



# Assessing the Value and Utility of Advanced Technologies for First Responders in a School Shooting Scenario

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## Abstract

Drawing from the experience of our military forces over the past decade, First Responders are just now starting to realize the benefits of employing unmanned systems. For more than a decade, Unmanned Aircraft Systems (UAS) and Unmanned Ground Vehicles (UGV) have proven their value to the United States military. Law Enforcement personnel are learning to employ UAS and UGV against perpetrators of crimes in a variety of ways, most importantly to respond to disaster scenarios. Firefighters and Emergency Medical Services (EMS) personnel could employ these technologies to help find lost personnel, identify the magnitude and map the area of a fire, and respond to hazardous situations or natural disasters, among many other functions. One of the most important scenarios in which First Responders could employ them is a school shooting. With the recent tragedy at Sandy Hook Elementary School, our nation is struggling to find solutions. This article describes an experiment conducted December 3-6 to assess the value and utility of a UGV, a UAS, and a technology that distributed the video feeds from them to iPhones, Androids, and other viewing devices to the First Responder, in a school shooting scenario.

## Introduction

For more than a decade, unmanned systems have proven their value to the United States military. These systems provide a means for soldier operators to see what the employed systems see from a standoff distance. Operators fly Unmanned Aircraft Systems (UAS) at varying altitudes to pinpoint enemy locations, monitor activities, survey the battlefield, assess battle damage, and conduct general reconnaissance, among other tasks. Unmanned Ground Vehicles (UGV) are being employed in largely the same roles but also possess the capability for close-in inspection and investigation of suspicious objects, defeat of improvised explosive devices, and operation in other places where UAS cannot be employed. Law Enforcement and other First Responders are just now starting to realize the benefits of these advanced technologies for largely the same purposes.

This experiment was conducted December 3-6, 2012 at the Southeastern Equipment and Technology Advancement Center (SETAC) in Eufaula, Alabama to assess the value and utility of advanced technologies for the First Responder in a school shooting scenario. UNEQ chose the Eufaula department because its staff, training, and equipment is representative of police departments serving and protecting the 18,112 incorporated places [1] in the United States with populations of 24,999 people and fewer [2]. There are 18,112 of these incorporated places and only 1,428 incorporated places with populations of 25,000 people or more. These numbers do not reflect the many unincorporated places in the United States [3].

In preparation for the experiment, on December 3, the participating vendors trained personnel from the Eufaula Police and Fire/Rescue Departments. In addition, SEMCO integrated their VDU-100 Video Distribution Unit with RoboteX's Avatar II Tactical UGV and Air Robot's AR-100B UAS. On December 4, UNEQ conducted side experiments with the UGV and the UAS to characterize their performance in the operational environment and gain the requisite understanding of their capabilities. December 4th concluded with a

pilot test, where UNEQ and the First Responders ran the scenario with all data collectors in place, completing all required data collection instruments.

During the pilot test, experiment staff conducted a shakeout of data collection procedures to insure the effectiveness of the data collection instruments. On December 5, UNEQ and the First Responders conducted experimentation for record by conducting two iterations of the school shooting scenario.

UNEQ chose to use a school shooting scenario because it fully taxed the Eufaula First Responders and thereby allowed them to employ each of the technologies to their fullest potential. UNEQ conducted the two iterations; a base case, where the First Responders responded with just their organic equipment; and a technology case, where they responded with the Avatar II, and the AR-100B, both with the capability to distribute their video.

## Avatar II tactical robot (RoboteX)

The RoboteX AVATAR II (see Figure 1) is a small ground robot whose dimensions are 24.41 in. x 15.35 in. x 6.14 in. It weighs 25 pounds without the battery. It has a reported operating range of 300 meters and can operate for approximately 4-5 hours. The Avatar II has a wide-angle color drive camera that allows the operator to see what the camera sees. It comes with a variety of accessories that provide additional capabilities.

