Training for the Urban Terrain

Industry provides challenging environments for warfighters preparing for operations in the world’s teeming cities.

By Erin Flynn Jay, MT2 Correspondent

With future military operations expected increasingly to occur in the world’s burgeoning cities, military trainers and their industry partners are stepping up efforts to develop effective technology and formats for military operations in urban terrain (MOUT) training.

“With the wind-down of U.S. direct combat operations in Iraq and Afghanistan, and the re-balancing of our forces, uncertainty exists as to how future threats will translate into the look and functionality of our military MOUT facilities,” said Kit Lavell, executive vice president for Strategic Operations Inc. “After September 11, we learned that we needed to rapidly redesign and rebuild our Cold War-looking training facilities to meet the new, asymmetric threat. Strategic Operations believes the emphasis in the immediate future will be on more affordable, re-configurable, mobile, multi-purpose MOUT facilities.”

To meet those needs, Strategic Operations offers new products. Their patented Re-locatable Habitat Unit (RHU) is based on a 4-foot by 8-foot composite material panel system that is lightweight (less than 100 pounds), and engineered to assemble into multi-story, complex configurations with only one tool.

“The RHU is designed by movie-industry professionals and military tacticians to faithfully replicate any area of the world in look, construction material and type, offering a wide array of textures and looks,” said Lavell. “An international client has asked Strategic Operations to assemble a MOUT with more than one hundred RHUs inside a climate-controlled structure for day and night operations.”

Other clients have asked the company to build realistic interiors inside live-fire shoot houses, similar to a first-of-its-kind project for a 35,000-square-foot shoot house they built for a U.S. special operations client. “With 52 different zones, including residences with furniture and appliances, a hotel with a revolving door, a bank with teller stalls and vault, a school, and a medical clinic, the interiors of the shoot house are all made of architectural foam. The result was unprecedented hyper-realism with no ricochet danger in an affordable and easily repairable environment,” said Lavell.

Other new products are merchant ship simulators built for Navy MOUT facilities and a series of modular MOUT structures built specifically for mission rehearsal by special operations units. Lavell said these structures replicate real-world facilities of many descriptions, built quickly for timely operational requirements. Exteriors and interiors have realistic props, sets, and other “atmospherics,” all of which add to the “willing suspend of disbelief” that the operators are not in the actual facility.

Flexible Scenarios

Another key trend is to invest in the next step for urban training by scaling up the single shoot house to entire villages in which maneuver training can be conducted. The need is all the more pressing with the wind-down of operations in Southwest Asia, where real-world missions spurred intensive development of warfighters’ skills in dense environments.

MOUT training is leaning toward greater need for flexibility and for forces to train as many scenarios and in as many different areas as possible, observed Oliver Meyer, senior vice president of simulation and training for RUAG Schweiz AG.

“A single and permanently instrumented location operated by a third party no longer meets all the needs of modern forces,” he said. “They need technology that is mobile, robust and easy to use anywhere, yet still captures all the data required for effective training and a detailed after-action review.”

RUAG offers the Mobile CTC (combat training center) concept to deliver customers the flexibility they need. “With our concept, customers can ‘train as they fight’ using our Gladiator harness and high-fidelity 1- and 2-way laser simulation for accurate ballistics for a range of light and heavy weapons,” said Meyer. “In addition, Mobile CTC encompasses a vehicle-based EXCON and mobile transponders to ensure the data connection between all participants and provide a platform for in-depth exercise analysis out in the field.”

The MOUT training market is changing in terms of what specific skills forces want to train and which environmental and situational factors need to be replicated in the training exercise, he added.

“The expectation is that more military operations will occur in urban environments, but also that this comes along with an asymmetric threat and an enemy concealed within the normal population,” Meyer said. “Target identification therefore becomes a skill that needs to be increasingly trained, as does appropriate force escalation. The challenge that forces and providers face today is to provide comprehensive and realistic training of the traditional infantry skills of fire and movement, within a wider framework that responds to the more complex nature of modern urbanized warfare and the enhanced scrutiny soldiers’ actions come under in this age of rapid and global information exchange.”

