Photo courtesy of Gregg Rowland

R-TECH™ NEWSLETTER
The Newsletter of the First Responder Technologies Program

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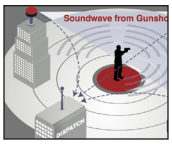

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This Newsletter discusses technologies of interest to first responders that have received funding, in part, from the Federal government. Mention of these technologies should not be construed as an endorsement of either the technology, or the entity producing it, by the Federal government.

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SOUND ADVICE

Sound Detection Device Pinpoints Location of Gunfire

Photo courtesy of Gregg Rowland

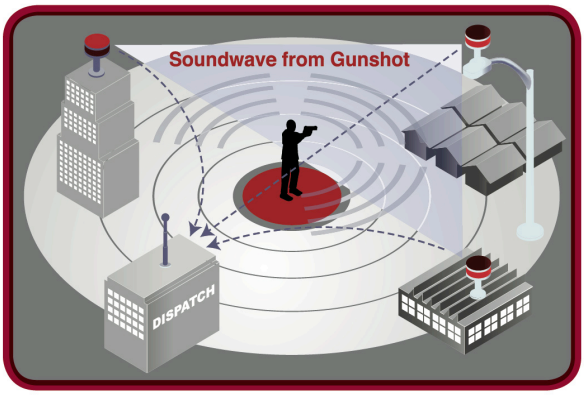
Violent crime involving handguns is a constant problem in municipalities across the United States. The city of Birmingham, Alabama is one example. Birmingham had more than 6,300 reported incidents of gunfire between July and December 2008, and 1,415 in January 2009 alone.

Law enforcers operate frequent patrols in high-crime areas like Birmingham throughout the country to counter gun violence, but efforts to field a strong police presence are often affected by budgetary and manpower constraints. Responders also face the challenge of under-reporting and faulty reporting of gunfire, which limit their ability to precisely determine the location of a shooting. To overcome these obstacles, the Birmingham Police Department (BPD), and police departments in 35 other cities, are turning to technology to better serve their communities. One such technology, ShotSpotter, developed by ShotSpotter, Inc., is designed specifically to detect and alert authorities to gunfire.

The ShotSpotter system incorporates a series of global positioning system (GPS)-equipped acoustic sensors that are placed throughout a location under surveillance. When the sensors detect the sound of a gunshot, this information is relayed via telephone lines or wireless network to the municipality's information technology architecture. Based on the GPS information from each sensor, coupled with a calculation of the difference in the time that it takes each sensor to hear the sound, the system can triangulate the information to derive an origin point of the gunfire. This information is then converted to a longitudinal-latitudinal cross point and sent to a 911 call center or mobile laptops in patrol cars, where software can correlate the coordinates to an area map.

The ShotSpotter system helps law enforcement to arrive at a shooting in time to help save victims, rather than wasting valuable time in pursuit of false leads. "The technology is more reliable than eyewitness accounts," said Gregg Rowland, Senior Vice President of ShotSpotter, Inc.

The BDP deployed ninety ShotSpotter sensors over a six square mile radius just over a year ago. They are finding that the system helps officers respond faster to gunfire. "The ShotSpotter alerts the dispatchers and within seconds they can put out a call to officers in the field," said Lt. Elaine Driver of the BDP. Lt. Driver further explained that the system helps officers pinpoint a more exact location of a shooting and informs officers whether single or multiple weapons are involved.



Graphic courtesy of Gregg Rowland

ShotSpotter can determine the number of shooters and the user can analyze the data to distinguish between single action, double action, semi-automatic, and fully automatic weapons. The system further differentiates between gunfire, construction noise, firecrackers, or explosions and will relay this information to a call center or mobile laptop so that law enforcement officers can decide on the best response strategy.

Lt. Driver said that although the BDP is pleased with the speed and accuracy of their response times, the system does not replace the value of community policing efforts. "We still need the citizens to work along with the system,"

Sound Advice (continued)

said Driver. "The system can get us there faster, but citizens can add valuable information including description of suspects that we cannot get through ShotSpotter."

Funded by the U.S. Department of Justice through the National Law Enforcement and Corrections Technology Center, the ShotSpotter system is within the categories on the *Authorized Equipment List*.

For more information on ShotSpotter, visit www.shotspotter.com.

