

# Improving Soldier Learning and Performance Through Simulation and Training Technologies

Robert A. Sottolare

**S**oldiers today are becoming proficient through advanced technology that is blurring distinctions between live and virtual training. These technologies are being pursued in Orlando, FL, at the Simulation and Training Technology Center (STTC), part of the U.S. Army Research, Development and Engineering Command (RDECOM).

AW-VTT provides Soldiers with virtual experiences to improve competencies in simulated urban, jungle or desert environments in preparation for live-fire exercises (LFX) and combat operations. Here, Soldiers from the 16th Cavalry Regiment, Fort Knox, KY, train during an LFX at Fort Knox's St. Vith Range. (U.S. Army photo by Mike Roddin.)

STTC engineers are making a difference in the way Soldiers learn by developing simulation technology that provides critical capabilities that increase warfighters' battlefield readiness and performance. Through a concept called "simulation-enabled learning," developers create the enhanced technology that makes simulations and training better for Soldiers. This article describes several STTC research and development (R&D) programs that are getting technology to warfighters faster.

Because the AW-VTT is able to represent a variety of realistic operational environments and threats, this training tool has the ability to represent many aspects of human interaction, including changes in facial expressions.

and Engineering Network. The AW-VTT provides Soldiers with virtual experiences to improve competencies in operations against asymmetric threats in simulated urban, jungle or desert environments. This tool provides Soldiers the ability to train interactively with other Soldiers at home stations, in transit or in their area of responsibility. The degree of realism is depicted in Figure 1 and serves to orient Soldiers faster than

ability to represent many aspects of human interaction, including changes in facial expressions. These representations can be accurately tailored to represent characteristics unique to different cultures or religions. These capabilities have already shown their value by preparing Soldiers for operations in Afghanistan and Iraq by giving them "cultural experiences" at their home stations before deployment. User assessments have been made by the 101st Airborne Division (Air Assault) (101st Abn Div) and the Illinois National Guard. A server capability will be available later this year to enable distributed training and user assessments at the U.S. Army Infantry Center, Fort Benning, GA.

**Cultural Familiarization Through Internet-Based Simulations**

Asymmetric Warfare-Virtual Training Technology (AW-VTT) uses computer-based Internet simulation training or through a secure wide area network such as the Defense, Research

other types of training venues.

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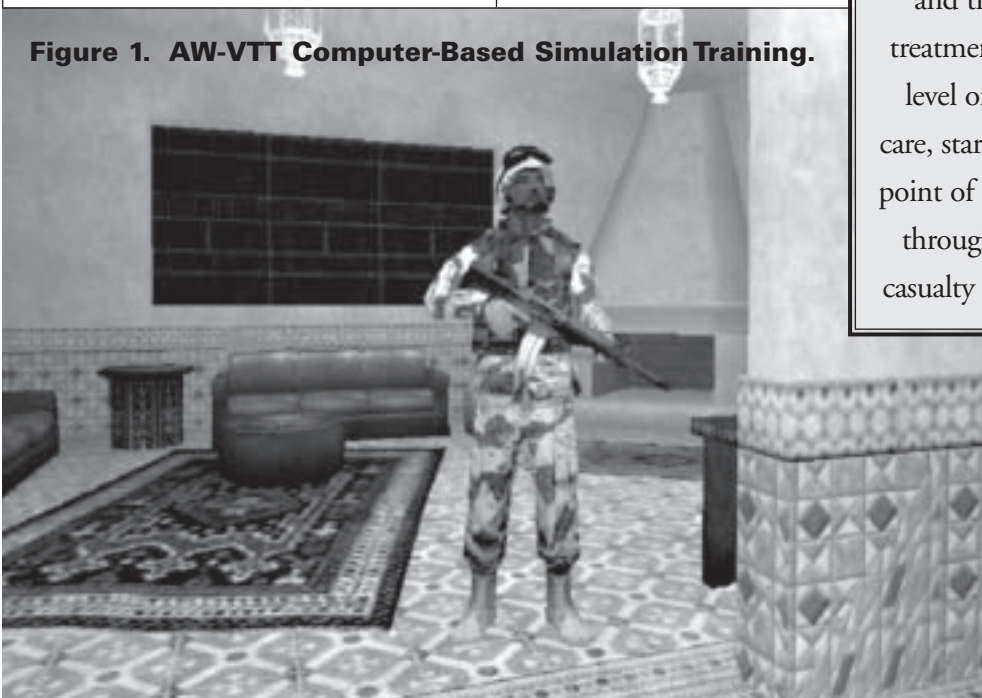
The CTPS consists of networked patient simulators that allow medics to train individually or as teams. The CTPS electronically stores the patient profile and tracks all treatment at each level of patient care, starting at the point of injury and throughout the casualty care cycle.

