# Military and Civilian Terrorism Response: The Other Joint Training

**Theresa Tamash, Mary Ann Pigora, and Matt Kraus**
**Applied Research Associates, Inc.**
**Orlando, FL**
**ttamash@ara.com, mpigora@ara.com, mkraus@ara.com**

## ABSTRACT

In 1999 funding was provided by Congress and the Department of Defense to train, organize, and equip a series of Civil Support Teams (CSTs). The CST mission is to support civilian emergency response authorities in crisis and consequence management for domestic incidents involving Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Weapons of Mass Destruction (WMD). Each CST employs 22 Army and Air National Guardsmen trained in 6 functional areas: command, operations, communications, administration and logistics, medical, and survey.

CSTs and civilian emergency response organizations share a common mission – to effectively mitigate the effects of WMD incidents. To achieve this mission CSTs and civilians must be able to train together. Coordinating efforts between military and civilian teams in high stress situations will always be challenging but a joint training and exercise program will begin to solve this problem.

This paper will discuss the issues and solutions involved with modifying a training and exercise program designed specifically for civilians to create a tool that is able to train, exercise, and assess CSTs and civilians together. The Automated Exercise and Assessment System (AEAS) is a simulation system designed to train, exercise, and assess command-level civilian emergency responders in incidents involving WMD. Incorporating CSTs into AEAS required knowledge engineering the responsibilities of the six functional areas of a CST and how the CST is expected to complement the civilian emergency response team. While tasks, conditions, and standards are consistent for all CSTs, their standard operating procedures, capabilities, response times, and equipment vary substantially from team to team.

## ABOUT THE AUTHORS

**Theresa R. Tamash** is a Scientist at Applied Research Associates, Inc. For the past 5 years her work has been focused on simulation training systems, including Close Combat Tactical Trainer (CCTT), OneSAF Objective System, and the Automated Exercise and Assessment System (AEAS). Ms. Tamash obtained her MS in Computer Science from the University of Central Florida and her BS in Computer Science from Rollins College.

**Mary Ann Pigora** is a Senior Scientist at Applied Research Associates, Inc., where she leads the emergency response simulation and training efforts. She has over 12 years of experience in 3D graphics and simulation, and is the lead architect on the Automated Exercise and Assessment System. Previous experience includes creating CGF and visual databases for human simulation, work on the OneSAF Objective System, and computer animation for the movies Mulan and Fantasia 2000. She received her MS in Computer Science from the Georgia Institute of Technology.

**Matt Kraus** is a Principal Scientist at ARA. He has a Bachelor of Science degree in Computer Science from Western Michigan University and a Master of Science degree in Simulation Modeling and Analysis from the University of Central Florida. His research interests are in the areas of distributed computing, artificial intelligence and computer graphics.

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## INTRODUCTION

In 1999 funding was provided by Congress and the Department of Defense to train, organize, and equip a series of Civil Support Teams (CSTs). The CST mission is to support civilian emergency response authorities in crisis and consequence management for domestic incidents involving Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Weapons of Mass Destruction (WMD). Each CST employs 22 Army and Air National Guardsmen trained in six functional areas: command, operations, communications, administration and logistics, medical, and survey.

The National Guard Bureau (NGB) commissioned the design and creation of the Automated Exercise and Assessment System (AEAS) in 2001 in order to aid civilian emergency response organizations in training for incidents involving CBRNE WMD. A secondary goal of AEAS was to be able to provide the NGB with an objective assessment of the jurisdiction's actions taken to mitigate the effects of the WMD incident exercised. After a year and a half of design and development, including input from a Stakeholder group made up of emergency response experts from various Federal, State, and local agencies, AEAS was released in early 2003.

The NGB's vision for AEAS was training and exercising a single civilian jurisdiction. All 15 Emergency Support Functions (ESFs) specified in the National Response Plan that was released in December 2004 are included in AEAS, but the system allows for minimal interaction between local agencies and Federal and State organizations. The software was designed to eventually allow for Federal and State organizations to be included (Pigora and Tamash, 2005). For this effort our mission was to modify AEAS so that a CST could exercise their doctrine and equipment in three scenarios designed to push the team to the limit so their breaking points could be identified. Although our primary task was to modify AEAS to exercise a CST individually, a secondary objective was to support joint training.