Dispatcher utilizes ShotSpotter software to pinpoint the location of reported gunshots. Image courtesy of Gregg Rowland

PRACTICE MAKES PERFECT

Active Shooter Simulation Tool Prepares First Responders for the Real Thing

Image courtesy of Clandestine Systems and Signature Science

Simulation tools have long been used in the aviation community to help them prepare for a variety of in-flight scenarios. More recently, the first responder community has taken up simulation tools to provide scenario-based training for everything from chemical spills to terrorist threats. One particular simulation was prompted by the need to better prepare first responders to react to school shootings.

Active Shooter Training for the Responding Officer (ASTRO) is a Windows-based program that sets up a video simulation in a large school environment in which the user can take on the role of a responding officer. The technology is currently in development at Clandestine Systems and Signature Science for the U.S. Department of Justice and the National Institute of Justice Technical Working Group.

ASTRO enables an officer to start at one of multiple entrances to a school building and navigate through the building as they encounter up to three active shooters. Chris Sharp, the designer of the system, said the simulation presents a variety of shooter scenarios each time it is played. "The shooter(s) will do a number of things – they might even drop the weapon and leave with the other students, and responders have to react to the situation," said Sharp.

As long as they are on the same local area network (LAN), multiple users can access the simulation simultaneously, each taking on a different role as a responding officer, aggressive shooter, harmless student, or even a student who is not the shooter but picks up a weapon. Users on the system will view everything through the eyes of the person they are playing.

"It's a chaotic environment with students screaming, and you don't know where the shooter is. You may not even hear them because of the thickness of

Practice Makes Perfect (continued)

the walls," said Sharp. The player may see people wounded, including students and officers.

Whatever the scenario chosen by the program, first responders will be better equipped if they are exposed to simulations beforehand. "ASTRO is a training program designed to build skills and decision-making abilities for those responding to active shooting incidents," said Lieutenant Raj Ramnarace of the La Crosse, Wisconsin Police Department and member of the National Institute of Justice School Safety Technology Working Group.

First responders will also be forced to rely on their prior training. Don Alwes, a lead instructor for the National Tactical Officers Association, said "ASTRO will allow officers to mentally rehearse some of the tactics they have previously learned during hands-on Active Shooter Response training. Such mental rehearsal can help keep officers' skills sharp between the limited opportunities many agencies have for hands-on training."

The simulation tool further helps first responders to mentally prepare for what they may face one day. "You don't want to be shocked when you are in a real situation," said Sharp, "and the best way to prepare before it happens is to practice in a simulation and resolve it."

ASTRO can be used with a judgmental firearms simulator. A first responder can project the program onto a large screen and fire a weapon from the simulator towards the screen, and the program will respond to the fired weapon. "The sound is really important, because all of these things make it seem real," added Sharp. First responders may choose from a range of weaponry, which can be matched to an officer's standard-issue and special-issue weapons.

ASTRO does not require a high-end personal computer for operation and should be available free of charge in May 2009. For more information, visit www.signaturescience.com.