## VDU-100 Video distribution system (SEMCO)

The VDU-100 (Figure 2) allows the user to encode and transmit video using several wireless and wired transmission modes from its point of collection to essentially anywhere in the world on a near real-time basis. Users can view the decoded video simultaneously on an unlimited number of commercial devices. The viewer(s) can control camera pan, tilt, and zoom functions, perform video enhancement,

and adjust frame rate and resolution. With a laptop or PC as the viewer, the user can record video or photos locally.



Figure 1: RoboteX Avatar II Tactical UGV.



Figure 2: SEMCO's VDU-100.

### AR-100B Micro unmanned aircraft system (AirRobot)

The AR-100 (Figure 3) is a Vertical Take-Off and Landing Micro UAS that weighs less than 2 pounds and is virtually silent because of its electrical propulsion system. First Responders can fly it for close range, stealth Intelligence, surveillance, and reconnaissance operations out of line of sight during day and night operations. While airborne, it provides real time full motion video and IR thermal imaging feed to the ground station where the operator can record it.

In both trials, there was one perpetrator, multiple mock explosive devices, and multiple casualties. We mitigated the learning effect and controlled its impact on the experiment by placing the mock explosive devices in different locations (except for the device on the roof), changed the locations of casualties, and changed slightly, the location of the shooter. The advanced technology trial established the value and utility of using the advanced technologies for the accomplishment of this scenario.

Analysis of data from the two cases provided the difference in performance afforded by the use of the UAS, UGV, and distributed video system. Both departments responded code 2 (normal traffic), and the response time; while recorded, was not analyzed as part of the experiment data because neither of the unmanned systems would have caused a delay in response or contributed to a quicker response. Had this been an actual school shooting, the Eufaula departments most likely would have called for additional personnel and mutual aid agencies would have responded. This experiment included only Eufaula's organic personnel capabilities.



Figure 3: AirRobot's AR-100B UAS.

**Scenario Site:** SETAC High School campus is located at 315 Outback Road in Clayton, Alabama. The school is a one-story building with odd angled long hallways and thirty-six rooms. The High School sits on a 250-acre campus with separate vocational education, mechanical arts, administrative and storage buildings. As part of a modernization project, the school district recently approved the demolition of two of the buildings and the construction of upgraded buildings in their place. Demolition took place last week and workers had not yet removed the rubble and debris to begin new construction.

In the scenario, a SETAC high school student burst into the school brandishing weapons and explosives. He had reportedly killed several students and teachers and threatened to blow up the school and other buildings on campus. The majority of students were able to escape from the main school building, but the gunman was holding hostage an unknown number of students somewhere in the school. The Eufaula First Responders were tasked with diffusing the situation, locating and neutralizing any unexploded ordnance, rescuing the hostages, and detaining the suspect as they would had this been a real school shooting.

**NOTE:** This scenario was slightly different from most mass shootings in that the shooter did not also immediately kill himself; but very much like others where the shooter kills several people then takes hostages or tries to escape. UNEQ purposely set the scenario this way to create an active situation in which the First Responders could exercise the advanced technologies to their fullest and where significant learning could take place.

**Demographics:** Twenty-one Eufaula First Responders, composed of 9 SWAT and 12 Fire/Rescue personnel, participated in this experiment. Their average age is 35 years with an average of 10 years of experience in their respective fields, 6.5 years (average) of which they have spent in the Eufaula force. Typical training for all participants includes Alabama Peace Officer and Basic SWAT training, Firefighter I and II with basic EMS and HazMat. Other participant qualifications include Weapons Instructor, Sniper, Less Than Lethal Weapons, Demolition, Mechanical Breaching, Paramedic, Fire Officer I and II, Apparatus Operator, Fire engineer, Confined Space Rescue, and Weapons of Mass Destruction Awareness.