Our research turned up few systems providing CST training, and none that provide a joint military and civilian functional exercise experience. The Civil Support Team Trainer (CSTT) is an interactive web-based training system currently in development. The system is designed to train individual skills in a virtual environment, such as "identifying agents and substances, assessing current and projected consequences, advising on response measures, and assisting with requests for additional military support" (Civil Support Team Trainer, 2005). The Virtual Emergency Response Training Simulation (VERTS) is another virtual system aimed at training the individual members of a CST (Willingham, 2003). Neither CSTT or VERTS include a component for training or exercising coordination between teams or agencies.

A critical piece of the National Response Plan is increasing coordination capabilities between Federal, State, and local agencies. It is imperative that jurisdictions have a cost effective and easy to use system to aid in fostering the inter-agency coordination that has scarcely been exercised in the past. This paper will discuss the approach taken, results, and lessons learned in modifying AEAS for joint military and civilian training.

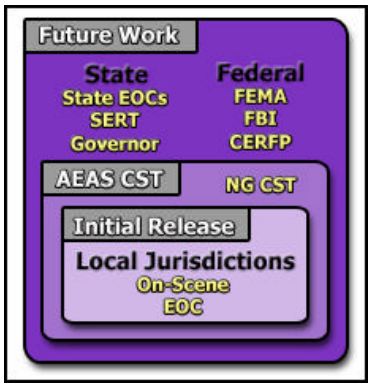


**Figure 1: Inter-Agency Coordination in AEAS**

## CHALLENGES IN CIVILIAN EMERGENCY RESPONSE TRAINNG

The initial development of AEAS for civilian jurisdictions presented many challenges not generally found in the development of military simulations.[1] The wide variation in civilian emergency response organizational structures, resources, equipment, Standard Operating Procedures (SOPs), chains of command, and communication protocols demanded a flexible, customizable design. A basic requirement of the system was automated assessment of how well participant actions mitigate the incident, not an easy task in a free-play environment. The AEAS concept of operations, which specified that a local Training Officer be able to easily set up and execute exercises, also broke the paradigm of complex military simulations, many of which require specialized training and technical support.

The most striking challenge was the lack of national standards. In order to create a training system, it was vital to define what should be trained. In military simulations, field manuals provide doctrine. At the time AEAS was being designed in early 2002, there was a noticeable lack of national standards available to civilian jurisdictions. Efforts were underway to change this, and a common command structure was taken from the massive wildfire fighting efforts in the West and adapted for general incident response. This structure, the Incident Command System (ICS), was adopted in some form by most civilian jurisdictions. AEAS is specifically aimed at exercising ICS, and utilizes the ICS command structure and nomenclature.

Beyond ICS, however, there was great divergence in standards, equipment, and communications. To address the lack of standards, a Stakeholder group of Federal, State, and local emergency management experts was created, and they provided guidance during all phases of development. This Stakeholder group essentially took the place of a definitive civilian emergency response doctrine – they were emergency response experts who would later work to define the emerging national preparedness guidelines such as the National Incident Management System (NIMS), the Target Capabilities List (TCL), and the Universal Task List (UTL).

Meeting the challenge of assessing participant actions relied directly on the output of the Stakeholder group. Using accredited references, the Stakeholders and Subject Matter Experts agreed on a system of Tasks, Conditions, and Standards (TCSs) to define What, When, and Why actions should be taken during a WMD incident. Notice the Who and How are left off that list. Who accomplishes tasks, and How tasks are accomplished, varies substantially from jurisdiction to jurisdiction, but the What, When, and Why often remain the same. Using this approach, Expected Actions were created for each task to specify what action(s) should be performed. A task can often be satisfied by a variety of actions, and can be completed by multiple participants, allowing for variance in Who and How in the free play environment (see Figure 2). The TCSs are data-driven and can be updated to reflect changes in doctrine. (Pigora, Barshatzky, Kerrigan and Murphy, 2002)

**Constant across jurisdictions**

**Task** (What): Approach Scene

**Condition** (When): In the management of crisis and consequences of an incident involving a suspected HAZMAT

**Standard**: Approach scene from an upwind direction via a safe (uncontaminated and secured) route, establish water supply, hose lines and suppression duties, avoid contact with unknown liquids, and isolate hazard area.

