AlphaACT SBIR Phase II Plus:
Final Report

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Abstract

In this Small Business Innovation Research Phase II project, AlphaTRAC's goal was to revolutionize crisis decision-making by developing a radically innovative approach to training. The AlphaACT® decision support system is a platform technology used as the basis for web-based training applications. The training applications use varying levels of immersion to provide the engagement necessary for effective training on decision-making skills. Based on the recognition-primed decision model, AlphaACT applications employ a pattern recognition engine to help the decision maker quickly choose a case on which to base an appropriate course of action.

In this Phase II project, AlphaTRAC:

- Built core components and integrated them into the AlphaACT platform
- Developed three discipline-specific applications—for asymmetric combat, HAZMAT emergency response, and firefighting response
- Developed two applications to gather and archive event experiences for populating the application knowledge bases and developing training scenarios

All of these applications have been transitioned and fielded or commercialized, with the exception of the asymmetric combat application. This application is scheduled to transition to operation under a U.S. Marine Corps Program of Record by the end of fiscal year 2014.

1 INTRODUCTION

In this Small Business Innovation Research (SBIR) Phase II Project, AlphaTRAC has worked to revolutionize crisis decision-making by developing a radically innovative approach to crisis decision-making and by developing and commercializing technology to support the new approach. The AlphaACT decision support system is a platform-based capability that rigorously addresses the needs and requirements of decision makers—as defined by the decision makers themselves. Its success is based on its ability to teach the way that successful crisis decision-makers think and to broaden users' experience by bringing the knowledge of experienced decision-makers quickly to bear, even for novices.

AlphaACT applications are web-based systems that present the student with short, guided training scenarios. They use varying levels of immersion to provide the engagement necessary for effective training of decision-making skills. Based on the recognition-primed decision (RPD) model of psychology, AlphaACT applications employ a pattern recognition engine to lead the decision maker through a limited set of questions to a rapid choice of a prototypical case to represent the developing event. The guided interview ends as soon as a case is found that adequately matches the limited information available to the decision maker. The application then supports the user in adapting the base case to actual event conditions as known at decision time, tuning the decision for the specific event. Finally, AlphaACT applications identify additional information that can help users significantly refine the decision.

AlphaACT applications include a relational database that can be populated with cases specific to target disciplines (e.g., asymmetric combat, firefighting, HAZMAT). This database forms the knowledge base for the RPD process and for the pattern recognition engine.

AlphaACT applications are platform-based, with core elements (e.g., pattern recognition system, graphical interface, relational database) integrated into a core capability. Discipline-specific applications are built as extensions of the platform. As improvements are made to a specific application, the modifications are made to the platform and then the other applications. Through this synergistic approach, each new application serves to advance the platform capability.

In this Phase II project, we have:

- Built core components of the AlphaACT platform
- Integrated the core components into a platform
- Developed three discipline-specific AlphaACT applications—for asymmetric combat, hazardous materials (HAZMAT) emergency response, and firefighting response
- Developed two applications—360Recall and XCapture ADT—to gather and archive event experiences for populating the application knowledge bases and developing training scenarios

All of these applications have been transitioned and fielded or commercialized, with the exception of the asymmetric combat application. This application is scheduled to transition to operation under a U.S. Marine Corps (USMC) Program of Record by the end of fiscal year (FY) 2014. A number of other discipline-specific applications are in development or planned outside the scope of this contract.

Funding for the base SBIR Phase II effort was provided by the Defense Advanced Research Projects Agency (DARPA). Funding for some platform components and applications was provided by partnering agencies, including the DARPA Oh By The Way Program, the Department of Defense (DoD) Rapid Reaction Technology Office (RRTO), the DoD Domestic Preparedness Support Initiative (DPSI), the USMC, the Office of Naval Research (ONR), the Department of Homeland Security (DHS), and the Department of Energy (DOE).

The contract included the following funded contract line items (CLINs):

- CLIN-0001 (AA and AB)
- CLIN-0003
- CLIN-0004
- CLIN-0005
- CLIN-0008
- CLIN-0010
- CLIN-0012
- CLIN-0014
- CLIN-0016
- CLIN-0018 (AA, AB, and AC)
- CLIN-0020
- CLIN-0022
- CLIN-0023
- CLIN-0026
- CLIN-0028 (AA, AB, AC, and AD)

These CLINs funded development of the AlphaACT platform, as well as the applications (shown in the following table) that use the platform.

Application	CLINs
AlphaACT platform*	• CLIN-0001 (AA and AB) • CLIN-0003
AlphaACT HAZMAT	• CLIN-0004 • CLIN-0005
360Recall	• CLIN-0008
XCapture ADT	• CLIN-0010 • CLIN-0012 • CLIN-0014 • CLIN-0020 • CLIN-0022 • CLIN-0023 • CLIN-0026
Artificial intelligence (AI) engine*	• CLIN-0016
AlphaACT FIRE	• CLIN-0018 (AA, AB, and AC)
AlphaACT USMC**	• CLIN-0028 (AA, AB, AC, and AD)

*Used in all AlphaACT applications
**Now known as Squad Leader Decision Trainer (SLDT)

This report presents the final results of the program and, for each application developed under the contract, includes the following subsections:

- Project objectives
- Project tasks
- Project outcomes
- Project collateral

This document also includes:

- A summary and conclusions
- A list of abbreviations and acronyms

2 THE ALPHAACT PLATFORM

The AlphaACT platform is an innovative technology platform that is used as the basis for a range of user-specific applications that address crisis decision-making. An application integrated

into a web portal, it employs training scenarios to help improve users' decision-making skills, even when event information is sketchy or incomplete.

