Simulation-Based Training Provides Cost-Effectiveness, Flexibility

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Although training is invaluable, first responder and emergency management agencies nationwide are finding their budgets tighter than ever, and it's becoming increasingly difficult to conduct large-scale training exercises. The federal government is considering scaling back 2011's National Level Exercise, which was envisioned as a five-day drill in response to a magnitude 7.7 earthquake in the Midwest. And live drills also are becoming harder to produce on the state and local level, as funding is difficult to come by. Simulation-based training has become a popular and cost-effective method of training personnel, and agencies nationwide are employing software and tools to aid their education efforts.

The New York City Office of Emergency Management's ADMS features a geo-specific location. This allows incident commanders and responders to familiarize with an environment in addition to their emergency management training

"Simulation is a valuable tool for emergency response and can be used for vulnerability assessment, planning, training and decision support," wrote Dale Hall, former director of the National Institute of Standards and Technology's Manufacturing Engineering Laboratory, in the report Modeling and Simulation for Emergency Response. "It was identified as the only feasible approach when it is difficult to do real-life experiments, as is the case for homeland security applications."

Simulation-based training is as diverse as the events the nation's responders face; it can be used to drill on emergencies related to public health, hazardous materials, natural disasters, homeland security issues, and to test incident command and emergency operations centers. Training also can range from simulating emergency events for a single user to a multiuser, multiagency environment.

City Simulation

The New York City Office of Emergency Management (OEM) drills its first responders and partner agencies in a 3-D virtual replica of the city. City blocks are scaled to size, citizens roam the streets and Macy's sits prominently on 34th Street, as officials conduct a disaster simulation to test the agency's unified command. The OEM worked with

Environmental Tectonics Corp. to create the virtual environment that runs on the company's Advanced Disaster Management Simulator (ADMS) training system.

"The main goal of our simulations is to test the command element, to put them in situations to test their ability to implement what we call the citywide incident management system, which is additional information added to ICS [the Incident Command System] that we put in place to help organize how we manage emergencies," said Jacob Cooper, the OEM's deputy commissioner for agency development and coordination.

The OEM has seven simulations that it runs with representatives from various city agencies and other partners. Cooper said participants are briefed about the emergency situation that's being simulated and then brought into the simulator room where they can view the scene. "They're able to talk about different decision points, what they're going to do next, set some objectives, think about what they're going to say to the press, things of that nature, and then they do an after-action report," Cooper said.

When participating in a simulation, the trainees use a joystick to explore the virtual environment and radios to communicate and determine their needs. A facilitator runs the simulation and makes things appear onscreen as requested by the trainees. "If someone asked for six fire trucks and four police officers to perimeter off an area, the next thing he or she knows, it's appearing onscreen as it would in the real world," said Karen Delos Santos, Environmental Tectonics Corp.'s business development manager. "What makes ADMS most unique is that although it's virtual training, it's unscripted scenarios."

ADMS uses artificial intelligence and a physics-based engine, according to Santos. When simulating a terrorist attack, people automatically run and hide, and in firefighting situations, the fires propagate the way they would in real life. "There's nobody who has to say, 'OK, fire you need to spread to the east because the wind direction changed,'" she said. "That's the artificial intelligence coupled with the physics engine that are the brains. It's a bunch of algorithms that are driving the things that happen within the scenario, coupled with what the trainee does or doesn't do."