**Reference** (Why): NFPA 471, NFPA 472, Chaps 2,4,5, FEMA Region VI HAZMAT Exercise Evaluation Supplement, p. 8, NFPA Supplement 14, etc.

**Varies in each jurisdiction**

**Functional Areas (FA)** (Who):

- Incident Command
- Fire
- HazMat
- Operations

**Expected Actions** (How):

- Establish Entry and Exit Corridors
- Establish a Cold, a Warm, and a Hot Zone perimeter

| Assessed | Circumstance |
|---|---|
|  | An **FA** completed an **Action** |
|  | A reminder was issued, then an **FA** completed an **Action** |
|  | A reminder was issued, but an **FA** did not complete an **Action** |

**Figure 2. TCS and Assessment Example**

[1] Initial development of AEAS was performed by the authors prior to employment at ARA.

Another challenge was the variation in equipment and resources between civilian jurisdictions. Unlike military simulations, which have a fairly standard equipment set to work with, AEAS must be able to handle not only equipment variances, but also variances in facilities, available mutual aid, and federal resources such as mobile medical teams. The Close Combat Tactical Trainer (CCTT) simulates a finite set of entities and units that were defined based on actual military resources (US Army Simulation, Training, and Instrumentation Command, 1999). The Army's next generation training simulation, the OneSAF Objective System (OOS), allows entities to be composed from components, such as a tank that is made up a tracked vehicle, a certain caliber gun, and a particular mass for physics calculations. Composed entities and units still represent the Army's actual equipment, and the system provides developer level tools to compose additional entities, units, and behaviors.

A different approach was required for AEAS because of the lack of standardized equipment lists. Rather than focusing on equipment, AEAS tracks the actions a resource can carry out to mitigate an incident (see Figure 3). For example, a Heavy Rescue resource may be able to transport victims, treat patients, and do high angle rescue operations. AEAS uses a "capability-based" architecture that enables a jurisdiction to easily input the resources that they can bring to bear on a situation. The jurisdiction can create a resource with any name and call sign, any mix of capabilities, and specify the supplies it carries. Only capability and equipment data pertinent to the AEAS scenarios is collected. (Pigora and Tamash, 2003)

Some AEAS design challenges were common to military simulations, such as how to train effective communications practices and capture the participants' situational awareness. AEAS trains both Emergency Operations Center (EOC) and on-scene personnel. In a real world incident, the EOC must rely on on-scene personnel to be their eyes and ears. In an AEAS exercise, on-scene and EOC participants are in separate rooms and have different variations of the AEAS interface. On-scene participants can see a map that provides detailed information such as the locations of resources, explosions, smoke plumes, and victims, but the EOC players do not see this data on their map. All this information must be relayed from on-scene personnel to those in the EOC through radio, email, or phone communications, otherwise the EOC will not know what is happening on the scene (see Figure 4).


**Figure 3. Differing approaches to entity and resource composition**

Participants are encouraged to bring their normal communications equipment to an exercise, but when a decision is made, the decision must be recorded in the AEAS interface to be logged for the After Action Review (AAR). AEAS provides simulated email and radio channels for this purpose. The AEAS assessment engine looks for notifications through radio and email traffic after significant events to assess whether communications are taking place between peers or commander and subordinate. Further, all reports and forms, such as the standardized Incident Action Plan, are filled out and logged through the AEAS interface. Empirical data has shown that the communications assessment is indicative of overall team performance.

Another common challenge is realism. Normally on-scene personnel work an incident for hours before an EOC is stood up and is operational. Forcing a simulated EOC stand-up would result in bored EOC participants and inefficient use of training time. The solution was to fabricate a meeting of EOC personnel (usually for a training exercise) that coincides with the beginning of the scenario.

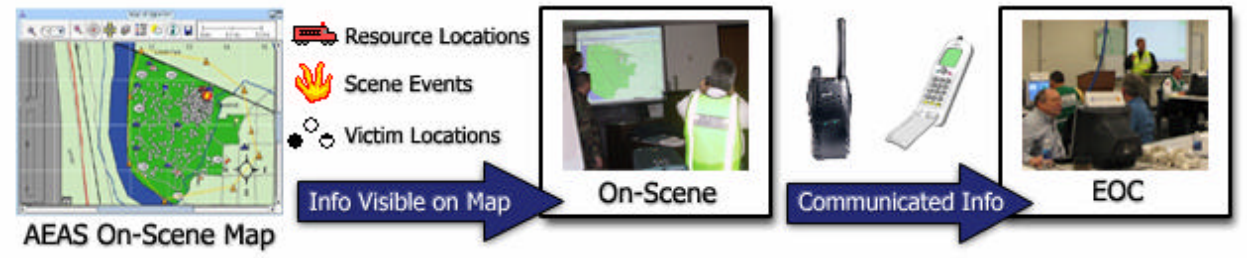


**Figure 4. To encourage effective communication practices, scene and EOC personnel are in separate rooms and see slightly different interfaces. They must communicate important information.**