Based on the RPD model, the AlphaACT platform helps learners use the observable characteristics of an incident to identify similar events from a knowledge base and then use that information to determine the appropriate course of action to take. It serves as the platform for all AlphaACT applications.

2.1 CLINs

The AlphaACT platform was developed under the following CLINs:

- CLIN-0001(AA and AB)
- CLIN-0003

2.2 Project Objectives

Establish a core set of features that are common across crisis decision spaces so that training and response tools can quickly be built and adapted to meet the needs quickly of many different crisis environments.

2.3 Project Tasks

2.3.1 CLIN-0001 (AA and AB)

Task 1: Select and characterize DoD markets

As part of Task 1, AlphaTRAC:

- Identified candidate DoD markets
- Selected and characterized target DoD markets
- Identified candidate innovator-level end users
- Selected and engaged a Phase II innovator-level end user

Task 2: Establish technical basis for AlphaACT system

As part of Task 2, AlphaTRAC:

- Characterized the decision-making processes for target markets
- Refined the AlphaACT decision process
- Published the AlphaACT decision process

2.3.2 CLIN-0003

Task 1: Design and build the initial AlphaACT core

As part of Task 1, AlphaTRAC:

- Established end user needs and requirements for target DoD markets
- Established system requirements for the AlphaACT core
- Designed the AlphaACT core
- Built the initial AlphaACT core

Task 2: Build the final AlphaACT core

As part of Task 2, AlphaTRAC:

- System tested the AlphaACT core
- Redesigned and modified the AlphaACT core
- Finalized the AlphaACT core as Build 1.0

Task 3: Build and deliver an application-specific version of AlphaACT

As part of Task 3, AlphaTRAC:

- Established end user needs and requirements for Phase II innovator-level end user
- Established system requirements for the AlphaACT tactical system
- Designed custom modifications and extensions to the AlphaACT core
- Conducted initial build of AlphaACT tactical system
- Tested initial build of AlphaACT tactical system with Phase II innovator-level end user
- Redesigned and rebuilt AlphaACT tactical system
- Conducted acceptance testing for AlphaACT tactical system
- Delivered AlphaACT tactical system to Phase II innovator-level end user

2.4   Project Outcomes

2.4.1 Transition Status

The AlphaACT platform has been successfully developed and fielded for three major AlphaACT applications (HAZMAT, FIRE, and USMC). Each of the applications uses the same AlphaACT platform code base. The creation of the platform allows for the quick development of new

applications, and the improvements that have been made for each application are shared by the others.

2.4.2 Key Issues Encountered during the Project

- Understanding the decision process we were working to implement
- Creating a platform before understanding the types of decision spaces we would support
- Creating a platform that worked in multiple browsers

2.4.3 Lessons Learned

- Start with two specific but different applications and build the core from common features

2.4.4 Plans for Future Effort

- Continue development of applications so that the core feature set can grow

2.5 Project Collateral

Collateral developed in support of the AlphaACT platform includes:

- "The AlphaACT Decision Support System for Emergency Responders" (published in the peer-reviewed Proceedings of the Human Factors and Ergonomics Society 54th Annual Meeting in 2010)
- "An Information Paper on Crisis Decision-making Training Technology" (published by the International Association of Fire Chiefs [IAFC] on August 1, 2012)

3 ALPHAACT HAZMAT

AlphaACT HAZMAT is a discipline-specific training application built on the AlphaACT platform. It is a web-based solution designed to help first responders learn how to make critical decisions during HAZMAT emergencies.

3.1 CLINs

AlphaACT HAZMAT was developed under the following CLINs:

- CLIN-0004
- CLIN-0005

3.2 Project Objectives

Create the first application of a decision process for training in order to validate the core features and decision-making concepts. Create a system that trains first responders to effectively respond to HAZMAT emergencies to protect lives and resolve the events.

3.3 Project Tasks

3.3.1 CLIN-0004

Task 1: Establish end user needs and requirements and develop software system design

As part of Task 1, AlphaTRAC:

- Established a comprehensive set of end user needs and requirements for the AlphaACT HAZMAT Analyzer
- Developed a top-level software design document for the AlphaACT HAZMAT Analyzer

Task 2: Develop and test the AlphaACT HAZMAT analyzer software application

As part of Task 2, AlphaTRAC:

- Advanced from top-level design to detailed system and software design for the AlphaACT HAZMAT Analyzer
- Built the AlphaACT HAZMAT Analyzer software application using agile programming techniques
- Performed the test-build cycle until system requirements were met

Task 3: Obtain databases needed to support the capability

As part of Task 3, AlphaTRAC:

- Obtained and/or created the databases needed to support the AlphaACT HAZMAT Analyzer

Task 4: Integrate the HAZMAT Analyzer with the AlphaACT system

As part of Task 4, AlphaTRAC:

- Integrated the HAZMAT Analyzer module with the HAZMAT version of the AlphaACT system

Task 5: Produce trained artificial intelligence engine for example application

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As part of Task 5, AlphaTRAC:

- Built and trained an analytical HAZMAT AI engine

3.3.2 CLIN-0005

Task 1: Replace simulated AI technology with fully functional AI engine

As part of Task 1, AlphaTRAC:

- Implemented and tested the AI engine
- Integrated the AI with the enhanced AlphaACT HAZMAT prototype
- Tested to confirm the functionality of the AI subsystem

Task 2: Establish end user needs and requirements and develop software system design

As part of Task 2, AlphaTRAC:

- Developed a top-level software design document for the enhanced AlphaACT HAZMAT prototype

Task 3: Increase number of key emergency management decisions addressed

As part of Task 3, AlphaTRAC:

- Redesigned the AlphaACT demonstration system knowledge base and the user interface to track, display, and support decision-making for the new decisions

Task 4: Increase number of hazardous materials treated to include key chemicals of interest to DoD

As part of Task 4, AlphaTRAC:

- Added 47 DoD-specified additional chemicals to the knowledge base

Task 5: Characterize additional chemicals

As part of Task 5, AlphaTRAC:

- Characterized the additional chemicals identified in Task 4

Task 6: Conduct consequence analysis for the additional chemicals

As part of Task 6, AlphaTRAC:

- Conducted consequence analysis for the additional chemicals identified in Task 4

3.4 Project Outcomes

3.4.1 Transition Status

AlphaACT HAZMAT was launched as an operational product in September 2012 and has been in lifecycle management since that time. It is currently offered as a jointly branded product through the IAFC Near-Miss program, where it is available to nearly 11,000 users. Subscriptions to AlphaACT HAZMAT are also available for purchase at www.alphatrac.com.

Since project inception, AlphaACT HAZMAT has also been:

- Accepted as a National Incident Management System (NIMS) Supporting Technology Evaluation Program (STEP)-certified product
- Recognized by the IAFC technology council as a technology of merit
- Established as a product available for purchase through the DHS authorized equipment list grant program and through the website for trial users

3.4.2 Key Issues Encountered during the Project

- Identifying an AI engine that could handle the amount of data required by the decision space
- Integrating global information system (GIS) software into the system
- Creating engaging scenario content
- Creating technically accurate protective actions

3.4.3 Lessons Learned

- It is difficult to use subcontractors to accomplish objectives due to the complexity of the tasks and the amount of research involved
- It is important to get end user groups involved early for feedback
- It is important to weigh the end-user feedback against the feasibility of development

3.4.4 Plans for Future Effort

- Update the system to incorporate recent upgrades made to the AlphaACT platform
- Move away from the display of technical consequence information and toward the presentation of case-based reasoning results like other AlphaACT applications

- Improve the quality of scenario simulation
- Improve the feedback and scoring system

3.5 Project Collateral

Collateral developed in support of AlphaACT HAZMAT includes:

- *AlphaACT HAZMAT User Guide*
- *AlphaACT HAZMAT Quick Reference*
- *AlphaACT HAZMAT Technical Description*
- 11-part series of video tutorials describing how to use AlphaACT HAZMAT
- *AlphaACT HAZMAT at Urban Shield 2010* (a white paper published in October 2010)
- *STEP Evaluation Report: AlphaACT HAZMAT version 2011.03.09.09.41* (published by FEMA in September 2011)
- "New Training Program Strives to Capture and Recreate User Experiences" (an article published in *Firefighter Nation* on April 18, 2012)

4 360RECALL

360Recall is a supporting application to the AlphaACT platform and the SLDT application. It is a web-based authoring application developed for the USMC that helps users quickly and easily document mission experiences with minimal effort.

With 360Recall, you can:

- Capture the details of a mission or event
- Review, edit, and share your event descriptions
- View and learn from event descriptions shared by others

360Recall helps you write descriptions of actual missions or events you may have heard about during story-swapping sessions with other Marines.

By presenting you with structured prompts and questions, 360Recall captures information about a mission or event—things like:

- Operation orders
- Event details
- The cues or indicators that helped you recognize danger
- The decisions made
- The lessons learned

The event descriptions developed using 360Recall are structured and stored in a database that allows them to be searched, enabling you to sift through the information and making the content captured in the event descriptions useful to SLDT.

4.1 CLINs

360Recall was developed under:

- CLIN-0008

4.2 Project Objectives

To create a system that gathers experiences from end users in order to grow the experience database for use in training. To gather structured combat experiences without requiring in-person interviews for use by novice users of AlphaACT USMC (SLDT).

4.3 Project Tasks

Task 1: Develop initial needs, requirements, and top-level design for scenario authoring software application

As part of Task 1, AlphaTRAC:

- Developed initial end-user needs, requirements, and top-level design for 360Recall

Task 2: Conduct agile development of scenario authoring software application

As part of Task 2, AlphaTRAC:

- Conducted incremental development activities; testing and evaluation by AlphaTRAC, TECOM, and TECOM-designated SMEs; revision/creation of end user stories (needs/requirements); and reprioritization of the product backlog (design features)

Task 3: Conduct verification testing of stand-alone scenario authoring software application

As part of Task 3, AlphaTRAC:

- Conducted collaborative verification testing to demonstrate that 360Recall met the defined needs/requirements

Task 4: Use the application to gather scenarios for AlphaACT USMC system development

As part of Task 4, AlphaTRAC:

- Used 360Recall with SMEs identified by TECOM to gather and archive combat scenarios

4.4 Project Outcomes

4.4.1 Transition Status

360Recall was delivered as field ready in August 2012 and has been integrated with AlphaACT USMC (SLDT). The system served as the basis for the transition to full case-based reasoning in AlphaACT applications. It is a platform that is also now used in the production of all XCapture applications.