**Data collection:** Data Collector 1 was with the SWAT team, Data Collector 2 with the EMS team, Data Collector 3 at the Tactical Operations Center, and Data Collector 4 in the position that allowed

him to collect the required data concerning the overall scene. For instance, Data Collector 4 started the iterations at the front gate of the campus, moved to the front of the school to observe UAS flights, moved inside the school to observe and record actions with the UGV, and he moved to other locations where action was occurring but not being recorded by one of the other data collectors. The Data Collectors recorded every action taken by their respective elements, how the actions took place, the times at which those actions took place, how their respective elements accomplished those actions, and took notes as required.

**Baseline Trial:** The purpose of the baseline trial was to record the events and actions taken by the Eufaula First Responders in responding to the school shooting with only their currently issued equipment. In the baseline trial, there was one perpetrator, multiple mock explosive devices, and multiple casualties.

**Advanced Technology Trial:** The purpose of the advanced technology trial was to record the events and actions taken by the Eufaula First Responders in responding to the school shooting with the advanced technologies and draw comparisons to the baseline trial.

**Baseline Trial Summary:** The Fire Department (1 person) arrived first on scene at 8:30 (H-Hour) probably because the Southside Fire Station is only 3.09 miles from the SETAC High School Campus and is the closest first responder station in Eufaula. Three SWAT officers arrived on scene at H+ 5 minutes. They established the Tactical Operations Center (TOC) at H+ 7 minutes, and the SWAT sniper was in position at H+13 minutes.

The incident commander positioned the TOC with the administration building between it and the school to provide cover. From the TOC, the officers could not see the school, the area behind it, or any of the rooms inside the school. TOC officers made decisions based on what they heard via radio communications between them and the SWAT team.

The SWAT team deployed to the gym first because one of the walking wounded told them that personnel were in the gym. They deployed via a route (approximately 446 meters- 5 minutes) that provided them cover and concealment from the school. SWAT moved along this avenue of approach without the ability to see what was there before traversing it. Had the suspect anticipated possible avenues of approach and been waiting for the SWAT team on this approach, the suspect could have ambushed the SWAT team and inflicted casualties or at least delayed the approach, which would have slowed the entire process.

The SWAT team selected their point-of-entry to the school without having the ability to see what was there first. Had the shooter booby-trapped or been present at the door, the SWAT team would have been engaged. The SWAT team entered the school at H+ 1 hour and five minutes. They entered the building and every room in it, without the ability to see what was there first. Had the shooter booby-trapped the doors or been present in one of the rooms the SWAT team entered, he could have immediately engaged them, possibly causing injuries or death. In the baseline trial, SWAT had no visual of hostages, shooter, or explosives until they found them.

At H+ 1 hour and 10 minutes, in the third room, the SWAT team discovered a mock explosive device by walking up on it. Had this been a command-detonated device, the shooter could have detonated it and seriously injured or killed the SWAT team.

Since the Eufaula police department does not have an organic explosive ordnance disposal (EOD) team, they followed SOP by “calling” the closest EOD support element in Dothan, Alabama [4] for support, and retreated from the school to a safe position behind the gym at H+ 1 hour and 13 minutes to wait for the Dothan EOD team to arrive. This wait time would have been at least 120 minutes; the approximate time it would have taken for the Dothan EOD team to assemble, prepare their gear, drive 64 minutes, orient themselves with the scene, deploy bomb disposal robots, neutralize those devices, and declare the devices cleared. If bomb disposal support comes from Columbus, the wait time would have been at least three minutes longer. The experiment schedule did not allow for a 120-minute pause, so UNEQ called an administrative all clear at H+ 1 hour and 27 minutes. At H+ 1 hour and 27 minutes, 17 minutes after discovering the device, the SWAT team re-entered the school.