Image courtesy of Clandestine Systems and Signature Science

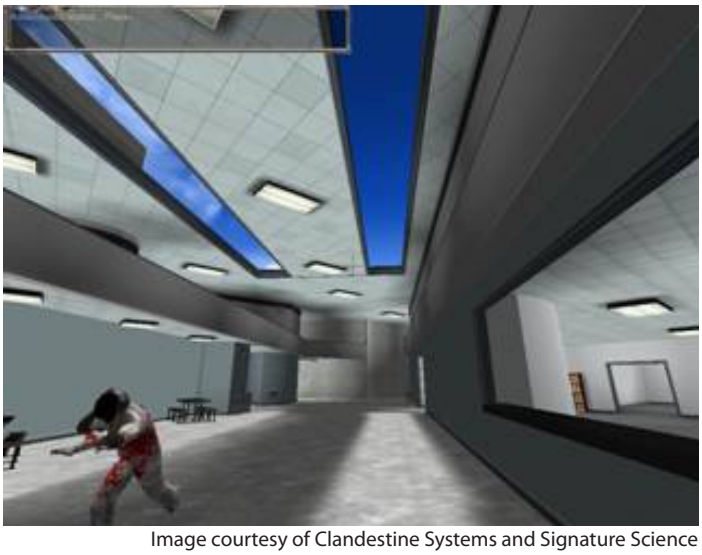


Image courtesy of Clandestine Systems and Signature Science

Image courtesy of Clandestine Systems and Signature Science

MEETING OF THE MINDS

Web-Based System Improves Crisis-Based Decision-Making

Photo courtesy of FEMA photo library

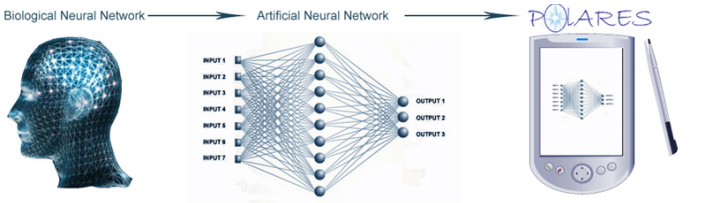
First responders facing crises may benefit from the advice of colleagues who have successfully made decisions in similar situations. However, time does not often allow for consultation between responders. A new Web-based software program in the prototyping phase, PolARES, may soon change this by making it possible for responders to receive timely input during emergencies.

PolARES contains a database of decisions made by first responders during various situations and the actions they took. The system was developed by AlphaTRAC, an emergency management consulting firm based in Colorado. PolARES's development was funded internally at AlphaTRAC and through the Defense Advanced Research Projects Agency (DARPA). According to the system's designer, PolARES is not just an archive of previous decisions and actions, but also a dynamic system that benefits from continuous input.

The PolARES system is designed to help a decision-maker to build and execute a course of action based on the experiences "mined" from a knowledge base built by the response community. This database will reside and be maintained at a central location for each response community and will grow from the first responders who use it. When used by firefighters, for example, the database will gain new experiences, and the system will become better at assisting other firefighters in crisis-based decision-making. PolARES will also help novice decision-makers learn to think like veterans. "The system is really built by the decision-makers themselves rather than some group of experts that rarely put boots on the ground," said C. Reed Hodgin, president of AlphaTRAC.

Tom True, Assistant Fire Chief of the Hanford Fire Department in Richland, Washington, attended a demonstration of the system. True believes the system will benefit Generation X and Generation Y responders, who are comfortable with technology. "It's an interesting paradigm; you may get an incident commander [who] is comfortable using technology and it takes five key strokes to come up with a knowledgebase, while others who are not comfortable with technology may rely solely on their past experience," he said.

PolARES is a Web-based application that operates on a central server accessible via the Internet. Hodgin said that the system is based around the Internet to provide all users with a familiar common operating platform. Users can run the application located on the central server or the application can be downloaded to their computers. "They can use it to self-train every day," he said. "The database is continuously changing and downloads daily to their machine; they can get the latest version and go."



Graphic courtesy of AlphaTRAC

Hodgin said that both training and response field operations will be functional in two modes – Internet and stand-alone. The Internet mode connects users to the central community-based system and allows them to access an up-to-date knowledge base. Interface is done through Web-like software that uses the first responder's Internet browser in "online" mode.

In the stand-alone mode, a first responder can connect to the system periodically to download the updated knowledge base. The user is disconnected from the Internet but still able to run the software using the Internet browser in "offline" mode.

Meeting of the Minds (continued)

The PolARES system is based on the Recognition primed Decision Method (RpDM), an approach that is considered the "naturalistic decision model" and most frequently relied on by decision-makers during a crisis. RpDM focuses on identifying changes in an event and using them to proactively make a decision, as opposed to the conventional reactive approach that involves analyzing a situation and acting in response. Research on field studies of emergency response decisions has led to a formal adaptation of RpDM.

The PolARES system helps first responders to learn how to use RpDM by applying emergency situations to six simple steps:

Step 1: **Characterize**. The first responder sizes up the situation and quickly gathers all information about the event.

Step 2: **Recognize**. The first responder selects questions or cues to identify a case from a community knowledge base that is "good enough" for a starting point. PolARES uses an artificial intelligence base to speed up the process and ensure it's accurate.

Step 3: **Analyze**. The first responder compares the case suggested by PolARES to the conditions of the present emergency to determine if it's good enough to work from.

Step 4: **Customize**. The first responder modifies the case and decisions suggested by PolARES, as needed, to make them more appropriate for the present emergency.

Step 5: **Dramatize**. First responders play out the decision either in their own minds or with other team members to make sure every step is feasible before acting.