4.4.2 Key Issues Encountered during the Project

- Browser compatibility requirements weren't identified until the product had reached a very mature state. Once those requirements were established, advanced technology incorporated into the initial product had to be removed.

4.4.3 Lessons Learned

- Identify the target platform requirements early and build to the target from the beginning
- Get core functionality working before focusing on "nice to have" features

4.4.4 Plans for Future Effort

- Increase the number of browsers that the system works with
- Market the product as a free system that allows for experience sharing
- Set the system up to perform administrative tasks for target end users to incentivize them to use the system

4.5 Project Collateral

Collateral developed in support of 360Recall includes:

- *360Recall User Guide*
- A marketing overview video

5   XCAPTURE ADT

XCapture ADT is a supporting application to the AlphaACT platform and serves as the platform for other XCapture applications. It is a web-based authoring tool designed to help National Guard Agribusiness Development Teams (ADTs) quickly and easily create after action reviews (AARs).

With XCapture ADT, you can:

- Create AARs
- Review and edit your AARs
- Share your AARs with others in the XCapture ADT community
- View AARs shared by others
- Develop a list of contacts you encounter on missions

Using a guided interview, the system helps you document:

- Pre-mission information, including:
    - The mission purpose
    - The mission schedule
    - Assumptions about:
        - The weather
        - The terrain
        - Driving conditions
    - Planned tasks
    - Civil considerations
    - An assessment of risk
- Mission information, including:
    - The tasks that were actually attempted or completed
    - A review of the mission as a whole
- Lessons learned, including:
    - A review of the actual risk
    - Suggestions for things to sustain and things to improve

In XCapture ADT, information is structured and stored in a database. The system has a search function you can use to locate AARs of interest.

Once you've completed an AAR, you'll be able to:

- Edit it

- Print it
- Export it to Microsoft Word
- Share it with others who have system access

5.1 CLINs

XCapture ADT was developed under the following CLINs:

- CLIN-0010
- CLIN-0012
- CLIN-0014
- CLIN-0020
- CLIN-0022
- CLIN-0023
- CLIN-0026

5.2 Project Objectives

Gather structured information from AARs and mission experiences to improve the crisis decision-making of ADTs in Afghanistan.

5.3 Project Tasks

5.3.1 CLIN-0010

Task 1: Create a vision for the full-up AAR capability

As part of Task 1, AlphaTRAC:

- Worked with ADT Program leadership to identify and engage with an advisory group of ADT SMEs
- Worked with the advisory group to create an end-user-focused vision for the AlphaACT AAR Tool for ADTs

Task 2: Establish initial ADT end user needs for the pilot system

As part of Task 2, AlphaTRAC:

- Created the next layer of detail to support the end user vision for XCapture ADT—an initial set of end user needs

- Transformed the needs into "user stories" and an initial top level system design

Task 3: Conduct a collaborative initial design of the pilot system

As part of Task 3, AlphaTRAC:

- Collaborated with the ADT advisory group to create a top level design for the XCapture ADT, which served as a starting point for development of the software application

Task 4: Develop the pilot system using agile development techniques

As part of Task 4, AlphaTRAC:

- Iterated a build-test-evaluate-revise-build process until the maximum number of defined end user needs were met within available time and budget

Task 5: Prepare the TRL 6/7 pilot system for full field testing by ADT teams

As part of Task 5, AlphaTRAC:

- Cleaned up the pilot XCapture ADT and prepared it for use by ADT teams in full field testing

5.3.2 CLIN-0012 and CLIN-0014

Task 1: Extend the TRL-6 AAR software tool to TRL-7 and prepare for home station testing

As part of Task 1, AlphaTRAC:

- Worked collaboratively with ADT warfighter advisors to extend the current TRL-6 capability to TRL-7 with nearly complete functionality.
- Iterated a build-test-evaluate-revise-build process until the maximum number of defined end user needs were met within available time and budget.

Task 2: Test the TRL-7 prototype in home station locations and develop the tool to TRL-8

As part of Task 2, AlphaTRAC:

- Worked with a National Guard Bureau (NGB)-designated ADT Team to fully test the TRL-7 prototype at home station location(s) and in simulated in-theater environments

- Developed XCapture ADT to TRL-8 – a completely functional system ready for in-theater deployment and testing
- Conducted a seminal transition event to test the system against defined acceptance criteria

Task 3: Prepare for in-theater deployment and pilot testing

As part of Task 3, AlphaTRAC:

- Prepared XCapture ADT for in-theater deployment and pilot testing
- Obtained and configured hardware
- Implemented the software system in field-ready form and configured it for operation
- Established operational procedures
- Established stateside-to-theater communications for user support and rapid-response system modifications
- Produced user guides and other documentation
- Conducted final orientation for the ADT that will deploy with the system

Task 4: Deploy to Afghanistan and begin pilot operations

As part of Task 4, AlphaTRAC:

- Supported the in-theater installation and operation of the tool through the end of FY 2011, via the support/communications capability established in Task 3
- Conducted rapid-response system modifications as needed to ensure full functionality of the system in the field
- Made modifications to the system in response to user stories developed through field use of the pilot system

5.3.3 CLIN-0020

Task 1: Conduct pilot testing with ADTs at home station and in-theater

As part of Task 1, AlphaTRAC:

- Conducted and supported expanded pilot testing of the XCapture AAR tool with multiple ADTs while at home station and in-theater (Afghanistan)
- Developed and applied innovative methods of collaborating with ADTs that were deployed in forward positions in Afghanistan and methods for frequently updating XCapture software as the system advanced

Task 2: Develop extended XCapture functionality in response to warfighter feedback

As part of Task 2, AlphaTRAC:

- Iterated a build-test-revise-build process until the maximum number of defined end user needs was met within the available time and budget
- Included refined and additional system features as well as interfaces to the operational environment within which the AAR capability was meant to operate (e.g., networks, knowledge management systems)

Task 3: Develop and apply methods to archive, share, and analyze data from XCapture

As part of Task 3, AlphaTRAC:

- Worked with its subcontractor (the Kemmet Schreiben Company), the NGB ADT Program, the Communications-Electronics Research, Development, and Engineering Center (CERDEC), and other organizations to develop and apply advanced methods to archive, broadly share, and analyze data created with XCapture.

5.3.4 CLIN-0022 and CLIN-0023

Task 1: Identify and examine host capabilities for archival and management of ADT data

As part of Task 1, AlphaTRAC:

- Identified and examined potential host capabilities for long-term archival and management of ADT data generated by XCapture and other sources

Task 2: Support development of methods and processes to analyze XCapture and other ADT data

As part of Task 2, AlphaTRAC:

- Collaborated with CERDEC and the U.S. Military Academy Network Sciences Center to develop methods and processes to analyze XCapture and other ADT data for important TTPs, lessons learned, and trends

Task 3: Support adaptation and piloting of the SACCADE knowledge management technology

As part of Task 3, AlphaTRAC:

- Collaborated with CERDEC in the adaptation and piloting of the System to Aid Counterinsurgency Campaign Analysis, Design, and Evaluation (SACCADE) knowledge management technology for use in managing XCapture and other ADT data

5.3.5 CLIN-0026

Task 1: Continue pilot testing with ADTs at home station and in-theater

As part of Task 1, AlphaTRAC:

- Conducted and supported expanded pilot testing of XCapture ADT with multiple ADTs while at home station and in-theater (Afghanistan)
- Developed and applied innovative methods of collaborating with ADTs that are deployed in forward positions in Afghanistan and methods for frequently updating XCapture software as the system advances

Task 2: Develop extended XCapture ADT functionality in response to warfighter feedback

As part of Task 2, AlphaTRAC:

- Iterated a build-test-revise-build process until the maximum number of defined end user needs was met within the available time and budget
- Included refined and additional system features as well as interfaces to the operational environment within which the AAR capability operated (e.g., networks, knowledge management systems)

Task 3: Develop and apply methods to archive, share, and analyze data from XCapture ADT

As part of Task 3, AlphaTRAC:

- Worked with its subcontractor (the Kemmet Schreiben Company), the National Guard Bureau (NGB) ADT Program, CERDEC, and other organizations to develop and apply advanced methods to archive, broadly share, and analyze data created with XCapture ADT

5.4 Project Outcomes

5.4.1 Transition Status

The XCapture system is a platform technology, with planned deployment across a spectrum of military and non-military applications. Current or planned military commercialization plans include:

- National Guard Agribusiness Development Teams (deployed)
- Special Operations Command Civil Affairs Brigades (planned for fiscal year 2014)
- National Guard state partnership programs (planned)
- Joint stabilization operations (planned)
- Coalition stabilization operations (planned)
- Non-governmental stabilizations operations (planned)
- Operations for multiple services and programs (in planning)

5.4.2 Key Issues Encountered during the Project

- Providing usable unclassified internet access for teams that were in-theater
- Dealing with security concerns of teams and providing appropriate protocols to address the concerns
- Initial engagement with teams, which was critical to facilitating an understanding of the project and setting expectations for system functionality
- Providing hardware to teams at their request so they could use the system
- Losing our initial end user group when its mission changed and the group was no longer able to participate in the project, leading to a brief lapse of end user feedback (critical to AlphaTRAC's development process)

5.4.3 Lessons Learned

- Having an engaged end user group is critical to developing a useful product
- Setting realistic expectations for early adopters and ensuring that they are the right group of people is important for continued support and participation in the project
- When end users go silent, they most likely have some type of technical or political problem they are not communicating. By establishing a comfortable dialogue and method of communication with end users, we were able to identify and break through barriers
- It is important to establish, at least midway through the project, a continued funding source for ongoing operational support

5.4.4 Plans for Future Effort

- Quickly and early on, expand the technology's use to different but related missions to help ensure project longevity and adaptability to changing military needs

5.5 Project Collateral

Collateral developed in support of XCapture ADT includes:

- *XCapture ADT User Guide*
- *XCapture ADT Mobile User Guide*
- *XCapture ADT Storyboard Report Quick Reference*
- An overview video tutorial describing how it works
- A marketing video
- *XCapture ADT: Final Project Report* (published November 7, 2013)

6 ARTIFICIAL INTELLIGENCE ENGINE

This project refined the pattern recognition engine used for the AlphaACT platform, the SLDT application, and all subsequent AlphaACT applications.