**Combat Trauma Patient Simulations (CTPS)**

Army medics in training prepare for upcoming deployments by treating simulated combat casualties in conditions so realistic that they incorporate the look, sound and smell of war. CTPS patients (dummies) bleed and secrete fluid, providing realistic training to prepare medics to treat casualties in real-life scenarios including combat trauma, mass casualty situations

and stabilization and Soldier and civilian evacuation. Medics report that these simulators provide realistic training because they breathe, blink their eyes and have pulses that can be felt. Simulated patients can "die" if given incorrect or insufficient care. The simulator can be restarted, providing medics with feedback and the opportunity to try again. The CTPS consists of networked patient simulators

**Figure 1. AW-VTT Computer-Based Simulation Training.**



An AW-VTT simulation graphic of a Soldier searching a building in Southwest Asia depicts the degree of realism and attention to detail that Soldiers will experience in this interactive virtual training environment. (Image courtesy of STTC.)



This Southwest Asia urban setting helps trainees develop better cognitive judgment skills, observational acuity and heightened awareness of their surroundings. (Image courtesy of STTC.)



**Figure 2. SLIM/ES3 Training Module.**

- and requires no external facilities or infrastructure to operate.
- An interface that integrates with the Ground Soldier System (GSS).
- Embedded systems that easily attach to Soldier equipment to provide seamless capability.
- Two hardware subsystems — Soldier Station and Wireless Access Point.
- High-resolution graphics hosted on a lightweight, low-power portable, interactive computer system, which can host both GSS software and DAGGERS simulation software.

that allow medics to train individually or as teams. The CTPS electronically stores the patient profile and tracks all treatment at each level of patient care, starting at the point of injury and throughout the casualty care cycle.

The CTPS has trained more than 6,000 Soldiers and is fielded at the Department of Combat Medic Training, U.S. Army Medical Department Center and School, Fort Sam Houston, TX; Southeast Regional Medical Command, Fort Gordon, GA; and Field Medical Service School, Camp Pendleton, CA — which recently received a mini-CTPS system — and the Army National Guard, Fort Indiantown Gap, PA, which has had CTPS assets since 1998. The 1st Cavalry Division developed two patient simulators in Iraq to provide premission training for its combat medics.

Additional training sites are planned for Fort Benning;

Fort Rucker, AL; Fort Riley, KS; Fort Bragg, NC; and Fort Campbell, KY.

DAGGERS is the first step in realizing a fully embedded, portable, 3-D simulation for dismounted Soldiers. The augmented reality capabilities in DAGGERS also have potential applications for first responder training in homeland defense, special weapons teams, law enforcement and civilian medical training.

**Dismounted Soldier Simulations on the Move**

The Distributed Advanced Graphics Generator and Embedded Rehearsal System (DAGGERS) is a proof of concept for a dismounted embedded training system. The prototype was evaluated last year at Fort Benning and will be used to generate concepts and requirements for embedded training applications for dismounted Soldiers. DAGGERS includes:

- Squad-level self-contained training that is Soldier worn, battery powered



A Soldier demonstrates DAGGERS. Its major components include the helmet-mounted display, wearable computer and instrumented weapon. (Photo courtesy of STTC.)



16th Cavalry Regiment Soldiers reassemble their weapons during a break in the action following a morning LFX at St. Vith Range. AW-VTT will build upon actual live-fire training exercises in preparation for combat operations. (U.S. Army photo by Mike Roddin.)

DAGGERS is the first step in realizing a fully embedded, portable, 3-D simulation for dismounted Soldiers. This capability will enable Soldiers to conduct realistic training and mission rehearsal through augmented reality and scaled One Semi-Automated Forces (OneSAF) to represent virtual elements in a live training or mission-rehearsal environment. The augmented reality capabilities in DAGGERS also have potential applications for first responder training in homeland defense, special weapons teams, law enforcement and civilian medical training.

