerned, it feels just like they are navigating the real product," said Marcus Cannon, a project manager at developer Visual Purple, based in San Luis Obispo, Calif.

Visual Purple is designing the embedded training capability for the service's Collection Management Tool (CMT). CMT, which comes out of the Battle Command Battle Laboratory at Fort Huachuca, Ariz., is a visualization tool for intelligence assets that allows collection managers to see the location of assets, and to allocate and synchronize their use, such as specifying the area and time that an unmanned aerial vehicle (UAV) will make a pass.

Currently being used in Afghanistan, CMT is designed to be integrated with the Distributed Common Ground System-Army.

The embedded training tool for CMT, tentatively named Rapid Forge, teaches intelligence collection managers how to use CMT. Rapid Forge assesses the user's technical proficiency in using CMT and his decision-making skills to plan and execute intelligence reports as part of the collection management decision-making. Users are put into a scenario involving a U.S. brigade combat team battling heavily armed insurgents in a Central Asian republic.

The user steps into the shoes of a young noncommissioned officer on his brigade's



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**A soldier carries a small unmanned ground vehicle, left, and another puts unattended ground sensors in place during an exercise at Fort Bliss, Texas. The SUGV, sensors and other ISR components of the Future Combat Systems will include an embedded training capability.**

ISR synchronization team. He will have a variety of assets at his disposal, including UAVs, unattended ground sensors, signals intelligence sensors and tactical human intelligence teams, as well the ability to request coverage from higher-level systems at the joint task force level. He has to satisfy the brigade commander's priority intelligence requirements by developing a plan that synchronizes a variety of ISR assets at the brigade's disposal, as well as disseminate information and update ISR operations as the situation unfolds.

Depending on the specific scenario chosen, the user will be tasked with locating enemy fighting positions and command centers, maneuver and fire-support units, or deep logistical centers. But the best-laid plans can — and in this simulation, will — unravel. Sensors malfunction. The tactical operations center is shelled. Bad weather hampers reconnaissance. Surveillance units may be overrun by enemy forces. Should he draw off other ISR units to replace them?

The training tool uses software that is loaded on to the CMT system. Rather than a passive tutorial, the tool gives active feedback, Cannon said.

"The system isn't designed so when the user hits a roadblock, they type in a box and say, 'Here's what I need help with,' and they can't find it," he said. "There are little vignettes. As they are seeing these animated vignettes, there is this tracking component that watches their cursor movement and sees their level of surety. How quickly do they navigate the menus to get to the right place? How many drop downs before they find the right one? It provides an appropriate

level of remediation based on how proficient they are."

A user who doesn't operate the CMT functions correctly will hear a voice or see warning text informing him of the correct action. If the mistakes persist, the corrections will become more specific until the simulation eventually restarts. For the collection management process, the user will receive input from 3-D avatars representing his teammates ("Hey, you remember what happened last time somebody tried to do that?"), while the scenario itself will branch into different outcomes depending on the choices the user makes.

The software even tracks how much the user's mouse rolls around the screen. A restless mouse is a sign that he is having difficulty finding the button he is seeking.

CMT isn't the only project using embedded training. What may become the poster child for the embedded training concept is the highly visible and controversial Army Future Combat Systems (FCS), which will feature on-board training for battle command, fire control, driving and other tasks.

"FCS has a requirement for a live-virtual-constructive embedded training capability as an integral part of the design," said James Shiflett, Boeing's director of training for FCS. Boeing and Science Applications International are the lead integrators for the FCS project.

FCS training is still under development as the project nears preliminary design review in February. But one goal of FCS is to have "training-unique hardware," Shiflett said. FCS will contain a hefty ISR capability through a variety of high-tech equipment, including UAVs, small unmanned ground vehicles and various ground sensors. Operators will be

able to practice their skills on the actual control hardware.

Embedded training offers many advantages, its proponents say. The most obvious is that it avoids the need to develop a battle command system and a separate trainer. For example, FCS battalion and brigade commanders will be able to create simulations and run them on their battle command displays without needing a dedicated simulations staff and equipment. Then there is the ease of updates. Embedded training is essentially a synonym for a software-based training solution, which is preprogrammed or loaded on to the real equipment.

"As CMT is upgraded, the training simulation is easily adapted to address the changes," Visual Purple's Cannon said. "Since the embedded training simulation uses the actual CMT software, there is no need for any additional CMT software changes to the training package."

However, embedded training poses its own challenges. "The embedded training simulation requires constant communication with the CMT software in order to provide accurate 'state of CMT' information to the simulation," Cannon said. "The embedded training simulation screenplay provided challenges regarding setting and level of detail addressed. The screenplay had to be written with sufficient detail to provide operational training and yet in a manner generic enough to allow for incorporation of future changes without requiring drastic modifications to the embedded training simulation."

A more ominous challenge is safety. No one wants a simulated enemy attack on a battle command display to be confused with the real thing (and don't even think about a fire-control mix-up). FCS will ensure there are enough visual effects to warn the user of what is real and not real.

"We have a common [war-fighter machine interface]," Shiflett said. "When you go into the training mode, we have an orange-and-black border that says you are the training mode. There are three training modes, three for live and one for virtual and constructive."

Shiflett cautions that embedded training should not be designed as some kind of highly detailed model.

"You build embedded training in enough detail that you get the cues so that you can observe the appropriate behavior, which is training people to perform tasks. That's the goal of embedded training. It's not to build the world's greatest simulation, from an engineering standpoint. A lot of time, people get that confused." ■