The pattern recognition system of AlphaACT USMC has two pattern recognition engines:

- One for case retrieval
- One to identify the next best question

The pattern recognition engine for case retrieval brings back a relevant case given a set of cues. In this context, "relevant" means cases that are analogous to the situation presented in an AlphaACT USMC scenario.

The pattern recognition engine for next best question supports teaching the student how to search for the most important cues in a scenario in order to quickly converge on situational awareness in a potentially overwhelming environment. We have termed this concept the "next best question." The next best question pattern recognition engine does this by returning "interesting" (or statistically decisive) cues to the user.

6.1 CLINs

The AI was developed under the following CLINs:

- CLIN-0016

6.2   Project Objectives

To improve the ability of AlphaACT applications to take cases gathered using the structured interview process (developed in the 360Recall project) and return appropriate ones to reinforce the case-based reasoning being taught as a part of training.

6.3   Project Tasks

Task 1: Define the initial decision-making space

As part of Task 1, AlphaTRAC:

- Worked with Human Performance Training and Education (HPT&E) and USMC to define the initial decision-making space

Task 2: Establish the initial needs, requirements, and top-level design

As part of Task 2, AlphaTRAC:

- Worked with HPT&E and USMC to develop initial end user needs, requirements, and top-level design

Task 3: Develop the prototype knowledge base

As part of Task 3, AlphaTRAC:

- Worked with HPT&E and USMC to develop the prototype knowledge base

Agile software development methods were applied in the development, with software development cycles of approximately one to two weeks duration, including:

- Incremental development, testing, and evaluation by the development team and HPT&E-provided subject matter experts (SMEs)
- Revision/creation of end user stories (the needs and requirements)
- Reprioritization of the product backlog (design features)

Task 4: Populate the knowledge base with initial experiences

As part of Task 4, AlphaTRAC:

- Worked with HPT&E and USMC to gather a limited set of experiences consistent with the decision space defined in Task 1

Task 5: Develop the prototype pattern recognition engine

As part of Task 5, AlphaTRAC:

- Developed a prototype recognition engine

6.4 Project Outcomes

6.4.1 Transition Status

The AI engine has been upgraded and integrated into AlphaACT FIRE and AlphaACT USMC.
Cue tagging, cue importance, and cue relationships have all been successfully integrated and the
AI engine successfully returns relevant cases in all tests.

6.4.2 Key Issues Encountered during the Project

- Determining the correct platform to use for the AI
- Understanding decision spaces and their impact on AI architecture
- Integrated cue importance and cue relationships

6.4.3 Lessons Learned

- Focus on getting an AI to work in a particular decision space and then extract concepts so
  that it can be cross-system compatible

6.4.4 Plans for Future Effort

- Improve the AI's ability to understand synonyms (when words are similar)
- Address latent semantic analysis (the AI automatically extracting cues from a story)

6.5 Project Collateral

Collateral developed in support of AI includes:

- *AlphaACT Pattern Recognition Technology* (a white paper published in February 2013)

7 ALPHAACT FIRE

AlphaACT FIRE is a discipline-specific application built on the AlphaACT platform. It is a
web-based training solution that helps firefighters learn how to make effective decisions in the
high stress, chaotic environment of a response to a residential fire. It uses training scenarios to

help users improve their decision-making skills, even when event information is sketchy or incomplete.

The system teaches decision-making skills based on the RPD model, an approach used by experienced and successful emergency responders and incident commanders. In the approach, decision makers first recognize similarities between the situation they face now and some past incident, then use that knowledge—about what went right and what went wrong—to plan their course of action.

7.1 CLINs

AlphaACT FIRE was developed under:

- CLIN-0018 (AA, AB, and AC)

7.2 Project Objectives

To provide training using the AlphaACT case-based decision process for first responders responding to residential structure fires in urban and rural environments. To provide first responders with a place to share experiences with residential structure fires.

7.3 Project Tasks

Task 1: Research decision space

As part of Task 1, AlphaTRAC:

- Worked with the fire community to define the decision space for which AlphaACT FIRE would be developed

Task 2: Develop user management and tracking system (external scope)

As part of Task 2, AlphaTRAC:

- Used its experience in user management and tracking, gained from the development of AlphaACT HAZMAT, to design a user management and tracking system that is scalable to the size of the fire response market

Task 3: Extend AlphaACT platform and develop knowledge acquisition tool (external scope)

As part of Task 3, AlphaTRAC:

- Extended the AlphaACT platform to support AlphaACT FIRE. The platform improvements were intended to support all AlphaACT applications and provided upgrades to DOE and the first responder hazardous material capabilities already in operation (as AlphaACT HAZMAT).
- Developed a special tool to gather events, experiences, and lessons learned from firefighters. The experiences were used to form the basis for the AlphaACT FIRE knowledge base and were used to develop and update the AlphaACT FIRE pattern recognition system. The knowledge acquisition tool also converted the experiences into stories and training scenarios that can be used in classroom environments.