As in the 1999 Columbine High School shooting, where explosives were also present, the SWAT team could have chosen to ignore procedure and bypassed the explosive devices in an effort to get to the suspect and save the hostages as quickly as possible. There is inherent risk in this approach as suspects could have detonated the bypassed devices, which would have certainly caused more casualties and/or deaths on the scene. The SWAT and EOD teams could have attempted simultaneous operations, where the SWAT team continued to pursue the suspect while the EOD teams neutralized the devices. There is inherent risk here as well because having multiple teams conducting different tasks would have added to the already chaotic scene. EOD personnel could have also been left vulnerable to attack as the suspect had yet to be neutralized and could have command detonated the devices or attacked the EOD teams outright.

When the SWAT team re-entered the school they had to re-clear the rooms they had previously cleared since they could not see what was going on inside the school while they were outside waiting for EOD support. While the SWAT team was outside the school, the suspect could have moved to the area by the door through which the SWAT team exited, or occupied one of the rooms close to the door, and engaged the SWAT team as they re-entered the school.

At H+ 1 hour and 31 minutes, the SWAT team entered the hostage room, discovered four students and one teacher; and learned that the suspect had fled the room. For the next 14 minutes, the SWAT team continued to search the school for the suspect, whom they discovered at the end of the hallway at H+ 1 hour and 45 minutes. For the next two minutes, they ordered the suspect to release a hostage he had with him, drop his weapon and lay spread-eagled on the floor. The SWAT team took the suspect into custody at H+ 1 hour and 47 minutes, and called the scene “secure.”

As per procedure, EMS set two staging areas, one outside the campus fence and the other inside the fence. They waited at the first staging from H+ 6 minutes to H+ 1 hour and 24 minutes (1 hour and 18 minutes). It took EMS five minutes to move to the second staging area, where they waited from H+ 1 hour and 29 minutes to H+ 1 hour and 47 minutes, until the SWAT team declared the scene secure. From H+ 1 hour and 47 minutes to H+ 1 hour and 51 minutes, the EMS team moved from the second staging area to the school, which they entered at H+ 1 hour and 52 minutes and immediately began treating casualties. For the next 4 minutes, they treated casualties and at H+ 1 hour and 56 minute, EMS loaded the casualties into an ambulance and at H+ 1 hour and 57 minutes, the experiment staff ended the iteration.

In the baseline trial, EMS got their first look at non-walking wounded casualties at H+ 1 hour and 52 minutes, because in shooting situations, EMS cannot enter a scene until the police have declared it secure. Trauma patients that are seen and receive treatment within one hour of the traumatic event have significantly greater chances of survival [5]. Depending upon the severity of wounds, some of the victims of the school shooting in this experiment would have died from their wounds before EMS personnel could get to them. This time also represents the first time that the EMS personnel had any visual of the casualties.

In the baseline trial, the SWAT team apprehended the suspect at H+ 1 hour and 47 minutes. This overall time includes the 13-minute administrative halt that experiment staff called to simulate the time that Eufaula SWAT would have had to take in waiting for the Dothan Police Department EOD team to respond when they found the first explosive device. It excludes the time of approximately 120 minutes that it would have actually taken for the Dothan EOD team to assemble, prepare their gear, drive 64 minutes, orient themselves with the scene, deploy bomb disposal robots, neutralize those devices, and declare the devices cleared.

In the baseline trial, the SWAT team was completely unaware that there was an explosive device on the roof of the school. The only way they could have found it would have been to climb the interior ladder, open the hatch, climb through it, and physically clear the roof.

### Advanced technology trial summary

The Fire Department (one person) arrived first on scene (1:29- H-Hour) again due to the close proximity of the Southside Fire Station. The first police officers arrived on scene at H+ 2 minutes, and the TOC and patrol officers at H+ 8 minutes. The incident commander again positioned the TOC with the administration building between it and the school to provide cover. The operator launched the UAS at H+ 9 minutes, and at H+ 11 minutes; it was airborne over the school. The TOC received the UAS video via the distributed video app at H+ 14 minutes and the SWAT sniper was in position at H+ 14 minutes. The UAS began sweeping the rear windows of the school at H+ 15 minutes and TOC personnel began viewing its video at the same time.