Step 6: **Utilize**. First responders put their decisions into action.

"The entire process can take about five minutes or less, with the time dominated by the information gathering in Step 1," Hodgin said. "Really experienced crisis decision-makers go through the entire process in just seconds."

Hodgin's team recently created a proof of concept prototype of PolARES. Testing of the prototype included demonstrations for field-level first responder disciplines, such as fire, HAZMAT, law enforcement, and disaster response. Before each test, first responders were briefed on the decision-making need (i.e., the emergency being demonstrated) and the use of RpDM and the PolARES system. "We walked through an emergency scenario with the decision — where to evacuate and shelter members of the public," Hodgin said. First responders were then able to run scenarios for themselves while AlphaTRAC representatives gathered their feedback.

Demonstrations of the PolARES prototype proved successful in decreasing the amount of time needed to make decisions that involve saving lives and property. "We have seen the decision-time for a key HAZMAT decision – public evacuation – reduced from almost an hour to less than five minutes," Hodgin said.

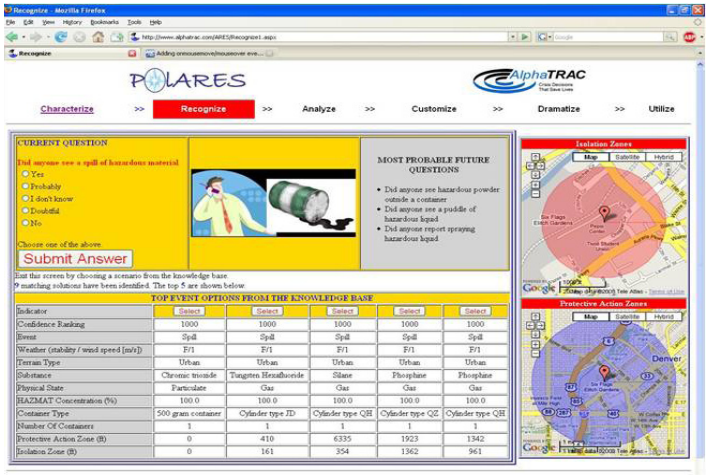


Image courtesy of AlphaTRAC

True said that he would be comfortable with the technology but would likely rely on his 20 years of experience to make decisions in the field. "I am connected to my electronic devices – my command vehicle is full of them, and I use them to help make decisions, but I don't make my decisions based on what comes out of that equipment," he said. At its current stages, he believes that PolARES would be useful in training or after-action reviews. "It would be very effective to run scenarios on, or to review after a crisis," True commented.

AlphaTRAC has begun building a field-ready system and expects it to be ready for deployment in about one year, according to Hodgin.

PolARES, its design, processes, software, and the six-step RpDM process are all patent pending. For more information on AlphaTRAC, visit www.alphatrac.com.

THE RESPONDER KNOWLEDGE BASE

Lessons Learned Information Sharing on RKB

The Responder Knowledge Base (RKB) gives its users access to *Lessons Learned Information Sharing* (*LLIS.gov*), the national network of peer-validated lessons learned and best practices for emergency response providers and homeland security officials. *LLIS.gov* gives first responders the opportunity to tap into a wealth of validated front-line expertise on effective planning, training, equipping, and operational practices for homeland security. Conceived and developed by response professionals, these lessons learned and best practices cover the full range of homeland security disciplines and functions.

New LLIS content is constantly being generated, updated to RKB, and linked to pertinent publications, the Authorized Equipment List (AEL)/ Standardized Equipment List (SEL) categories, and other related LLIS documents.

RKB users can browse the entire LLIS section by visiting the RKB homepage at www.rkb.us and clicking on the "Other Content" tab. In the drop-down menu, the user should select "Lessons Learned Information Sharing (LLIS) Documents." From here, a user can enter information into the "Search Phrase" feature to research a specific topic or area of interest in the LLIS summaries section. To view a lesson in its entirety, responders and government users can exit the RKB Website and enter *LLIS.gov* via a separate, secure registration.

Users may also come across LLIS documents when they are viewing various product records. On the right side of every RKB record, first responders will find a box labeled "Knowledge Links." This box displays links to relevant information to a record, such as related products, standards, third-party certifications, operational assessments, and grants or assistance programs. If LLIS documents are relevant to a particular record, a link to them will also appear in the Knowledge Links box.