Task 4: Gather event scenarios

As part of Task 4, AlphaTRAC:

- Used the knowledge acquisition tool to gather event scenarios from the fire community. We worked with firefighter advisors and volunteers across the nation to build an initial database of events for use in the development and piloting of AlphaACT FIRE.

Task 5: Develop pattern recognition functionality

As part of Task 5, AlphaTRAC:

- Adapted the current approach to pattern recognition systems to address the complex, judgment-based decision space of fireground management
- Investigated multiple pattern recognition engine approaches, using the experiences and events gathered in Task 4. We selected the best approach or combination of approaches.

Task 6: Conduct Workshop #1 to gather user stories

As part of Task 6, AlphaTRAC:

- Established a group of advisors/testers for AlphaACT FIRE from fire response agencies across the nation. This group of advisors represented the end user community in the agile development process.

7.4 Project Outcomes

7.4.1 Transition Status

- AlphaACT FIRE was deployed for first responder use as a key training capability by the IAFC
- XCapture FIRE was deployed for first responder use as the technology engine within the IAFC National Near Miss lessons learned system
- The Federal Emergency Management Agency (FEMA) has agreed to deploy AlphaACT FIRE as a training capability at its National Fire Academy

7.4.2 Key Issues Encountered during the Project

- Developing accurate and engaging scenarios
- Gathering cases
- Creating a sustainable model at a price point that local fire departments can afford

7.4.3 Lessons Learned

- Partnering is important in a well-established industry
- Setting up a training system that meets already defined requirements is important

7.4.4 Plans for Future Effort

- Continue gathering cases
- Continue the development of scenarios
- Improve scoring and score tracking
- Increase the number of compatible browsers

7.5 Project Collateral

Collateral developed in support of AlphaACT FIRE includes:

- *AlphaACT FIRE User Guide*
- 10-part series of video tutorials describing how to use it
- *AlphaACT FIRE Decision Space: A Research Report*
- *AlphaACT FIRE Application* (a white paper published in November 2009)
- "AlphaACT FIRE Simulation Training Program" (an article published in *Firefighter Nation* on March 28, 2013)

8   ALPHAACT USMC

AlphaACT USMC—now called Squad Leader Decision Trainer (SLDT)—is a discipline-specific application built on the AlphaACT platform. It is an online, immersive training solution that helps Marine Corps squad leaders learn how to rapidly reach effective decisions in the high-stress, chaotic environment of a mission. Using realistic simulation-based training scenarios, the system teaches you how to recognize and apply past experiences (your own and those of others) to rapidly changing situations.

SLDT helps you apply the RPD approach to decision-making. It teaches you to use the observable characteristics of a situation to identify similar events from the past (drawn from a knowledge base of cases managed by the system) and then helps you use that information to determine an appropriate course of action specific to the situation. This structured approach to crisis decision-making is based on the Observe/Orient/Decide/Act process.

Using scenarios, SLDT presents a mission simulation that includes audio and visual cues to heighten the sense of realism. The scenarios are divided into several segments, reflecting the scale and complexity of missions and the possibility that conditions may suddenly change, requiring you to rapidly adapt mission strategy and tactics.

The breaks in the scenarios come at key decision points, where you are led to deal with some aspect of the situation that requires rapid judgment to ensure mission success. At these "teachable moments," the system leads you to develop your own solutions and action plans, then provides recommendations from SMEs. Your response at the decision points are used to evaluate your proposed course of action.

8.1   CLINs

AlphaACT USMC (SLDT) was developed under:

*   CLIN-0028 (AA, AB, AC, and AD)

8.2   Project Objectives

To provide training using the AlphaACT case-based decision process for novice Marines conducting combat patrols in kinetic and non-kinetic environments. Integrate the 360Recall system developed previously in order to grow trainees experience base in a training environment.

8.3   Project Tasks

Task 1: Determine and implement information assurance and other USMC requirements

As part of Task 1, AlphaTRAC:

- Worked with USMC to determine information assurance requirements applicable to AlphaACT USMC implementation and ensured that these requirements were met in application design and development
- Worked with USMC and Office of Naval Research (ONR) to define the scope of decision-making (e.g., operational environment, mission types, level of unit, level of decision maker) to be addressed by the prototype system

Task 2: Evaluate VBS2 and select simulation approach for AlphaACT USMC

As part of Task 2, AlphaTRAC:

- Worked with ONR and USMC to evaluate Virtual Battle Space (VBS) as a simulation engine for use in AlphaACT UMSC
- Evaluated the viability of VBS simulations as part of AlphaACT USMC sessions conducted over MarineNet on typical USMC-provided computer hardware and software

AlphaTRAC determined that VBS did not meet the project needs and selected Unity instead.