Operators deployed the UGV at H+ 19 minutes and the TOC received that video at H+ 21 minutes. Because the UAS video was distributed, the TOC officers could see the school and the area behind it on their smartphones. They could also see the rooms inside the school in the same way because of the UGV video. In the advanced technology trials, TOC officers made decisions based on what they saw from video of the scene and what they heard via radio communications between them and the SWAT team.

The SWAT team deployed to the maintenance building via a route (approximately 66 meters-1 minute) that provided them cover and concealment from the school. The SWAT team moved along this avenue of approach after first viewing it via the UAS video, and driving the UGV along it, before they traversed it themselves. In the advanced technology trial, had the suspect anticipated possible avenues of approach and been waiting to ambush the SWAT team on this approach, they could have seen the suspect via the UAS and/or UGV video, which could have prevented that ambush. The suspect could have seen the UAS/UGV, and changed his position or chosen to shoot at the UAS/UGV. Either of these actions could have increased the probability of the suspect compromising his position and making the SWAT team more aware of the suspect's position.

The SWAT team selected their point-of-entry to the school after first seeing it via the UAS video and with the potential to see it via the UGV video. In the advanced technology trial, had the shooter booby-trapped or been present at the door, the SWAT team could have been aware of them.

The SWAT team deployed the UGV into the school and entered it themselves at H+ 31 minutes. They entered the building, and nearly every room in it, with the ability to see what was there first through the UGV video. Had the shooter booby-trapped the doors or been present in one of the rooms the SWAT team entered, it is likely that the UGV would have seen him first and prevented him from immediately engaging the SWAT team. In the advanced technology trial, the SWAT had visual of explosive devices, hostages, and the shooter through the UGV video before they encountered them themselves.

At H+ 37 minutes, they had cleared nine rooms with the UGV. At H+ 38 minutes, in the tenth room, the UGV discovered a mock explosive device, as opposed to the SWAT team themselves discovering devices in the baseline trial. Had this been a command-detonated device, the shooter could have still detonated it, yet the probability of loss of life or injury could have been much lower because the SWAT team was not in the room with the device.

As in the baseline, the Eufaula police department does not have an organic EOD team, but in the advanced technology trial, they were able to focus the UGV video on the device and call the Columbus Police Department bomb technicians. Because the UGV video was distributed, the bomb technicians in Columbus, Georgia (53 miles away) pulled up the app on a big-screen TV through a laptop and viewed the explosive device in the school in Eufaula, Alabama.



Figure 4: Eufaula SWAT team about to enter SETAC High School.

From H+ 38 minutes to H+ 43 minutes, the Columbus bomb technicians worked with the Eufaula SWAT personnel to get a clear enough picture of the mock explosive device to make a decision. They adjusted the pan, tilt, zoom of the camera, turned the UGV lights on and off, and re-positioned the UGV. Finally, the Columbus bomb technicians, unaware that the UGV had no bomb disposal capabilities, advised the SWAT team to neutralize the device in place. Since the UGV had no bomb disposal capabilities, at H+ 45 minutes, the SWAT team (see Figure 4) pulled back out of the school, as in the baseline. In this trial, they pulled back to the maintenance building to wait for an EOD team to arrive on site. At H+ 51 minutes, 13 minutes after

discovering the device, the SWAT team re-entered the school after an administrative call that the explosive device was neutralized.

As in the baseline trial, the SWAT team still would have had to wait at least 120 minutes for the Columbus or Dothan bomb technicians to assemble, prepare their gear, drive to Eufaula, orient themselves with the scene, deploy bomb disposal robots, neutralize those devices, and declare the devices cleared. However, had the Eufaula SWAT UGV been equipped with bomb disposal capabilities, theoretically, they could have neutralized the device at approximately H+ 43 minutes, just five minutes after finding it.