The lessons learned during the initial development of AEAS proved useful when incorporating a military team, and making a joint exercise experience possible.

## DIFFERENCES BETWEEN MILITARY CST AND CIVILIAN EMERGENCY RESPONSE OPERATIONS

CSTs and civilians share a common mission, but their training needs and response procedures are different. Since AEAS was designed for civilians, it was clear that it would need some modifications in order to train both civilians and CSTs. Understanding the differences between how a CST responds to an incident, and how civilian agencies respond was an important first step.

CSTs were born out of congressional orders specifying exactly how many members are on a team, what specific skill sets each team member must possess, and what equipment each team must have. Civilian agencies have historically been built based on the necessities of the real world. If a community has a problem with gangs, a task force is put together to address the problem. Until recently, protecting against WMD terrorist threats was not a priority for civilian agencies.

Doctrine is not a word that is generally used in civilian emergency response circles. It is traditionally a military word. CSTs have well defined doctrine describing their mission and precisely what is expected of them in WMD incidents (ARTEP 3-627-35-MTP, 2001 and FM 3-11.22, 2003). Civilians have policies and guidelines that vary widely from agency to agency, as discussed in the previous section. Only in the last few years has the Department of Homeland Security begun developing definitions and standards for civilian agency preparedness.

Civilians are the first line of defense. They rely on support agencies when situations escalate beyond their capabilities. Mutual Aid from neighboring communities, private entities, and, of course, their state's CST are usually prepared to assist. Conversely, CSTs are meant to be relatively self-sufficient. They can get assistance from neighboring CSTs, but the support team's arrival can take hours or days.

CSTs and local jurisdictions have a different focus at an incident site. The CST mission is "to support civil authorities at a domestic CBRNE incident site by identifying CBRNE agents/substances, assessing current and projected consequences, advising on response measures, and assisting with appropriate requests for additional support." (FM 3-11.22, 2003) The CST is there in a support and advisory capacity, and is not necessarily concerned with direct mitigation. A CST medical team is equipped and trained to render services to their team members, but is not intended to render medical assistance to civilians at the site. During a large scale incident where local resources are overwhelmed, the Incident Commander (IC) will likely request this assistance be provided. Use of the CST Unified Command Suite (UCS) vehicle and communications personnel may also be requested by the IC, as CST communications and reach-back capabilities may surpass those of the local jurisdiction. CST training necessarily involves how team personnel and resource allocation is handled in these instances.

Training is a way of life in the military. CSTs spend a lot of their time training to do their jobs well. Civilians spend most of their time performing their jobs but not preparing for the most severe circumstances brought on by WMD threats. Civilians and CSTs will come to joint training exercises with different expectations and training approaches.

## DESIGN CHALLENGES

Many of the differences discussed above created design and implementation challenges when incorporating a CST into AEAS. In this section, we will discuss the challenges we faced, and the solutions we employed.

**Response Profile**

When an emergency occurs, the first responders will almost always be from a civilian law enforcement agency or fire department. In a large incident, these first responders will be responsible for managing all aspects of the incident until an EOC is stood up and staffed with the appropriate personnel. This could take anywhere from a few minutes to a few hours. If the incident is severe enough to request the presence of a CST, it is hours before the CST has deployed and arrived on scene (see Figure 5).


**Figure 5. Varying response times pose a challenge with joint training**

In a real-time simulation training paradigm, the CST should wait a few hours until they have "arrived" to be active in the simulation. Two distinct solutions were used to solve this problem. One entirely uncreative solution has the CST pre-deployed to the city because of elevated threat levels when the incident occurs. The other solution involves more complex scenario planning, and enables the scenario to begin with the CST at their base station. The CST participants are kept involved and busy with preparation and deployment tasks, while the civilians are occupied with initial incident assessment and mitigation. The scenario is designed so that when participants feel these initial tasks are satisfied, the scenario can optionally be "fast-forwarded" to the point of CST arrival on scene. This is an important design element because it allows the scenario to be used for joint, CST-only, or civilian jurisdiction training.

