

Features

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Use-of-Force Simulators

Current simulator technology allows officers to experience much more than just pre-recorded shoot/don't shoot scenarios in training.

by Tim Dees



When I started the research for this article, one of the many voices in my head (don't worry - they're not talking about you) called the subject devices "shooting simulators," as opposed to driving and other types of simulator devices. As I read the literature and spoke to industry executives, I was reminded that these are more properly called use-of-force simulators.

Firearms are one of the options available to the person in the simulator, but like in real life, he also has voice commands and less-lethal tools like impact weapons, pepper spray, and electronic restraints to use.

Roman gladiator schools used simulation or scenario training, and every warrior class since has refined the technique. Most common in police training are role-playing scenarios, where volunteers - usually other cops - portray bad guys or victims while the trainee tries to resolve the instant dilemma. Role-playing is time- and personnel-intensive. You need a certain number of role-players multiplied by however many scenarios you will stage at once, plus props, plus a secure area to set up.

The "stage" is largely imagined because you don't have warehouses and highways and residential kitchens at your disposal in the training area, and there's usually a lot of standing around. Role-players also often go off script, so each trainee doesn't get the same training exposure and experience.

Video-based simulators use real-life environments, the actors never ad lib, and each scenario instantly resets as many times as desired. The precise location of each "hit" is recorded exactly, and the players continue to move,

fall down, or otherwise react appropriately. The instructor has the ability to present the same scenario over and over, use different scenarios, or alter the circumstances of a single one to produce a different outcome and optimal response.

Now more than ever, "keeping it real" is a critical factor in training new recruits. This generation grew up with movies made entirely of lifelike computer-generated graphics (CGI), sometimes rendered in 3-D (Toy Story was 15 years ago). They have always had complex, multi-layered video games, often played on large format TVs or computer displays. Anything less than state of the art, and they're asking, "This the best you got?"

Picture and Sound

Manufacturers of use-of-force simulators create their scenarios with medium- or high-definition cameras, shooting and playing at 720p or 1080p. They also use 5.1 surround sound, so footsteps behind the trainee or to the side are perceived as actually coming from that direction.

Most simulators are available with multiple screens, making it possible to create a full 360-degree environment. This requires at least six screens and projectors, and may also require additional graphics cards to drive the extra projectors. Adding that extra hardware is expensive, and that's the reason those setups are uncommon.

When a system uses more than one screen, the extras are more often positioned to the immediate left and right of the main display for approximately 120 degrees of view, to the left and right flanks for threats from three directions, or front and back. This latter configuration works well for Federal Air Marshal training, where the threat environment runs along the aisle of a passenger airplane.

Simulators generally run from a Windows-based computer platform, so they will run most any Windows software. Instructors can use the system for introductory or follow-up classroom sessions with PowerPoint, sound recordings, or video clips. Systems from IES Interactive Training come with a "Knowledge Base" of articles, clips, and other media keyed to situations in the included scenarios, and users can add more media as they choose. In a situation where the instructor wants to show the real-world relevance of a scenario, the push of a button brings up a news story or magazine article.

Computer Hardware

Games, not office applications, separate the man computers from the boy computers. A new top-end computer game might not run at all on a computer from three years ago. Use-of-force simulators are enough like computer games that they require similarly heavy-duty hardware.

The current crop of use-of-force simulators from Advanced Interactive Systems (AIS) use dual-core processors with dedicated graphics cards and 2 GB of memory, running under 32-bit Windows XP. Those from IES run 64-bit Windows 7. A 64-bit system doubles the size of the data pipe used in a 32-bit system. If the system is properly optimized and the processor is up to it, almost everything runs faster.

Quality of the displayed image is dependent on the graphics hardware. Inexpensive computers and most laptops use integrated graphics that share the system's internal memory with other functions. Use-of-force sims generally have dedicated graphics. These are separate "cards" installed in the computer that use their own onboard memory and processors. Dedicated graphics cards drive from one to six displays simultaneously, although most are set up for two displays. When you're shopping systems, pay special attention to the graphics capabilities, especially if you're planning on running more than one display.

Now that keyboards and pointing devices (mice, trackballs, joysticks) are all available in cordless models, the instructor is no longer tethered to the computer running the system. Being able to move around the room allows the instructor to keep his sight line on the trainee while still maintaining control of the sim.

IES offers a handheld PDA capable of running the entire system. The same company offers wearable biometric sensors that record the trainee's heart rate and respiration, then overlay that plot on the playback of the scenario. This kind of feedback is extremely valuable for teaching trainees to overcome stress.