With MOUT sites returning to combined arms live fire and decisive action force-on-force operations, instrumented MOUT training is evolving back to what it was prior to the September 11 attacks and the global war on terrorism, suggested Gray Campbell, senior program manager, General Dynamics Information Technology.
General Dynamics IT first instrumented MOUT training in 1995 with the Army MOUT site at the Joint Readiness Training Center (JRTC) at Fort Polk, La.

“This occurred due to the commanding general of JRTC and Fort Polk desiring a state-of-the-art MOUT site that utilized technology to upgrade the training facility,” said Campbell. “From 1996 to 2010, the Army built numerous MOUT sites across domestic and foreign locations, where the majority of training was platoon live-fire exercises (using training ammunition) and/or company-level force-on-force (using blank ammunition and laser technology).”

Once units started to deploy to Iraq and Afghanistan, many of the MOUT sites supported mission rehearsal exercises (MRE) for units preparing for operations. The training consisted of situational training utilizing a large number of civilian role players depicting Iraqi and/or Afghan civilians. The CTC MOUT sites were utilized for these MREs.

“Now that the Army has moved to training for Decisive Action Training Environment (DATE) operations, MOUT sites are returning to supporting a wide variety of live-fire exercises. The level of operation has increased, with many MOUT sites supporting company-battalion-level force-on-force operations,” said Campbell.

**Complex Villages**

MOUT villages often have more than 30 buildings. “Multiply that by floorplans ranging from as few as two rooms up to six-story structures with over 60 rooms plus hallways, as well as maneuver areas covering the approach and between structures, and the technology required to capture video and provide training enablers within the areas of interest can be extensive,” said Campbell. “In response to this complex undertaking within MOUT as well as for the larger training area, General Dynamics IT created a range management solution to promote range safety and support daily operations to maximize range utilization.”

General Dynamics IT’s solution is built on a COTS architecture and ties in peripheral solutions that configure the system to support reporting of daily activities, inventory control, maintenance, vehicle and personnel tracking and wireless network communications that can complement/supplant legacy land mobile radios.

The solution then presents a common operating picture of range operational status and health to credentialed users through a standard Web page. Campbell said this solution was designed to allow the range manager to take control of the information he receives from down range.

Through a Web page, the range manager can get up-to-date reporting on the range schedule, operational status, inventory, who is currently signed into the range and where they are now. The range manager can also receive feedback and monitor the status of the ranges being overseen, as well as standardize the methods used to capture and access that information.

On ranges as large and complex as MOUT, General Dynamics IT believes this type of capability will promote safety and support technical and operational management of the ranges role players, support personnel, and technologies to help maintain a safe and fully mission-capable training environment as the training evolves and expands into the future.

New opposing force (OPFOR) threats are being utilized, such as offensive and defensive cyber operations and continued use of role players. The Army also trains against the new DATE OPFOR model, which includes a wide range of threats, such as criminals, insurgents, guerrillas, paramilitary and militia forces and regular OPFOR military organizations.

“The majority of these threats migrate to built-up areas, so Army MOUT sites must support this level of training. Additionally, military units are increasingly utilizing actual civilian infrastructure to conduct large-scale training exercises,” said Campbell.

General Dynamics IT provides low-cost, flexible and portable instrumentation solutions to support live-fire exercises within existing and civilian facilities. In addition, the company offers a live-fire, force-on-force training system, introducing increased training stressors with live, realistic scenarios to support a new level of advanced training that incorporates judgmental shooting and rules of engagement decision-making.

**Training Feedback**

Another advance is represented by the ability of Saab’s MOUT instrumentation system to provide meaningful and measurable training feedback at platoon and company level, according to Steve Parrish, business development manager for Saab.