Another consideration for scenario design was ensuring the CST would be sufficiently stretched to their limit so their breaking points could be identified. The WMD incident had to be severe enough to require multiple days of support, so the CSTs would need to implement their rest cycle plans and do multiple entries into potentially contaminated areas. We solved this problem by having multiple incidents that affect large groups of people. Accidents involving CST personnel, arising from both the deployment and the incident itself, stresses personnel allocation. The longest scenario contains both bioterrorism and explosive incidents involving large crowds, and occurs over the course of 10 days. The ability of the system to compress time is key because it allows participants to plan out their actions but not have to sit through them in real time. The 10 day scenario can be completed in four to six exercise hours.

**Communications**

Ensuring participants use proper communication protocols was also a challenge. We learned during the initial development of AEAS that exercise participants will find alternate methods of communication during exercises. Several of these methods lead to negative training. In addition, there is more than one accepted way for a CST to establish communications with a local jurisdiction. The solution was to provide multiple methods of communication between the CST and the civilian jurisdiction, including simulated phone, email, and radio. Any communication method that utilizes the AEAS interface is considered valid by the assessment engine. Methods that cannot be tracked in the simulation, such as a CST member walking into the adjoining exercise room and speaking face to face with the Incident Commander, will not meet the assessment criteria for the required communication tasks.

Communication training can also be compromised when the simulation provides more information than participants would have normally. If all AEAS interfaces showed the same information, EOC players would be able to see an explosion that occurred miles from their location even if the on scene players neglected to inform them that an explosion occurred. During initial development this problem was solved by

having two map modes: EOC and On-Scene (see Figure 4). In EOC mode, things that can be learned through sight alone, such as victim and responder locations, are not visible. This solution is problematic when you consider a CST. During deployment and while they are en route, the CST must rely on communication with the civilian responders to know what is happening on scene, but when they arrive they can see it for themselves. The ideal answer is to have the CST players start out in EOC map mode and switch to On-Scene map mode when they arrive at the incident site, but our current implementation assigns the CST participants the On-Scene map mode. AEAS was not designed with the ability to switch between map modes during exercise execution, so the best possible solution was used until further funding could be secured.

**Doctrine vs. Subject Matter Expertise**

Subject Matter Experts (SMEs) were used extensively during initial AEAS development, to make up for the lack of established doctrine. For the effort to add a CST to AEAS, we had a CST Field Manual (FM), an Army Training and Evaluation Program (ARTEP) Mission Training Plan, and minimal SME assistance. Compared to the initial AEAS development for civilian response, the CST knowledge engineering process was much simpler because we were given a standard list of tasks to work from. Complex instruction sets are rarely complete, however. In this instance, the ARTEP was not an exact match for the guidance in the latest FM. Also, each CST can develop their own Standard Operating Procedures (SOPs), as long as they conform to the guidelines set forth in the ARTEP and FM. To make the AEAS assessment criteria as doctrinally sound as possible, we incorporated all of the ARTEP tasks and performance measures that could be tracked in the simulation, and augmented it with the extra guidance and forms found in the FM.

During the initial development of AEAS, three "beta" tests were conducted. This involved letting actual civilian jurisdictions use early, incomplete versions of the software in an exercise setting. These dry runs allowed our intended users to provide feedback and influence development, and were instrumental in developing a system that our audience considers useful and valuable. Unfortunately, we did not have the luxury of extensive user testing of the AEAS CST version during development. This would have been beneficial to the resulting product.

**Tracking Performance Measures**

When translating the ARTEP task performance measures to AEAS Expected Actions (see Figure 2), we first decided which ARTEP tasks were performed by our simulation participants. For example, when a deploy order is received, the CST commander designates a Unit Movement Officer (UMO) to oversee the deployment operations. The ARTEP performance measures for the UMO, such as Task 03-2-0001 Step 6b, "Ensured that the logistical equipment was properly marked" are too low-level to track in the simulation. Similarly, many of the ARTEP Survey Team tasks are below the command level. We allowed simulated resources to be designated in these roles, and did not include those low-level ARTEP tasks in the assessment of our command-level participants.