Scenarios - Yours and Theirs

The first use-of-force simulator I ran in the 1980s held its scenarios - all five of them - on a laser disc. There was no practical way to author scenarios for laser disc, so what you saw was what you got. Today's simulators contain fast internal hard drives with hundreds of scenarios each. Stock AIS systems come with 450 scenarios; those from

IES have twice that. Both vendors will produce customized scenarios for any customer.

Users can also produce their own scenarios. This is invaluable when you want your trainees to experience training seeing your uniforms, your cars, your trouble spots, and your policies. Simulator systems usually come with video editing and authoring software. This allows each user to shoot his or her own video, recording each desired "branch" corresponding to the actions (or inactions) of the trainee, and to the options set up on the fly by the instructor.

For instance, the action in a traffic stop scenario could start with the driver bursting out of the car, screaming at the officer. A branch could show the driver pointing a gun at the officer. One branch has the driver falling to the ground when the officer fires on center mass, another shows the driver shooting if the officer fails to fire, and still another might have the driver get back in and drive away if the officer scores a hit in a non-vital area or misses completely. Another branch would run if the officer gave the right verbal commands and persuaded the driver to surrender.

It takes some experience and a bit of trial and error to create scenarios that run smoothly. The major manufacturers each offer production training to their customers, so that any trainer can get in touch with his inner Spielberg. Whether the trainer undergoes the production course or not, the authoring software supplied with each system provides all the necessary tools. IES even supplies a 1080p HD camera.

Weapons

The weapons in use-of-force sims have been one of the most common points of failure. Handguns used empty cartridges loaded with primers to make a BANG when the trainee pulled the trigger, but the primers quickly fouled the weapons and blinded the lasers in their barrels. And there was noise, but no recoil.

Most firearms now supplied with use-of-force simulators (they're usually real guns, modified with lasers and incapable of firing live ammo) recoil when fired by way of a gas charge in or attached to the gun. The gas canister is usually in a modified magazine and recharged through a compressor or by replacing a CO2 air pistol cartridge.

There are many variations to this method, ranging from a gas canister mounted elsewhere on the firearm to using a large bottle tethered to the weapon by a hose. These weapons are much more reliable when only clean CO2 is moving through them.

Most systems track weapons discharges and aimpoints through a specialized camera, but it's possible to use real guns and real bullets. AIS and American Defense Systems Inc. (ADSI) offer a setup that uses a paper roll or a self-healing membrane as the backdrop, so officers can walk in with their regular duty gear and go to work.

Because these are use-of-force, not shooting, simulators, a variety of force options are available. Customers can have laser-equipped TASERS, beanbag guns, spray canisters and the like, all of which register their hits and misses with the sim. You can get impact weapons, but the effect of these is harder to assess, since power and technique are closely linked with results.

Shootback cannons, which fire pellets or paintballs at trainees, are falling out of favor. They can be effective in teaching people to use cover, but they are often misused to harass or humiliate a trainee. Also, safe use requires the trainee to wear goggles for eye protection, which detracts from the realism.

Versatility

Both IES and AIS partner with makers of driving simulators, so that a scenario can begin with the receipt of a radio call and driving response and move directly to the use-of-force simulator. Cameras mounted on or near the display screen can record every action of the trainee during the scenario, then replay it picture-in-picture on review.

Trainees often dispute what they did at critical moments-these recordings end the arguments. Some systems allow the instructor to record the scenario and the playback of the trainee's actions immediately to a CD, so the trainee can take it with him or her for review.

When more than one system is available, trainees can move from one room to another to complete a scenario, or even shoot head to head, each performing in different rooms. Trainers can get very creative with these tools.

The next step, already available from IES and Ti Training, uses stereo anaglyph (red and blue lenses) to display

scenarios in 3-D. Creating scenarios of this type requires a 3-D camera (or two cameras mounted together, lenses about 2.5 inches apart), so it may be a while until we see wide deployment of this technology.

How Much Do They Cost?

Basic portable systems that break down to fit in a Pelican case go for \$10,000 to \$15,000. Systems with more bells and whistles start at \$25,000 and go straight up from there. Much depends on whether the system will be portable or stationary, how many displays will be involved, and what weapons and other accessories are used. Granted, this isn't milk money, but such a system can take an officer through more critical incident exercises in an afternoon than he will experience in his entire career.

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FOR MORE INFORMATION:

[Advanced Interactive Systems \(AIS\)](#)

[American Defense Systems Inc. \(ADSI\)](#)

[IES Interactive Training](#)

[Meggitt](#)

[VirTra Systems](#)

[Ti Training](#)

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