When the SWAT team pulled out of the school this time, they left the UGV in the hallway to maintain surveillance. At H+ 48 minutes, UGV video showed the suspect. This alerted the SWAT team that activity had occurred in the area of the UGV and that they would have to be extra cautious after re-entering the building. Had they not left the UGV in the hallway, the SWAT team would have had no way of knowing that the suspect had been near the door. In addition, since they saw the suspect run down the hallway they had a higher degree of confidence that the rooms they had previously cleared were still clear.

At H+ 1 hour and one minute, the UAS video showed the suspect running out of a door at the rear of the school and into another, where the UGV video also showed the suspect when he re-entered the school. The UGV operator attempted to talk to the suspect using the UGV's two-way audio capability, but the suspect ran away. At H+ 1 hour and three minutes, the UGV discovered another mock explosive device but the experiment staff called an administrative all clear to preserve the flow of the scenario.

For the next six minutes, the SWAT team continued to clear the school and search for the suspect. At H+ 1 hour and nine minutes, the SWAT team caught a glimpse of the suspect in the hallway through a glass window. The UGV operator drove it close to the suspect and attempted verbal contact while the rest of the SWAT team moved toward the suspect. At H+ 1 hour and 11 minutes, the suspect released a hostage, threw down his weapon, and surrendered to the SWAT team. Once the suspect was in custody, the UGV operator "cleared" the remaining rooms with the UGV.

As per procedure, EMS set two staging areas, one outside the campus fence and the other inside the fence. In the advanced technology trial, they waited at the first staging for only 23 minutes, as opposed to 1 hour and 18 minutes in the baseline trial. At H+ 17 minutes, five EMS personnel reported watching the UAS video on their smartphones via the distributed video app and at H+ 19 minutes, reported seeing a casualty on the ground outside the school. At H+ 56 minutes, the UGV discovered a victim on the floor in one of the rooms. In the advanced technology trial, the first time EMS had a visual of a casualty came at H+ 19 minutes, as opposed to H+1 hour and 52 minutes in the baseline trial. While being able to see a casualty is certainly not the same as treating one, having an awareness of the type, location, and number of casualties, allowed for more effective and efficient planning for treatment.

EMS personnel waited at the second staging area for 56 minutes, until the SWAT team declared the scene secure. At H+ 1 hour and 7 minutes, five EMS personnel reported to the TOC to standby for the call that the scene was secure, which came from the SWAT team at H+ 1 hour and 9 minutes. The EMS team approached the school and entered it at H+ 1 hour and 21 minutes, where they began triaging and treating victims. From H+ 21 to H+ 23 minutes, EMS treated casualties and at H+ 23 minutes, loaded the casualties into an

ambulance. At H+ 26 minutes, the UAS spotted a possible explosive device on the roof of the school, which SWAT missed during the baseline trial. Since the suspect was already in custody and EMS was already treating victims, the experiment staff advised the First Responders to disregard the explosive device on the roof. At H+ 1 hour and 30 minutes, the experiment staff ended the iteration.

In the advanced technology trial, the operator conducted four UAS flights. During these flights, the First Responders used it to provide surveillance of the avenue of approach, gain an idea of what was on the avenue of approach before they moved along it, and select point-of-entry based on what the TOC and operator saw there. They also used it to locate victims outside the school, provide surveillance of the back area of the school while the sniper had visual engagement of the front, and find a possible explosive device on the roof of the school.

## Conclusions

Value is the relative worth, merit, or importance of something. Therefore, relative to the baseline, the advanced technologies were very valuable to the First Responders in this school-shooting scenario.

The SWAT team entered the school 34 minutes sooner than in the baseline. They apprehended the suspect 36 minutes sooner than in the baseline; and EMS personnel got visual confirmation of casualties 1 hour and 33 minutes sooner than in the baseline.