Roughly 70% of the command-level ARTEP performance measures were trackable in the simulation. The standardized forms in the FM were very useful, as they gave an unambiguous method for meeting criteria such as updating the incident safety plan.

Even allowing for discard of the low-level tasks, there is not a one-to-one correspondence between the ARTEP tasks steps and AEAS Expected Actions. Some ARTEP task steps may be assessed more than once in a scenario. For example, the condition for Task 03-2-003 specifies that a terrorist act involving WMD is threatened or has occurred. One task step involves taking confirmatory samples from the site. This step should be done as a baseline sample when the team is pre-positioned, and again after an incident has occurred. The task step will be given two separate assessments in an exercise run.

## OUTCOMES

At the completion of this effort, AEAS CST had six additional player roles (see Figure 6) and three new scenarios that exercised the new roles. Three CSTs from various states were scheduled to use AEAS CST for three days to help a team of researchers determine the shortcomings of CST standard operations and what measures needed to be taken to overcome these shortcomings. The first day of the event was training on AEAS and discussion of the exercise purpose, while days two and three were running AEAS scenarios and performing After Action Reviews.

The learning curve for simulation training systems can be steep. Relative to military simulation systems, the learning curve for AEAS is mild. Still, one of the CSTs decided that for the purposes of finding their breaking points, learning a new system was excessive and they could get the same results by performing a traditional

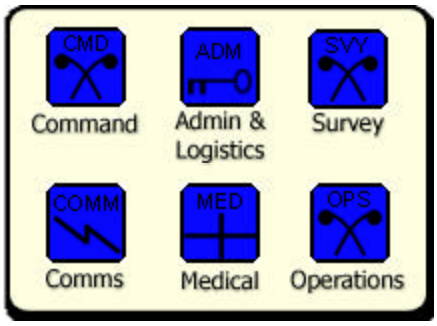


**Figure 6. Six CST Functional Areas**

tabletop exercise with the same three scenarios. The exercise coordinators reworked their plans and organized a tabletop for this CST, while the remaining CSTs went with the original plan and used AEAS. Each team reached the same conclusions at the end of the three days, demonstrating that there is no difference in the effectiveness of the traditional tabletop exercise versus the AEAS exercise. The tabletop exercise did require more support personnel than the AEAS exercises. The AEAS exercises each had one person participating in the simulation as the Incident Commander, one person facilitating the exercise and monitoring the pace, and a shared technical support person, totaling five support personnel for the two exercises. The tabletop exercise required four to six support personnel for one exercise: one giving scenario prompts, one or two running computers and projecting maps and other information, one or two recording actions and taking notes, and another one or two facilitating and observing.

Although the reception of AEAS CST was initially mixed, all three CSTs felt it could be a valuable training tool. The team who opted not to use AEAS felt the system should be introduced during basic CST training to help teach incident management and coordination, and then the CSTs would already be familiar with the tool for further training. Especially exciting to the CSTs was the possibility of training alongside civilian jurisdictions using AEAS. The CSTs also saw potential for using AEAS to meet their extensive training requirements, particularly when the weather is bad and they have little desire or opportunity to do live training.

## FUTURE WORK

Plans are being made to enhance AEAS CST so it can be utilized jointly by CSTs, the National Guard CBRNE Enhanced Response Force Package (NG CERFP), and civilians. This work is scheduled to be completed early in FY06. Incorporating input provided by the actual CSTs will give CSTs the same level of comfort with the system that civilians already have. To make AEAS CST a true joint training system, task assessment data for civilians will be added to the new CST scenarios, and CST task assessment data will be developed for the original AEAS scenarios. In addition, CST roles will be added to the two training scenarios: the interface tutorial that teaches use of the graphical user interface, and the practice scenario that provides a small, simple incident for participants to handle.

Adding the "CST Module" to AEAS showed us what it takes to add inter-agency coordination to AEAS. Now that the Department of Homeland Security has released guidelines that encourage increased coordination between Federal, State, and local organizations it is imperative that simulation exercise systems like AEAS be able to adapt as agencies begin to train together. AEAS's flexible, data-driven architecture allows it to make the transition from single agency training to joint multiple agency training.

## ACKNOWLEDGEMENTS

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