**‘Every Soldier Is a Sensor’ Training**

The Self-directed Learning Internet Module (SLIM), Every Soldier a Sensor Simulation (ES3) was developed in only 90 days. This project, developed at the Institute for Creative Technologies at the University of Southern California, addresses the

requirement to provide a security presence training tool for U.S. ground forces in current and future deployments. The tool provides practice in active surveillance and threat indicator identification as depicted in Figure 2 (Page 33), a screen capture from the actual training module. SLIM was developed with the close cooperation of the U.S. Army’s Office of the Deputy Chief of Staff for Intelligence, G-2, and is intended to be distributed over the Internet.

In actual SLIM training modules, trainees navigate urban terrain populated with civilians, security personnel and insurgents, seeking to detect threats of varying significance while attempting appropriate interaction with those whom they

encounter. Players work from a menu of actions that records their observations,

allows them to check maps, takes Global Positioning System readings and even takes digital photographs. Scenarios are time-limited — each action has a time cost. Skillful players will commit more observations to memory as the cost of investigating or recording every observation runs the clock out more rapidly. Following the patrol, the trainee prepares a report and is provided with a scored result, including success in civilian interactions. SLIM requires users to emphasize cognitive judgment and observational acuity to heighten

awareness of elements in their surroundings while prioritizing, reporting and honing memory skills.

SLIM requires users to emphasize cognitive judgment and observational acuity to heighten awareness of elements in their surroundings while prioritizing, reporting and honing memory skills.

## Enhancing Virtual Training in an Immersive Environment

The Virtual Integrated MOUT (Military Operations in Urban Terrain) Training System (V-IMTS) allows Soldiers to conduct virtual training in an immersive environment using a virtual database and the OneSAF, as planning and rehearsal tools in preparation for live training exercises.

Soldiers from the 101st Abn Div were the first to train using virtual MOUT training capabilities during live training exercises at Fort Campbell. The results of the combined live and virtual training were remarkable. Assistant Division Commander for Operations BG Michael Oates attended the training evaluation and commented that the V-IMTS "does for MOUT training what instant replay did for the National Football League years ago." Oates explained how the simulation could be

used to improve Soldier tactics and dismounted infantry training. Another benefit was that the virtual training exercises assisted in the preparation for the conduct of the situational training exercises and the virtual reality technology improved tactical decision making of all squad members. Finally, the virtual reality after action review system significantly improved feedback to capture lessons learned.

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## Global Partnerships

In addition to their in-house research and development program, STTC takes a global approach to leverage and support allied technology programs, commercial technology, other government agency programs, industry R&D and academic research to better support Soldier training capabilities. STTC is working closely with the Army Research Institute for the Behavioral and Social Sciences, the Air Force Research Lab, Defence R&D Canada and the

United Kingdom's Ministry of Defence on a program to support coalition mission training through Internet-based simulation. These initiatives and partnerships will ensure that RDECOM STTC continues to provide Soldiers and leaders the most advanced simulation and training technologies that industry has to offer.

**ROBERT A. SOTTILARE** is the Chief Technology Officer at RDECOM STTC where he oversees horizontal integration of STTC's science and technology program, and the transition of STTC's research and technology development to acquisition programs for the warfighter. He has B.S. degrees in electrical and civil engineering from the University of Central Florida and the University of Florida. Sottolare is an Army Acquisition Corps member who is Level III certified in both systems planning, research, development and engineering as well as program management. He is also a graduate of the Defense Acquisition University's Advanced Program Management course and is certified as a team trainer by the state of Florida.

## Did You Know?

The 2005 Acquisition Senior Leaders and Army Materiel Command Commanders Conference is scheduled for Aug. 22-25 in Detroit, MI. For more information, visit the Army Acquisition Support Center Web site at <http://asc.army.mil>, or contact Betisa Brown, Conference Chairperson, at (703) 805-2441 or [betisa.brown@us.army.mil](mailto:betisa.brown@us.army.mil).



An STTC evaluator solicits Soldier feedback following V-IMTS training at Fort Campbell. These 101st Abn Div troops were the first to train using virtual MOUT simulations to augment actual live training in a field environment. (Photo courtesy of STTC.)