SWAT and TOC officers made better decisions because they based them on what they saw from video of the scene and what they heard from radio communications between them and the SWAT team. In the baseline trial, they made decisions based on what they heard alone.

SWAT and TOC officers moved more confidently along the avenue of approach and selected the point-of-entry with more confidence because they had seen them first by viewing the UAS video. In the baseline, they could not see the entire avenue of approach until they traversed it; and the point-of-entry until they were in it.

Even though they still could not enter the scene before SWAT declared it secure, EMS personnel could better plan for treatment and mutual aid support because they could see casualties sooner via the UAS and UGV video.

TOC, SWAT, and EMS personnel were better protected because they could see behind the school, in the rear-windows, inside the halls and rooms, and on the roof of the school. In the baseline trial, they could not see behind the school unless SWAT was there. They could not see in the rear windows at all. They could not see inside the halls and rooms until they were in them, and they could not see on the roof at all.

TOC, SWAT, and EMS personnel were better protected because the advanced technologies allowed them to see explosive devices through the UGV and the UAS video without exposing themselves. In the baseline, the only way they could find them was by exposing themselves.

Utility is the state or quality of being useful. Therefore, the advanced technologies had great utility for the First Responder in this school-shooting scenario. They used them to identify and "clear" avenues of approach and points of entry; see where they could not see without them; locate explosive devices without exposing themselves; identify and attempt to assess casualties; "clear" rooms, and maintain visual of an area, object, room, or hallway without dedicating personnel.

Had the First Responders conducted the advanced technology trial without the capability to distribute the video via IP based applications on smartphones and other devices, the only officers who would have seen the video would have been the operators of the systems and those who could look over their shoulders to see the respective displays on the Operator Control Units. EMS personnel would not have been able to see the video at all, since they were in a staging area away from the TOC for most of the time during the trials.

In most cases, the operator of the system is not the officer who most needs to see the video. When these operators saw something in the UAS or UGV video they would have had to interpret what they saw then tell in person or call the other officers on the radio to inform them of what they saw. It is likely that this method of communicating what they saw through the unmanned systems video would have been less effective and taken more time to get the information to the officers who needed it most. In essence, this method would have limited the value and utility of the unmanned systems video to "one view and one perspective."

Distributing the video from the unmanned systems to any officer with a smartphone and the proper permissions to access the video, allowed for much more effective use of the video and opened the value and utility of employing the advanced technologies to "one view and many perspectives."

## Summary

The UAS, UGV, and distributed video capability assessed in this experiment were of great value and utility to the First Responders in this school-shooting scenario.

## References

1. United States Census Bureau, Statistical Abstract of the United States: 2012. There are 16,570 incorporated places in the United States with populations of 10,000 people or fewer and 1,542 incorporated places in the United States with populations of 10,000-24,999 people. (16,570 + 1542= 18,112).
2. The population of Eufaula in 2010 was 13,137 (U.S. Census Bureau).
3. United States Census Bureau, Statistical Abstract of the United States: 2012. There are 723 incorporated places in the U.S. with populations of 25,000-49,999 people, 432 incorporated places in the U.S. with 50,000-99,999 people; 200 incorporated places with 100,000-249,999 people; 40 incorporated places with 250,000-499,999 people; 24 incorporated places with 500,000-999,999 people, and 9 incorporated places with 1,000,000 or more people (723+432+200+40+24+9=1,428).
4. Closest EOD support is Dothan, Alabama, a 64 min drive to SETAC HS Campus. The next closest is Columbus, Georgia, a 67 min drive to SETAC HS Campus.
5. University of Oklahoma Medical Center- This hour is known as the "Golden Hour" and the chance of survival for the level one trauma patient decreases significantly after an hour has passed. <http://www.oumedicine.com/oumedicalcenter/medical-services-and-departments/trauma-one-center/what-is-the-golden-hour>