“The system’s hardware and software is designed to deal with the overwhelming amount of activity data that is typically generated above section level, and present it in a selectable manner that leads to meaningful feedback—effectively clearing the fog of war,” he said. “Earlier MOUT training systems on the market placed the emphasis on providing detailed positional tracking of individual exercise players, augmented with hours of surveillance video that required editing.”

Typically, the positional tracking solutions were expensive and complex, and did not rise to the challenge of coping with hundreds of exercise players in the three-dimensional environment of urban terrain and the frequent transitions into the open, Parrish noted. These systems were effectively designed to train building/room entry tactics and techniques and hostage rescue, but did not properly lend themselves to the broader spectrum of larger-scale collective training.

Saab’s approach has been to design a scalable system that can be readily configured to meet any exercise size, together with nodes of special interest, and software (WinExcon) that can match surveillance video footage to timed events and multiple selectable locations to enable timely and lesson-rich after-action reviews to be conducted.

“WinExcon has the tools to mine exercise data to facilitate actionable conclusions. WinExcon can visually aggregate and de-aggregate the unfolding exercise and enable pockets of interest to be viewed, view the flow of battle or at a higher level,” he said.

Saab’s instrumented MOUT technology not only addresses tracking and data management, Parrish noted, but also accurately simulates the composition of the urban environment to enable the realistic simulation of “shoot through walls” for direct and indirect fires. Further, Saab’s unique two-way simulation of armored fighting vehicles’ main gun and soldier-fired anti-structure weapons enable their effects against buildings to be realistically simulated.
Urban warfare is now reliant on intelligence, surveillance, target acquisition and reconnaissance feeds to provide the crucial intelligence needed, and Saab’s MOUT system can now replicate this without the need for real-world assets.

The system is not only scalable, but is also configured to be readily integrated to external virtual and constructive domains with the use of Saab’s WISE software, which enables connectivity regardless of protocols, standards and architectures.

“For many years, we have been seeing armies investing in skill houses, and much attention on high-accuracy measurement systems for the individual soldier. A lot of focus has been put on high-resolution indoor tracking solutions such as ultra-wideband (UWB). Much has been an engineering approach, and when observing individuals or just a few soldiers inside a single building, this makes perfect sense,” said Parrish.

The problem arises when these lessons are scaled up to a requirement for an entire MOUT training village. This has led to very expensive solutions, or in some cases uneven performance when UWB has been deployed at village size. Another lane of action has been to take video to the extreme and just have massive video coverage instead of a tracking system. But after action reviews have proven very time-consuming and difficult to analyze with this approach, Parrish continued.

“The mix of a medium-accuracy indoor tracking system combined with strategic video will enable an automated selection of applicable footage,” said Parrish. “The tactical training system gives who is shooting and who is getting hit, while indoor tracking tells us where these persons are located at that specific time and thus enables automated extraction of the correct video frames.”

**Scaling Up**

Military training programs are now investing in the next step for urban training by scaling up the single shoot house to entire villages to conduct maneuver training. Here, Saab is seeing a trend that it isn’t just about urban skills alone, but more about the full spectrum of requirements from crowded alleys to open plains. It is becoming evident that the modern training site must offer a seamless battle flow between open and urban terrain.

This means that an urban training package is so much more than indoor tracking. It is about simulating indirect fire effects on building and its inhabitants, high-fidelity shooting through walls, and ambient effects such as sounds, odors, fire and smoke.

Although not a specifically new product, Saab is offering a new module to its MOUT system to enable CBRN training to be conducted. This add-on capability supports specific standalone CBRN training, and also adds another facet to collective urban training. The CBRN simulates the nature and the spread of contaminants and their effect on field detection equipment. Further, the system simulates the effects of the use/non-use of personal protection equipment and decontamination measures.

Saab has always had the approach that any new training needs must be an add-on to the baseline tactical training system. The Saab Gamer system, designed for open terrain training, has been growing, with expansion packs for urban training, counter-IED and CBRN.

“By having this approach, we are trying to create the military training equivalent of a giant box of Legos. There will always be new pieces, but they will leverage all the pieces you already have invested in,” said Parrish.