Task 3: Integrate and advance the warfighter experience-gathering application and expand AlphaACT USMC knowledge base

As part of Task 3, AlphaTRAC:

- Incorporated the existing standalone 360Recall experience-gathering application as an element of the AlphaACT platform

360Recall is a software application, developed for the USMC, that:

- Walks the user through a structured process to capture a scenario or experience-based story from an SME employing a user friendly interface
- Engages with the user to identify and extract key decision elements, including event characteristics, cues, and decision points
- Gathers important lessons learned and advice from the SME
- Automatically converts the story and supporting information into a structured training scenario
- Stores the training scenarios in a knowledge base for use in training and in extending the AlphaACT USMC pattern recognition system

Task 4: Develop the AlphaACT USMC platform based on the AlphaACT framework

As part of Task 4, AlphaTRAC:

- Developed a software platform for the AlphaACT USMC application

Task 5: Develop the AlphaACT USMC COA creator tool

As part of Task 5, AlphaTRAC:

- Developed an event customization software tool that operates within an AlphaACT USMC training session to assist the user in developing a course of action appropriate to the scenario and decision(s) made

Task 6: Develop the AlphaACT USMC GUI

As part of Task 6, AlphaTRAC:

- Developed a graphical user interface (GUI) for AlphaACT USMC to guide the user through a training session, including scenario simulations, that is structured around and trains the AlphaACT version of the RPD process

Task 7: Develop the AlphaACT USMC user manager

As part of Task 7, AlphaTRAC:

- Developed an administrative subsystem that established and managed user accounts, including user account information and user profile/preferences information

Task 8: Develop the AlphaACT USMC virtual mentor

As part of Task 8, AlphaTRAC:

- Developed an automated help system that provides help to a user during a training session

Task 9: Integrate and upgrade a USMC-specific pattern recognition system

As part of Task 9, AlphaTRAC:

- Incorporated the standalone AlphaACT USMC pattern recognition engine, that was currently in development, as an element of the AlphaACT platform
- Upgraded the pattern recognition system based on experiences/scenarios gathered from warfighters and instructional developers (e.g., new key cues leading to good decisions)

Task 10: Develop networked version of AlphaACT USMC suitable for operation on MarineNet

As part of Task 10, AlphaTRAC:

- Developed an online version of AlphaACT UMSC suitable for deployment on MarineNet

Task 11: Develop simulation capability and generate simulation environment and scenarios

As part of Task 11, AlphaTRAC:

- Used the Unity simulation engine to develop a proof-of-concept immersive simulation capability for AlphaACT USMC
- Developed the interfaces and protocols for building and interfacing the simulation mission/event environments with AlphaACT USMC and generated a functional prototype demonstrating proof of concept

Task 12: Implement a capability to provide training data to USMC

As part of Task 12, AlphaTRAC:

- Worked with USMC to develop and implement a capability that tracks user performance during each training scenario, calculates performance data, and provides the data to USMC.

Task 13: Provide introductory training video and preliminary user documentation

As part of Task 13, AlphaTRAC:

- Developed and implemented within AlphaACT USMC an introductory training video and preliminary user documentation

8.4 Project Outcomes

8.4.1 Transition Status

AlphaACT USMC (SLDT) is nearing transition. The system has been tested on its target system and is awaiting final usability tests for verification of readiness to move to implementation. The system has been designed to operate on a USMC Digital Virtual Training Environment (DVTE)

hardware/software platform for near-term transition. We plan to deliver it by the end of FY 2014.

8.4.2 Key Issues Encountered during the Project

- Getting Information Assurance issues solved in the short time period for development. This caused the target platform to move from MarineNET to DVTE in the short term
- Getting timely feedback from an end user group that has a very busy schedule
- Integrating developing scientific research into the system
- Gathering cases
- Creating scenarios without much access to SME's

8.4.3 Lessons Learned

- Recognizing that time was the largest constraint and adapting project objectives to fit those time constraints

8.4.4 Plans for Future Effort

- Accessibility via MarineNET
- Larger databases of cases and scenarios
- Adaptive scoring

8.5 Project Collateral

Collateral developed in support of AlphaACT USMC includes:

- *Squad Leader Decision Trainer: Usability Evaluation: TBS* (published in July 2014)
- SLDT overview handout, prepared for the February 2014 meeting of HPT&E

9 SUMMARY

The goal of this SBIR Phase II project was to develop a platform-based training solution that could revolutionize crisis decision-making. In the five and a half years spent on the project, AlphaTRAC has built:

- A core system (the platform)
- Three training applications based on the platform
- Three supplementary tools that simplify information gathering and support decision-making

Using an agile development process and involving end users along the way helped ensure that the systems are both technically relevant and user friendly.

9.1 Transition

Transition is perhaps the most important phase of product development. Successfully transitioning a product is the single best indicator that a product meets the needs it was designed to serve.

AlphaTRAC has successfully transitioned two training applications, with an additional application on schedule for near-term transition. All three supplementary tools have successfully transitioned:

- AlphaACT HAZMAT was launched in September 2012 and is available for purchase and use through the alphatrac.com website.
- 360Recall was successfully developed and is used by the USMC for gathering experiences for use in general training as well as for use in AlphaACT USMC (SLDT).
- XCapture ADT, built on the same platform as 360Recall, was successfully launched and transitioned to field use in Afghanistan. It was used by ADT teams to collect information about missions and to share lessons learned.
- The AI engine bridges the gap between the XCapture experience-gathering tools and the AlphaACT training applications. It has been successfully integrated into each of the AlphaACT training applications.
- AlphaACT FIRE was successfully launched in 2013 and is available to a user base of over 1,000 users. It is currently available for purchase through the alphatrac.com website and its user base is growing every day.
- AlphaACT USMC (SLDT) is on schedule to complete transition by the end of FY 2014.

AlphaTRAC has focused on applied research, ensuring that end users are engaged in product development and prepared to use the product when it transitions.

9.2 Lessons Learned

All R&D efforts encounter difficulties along their path to success. We took to heart the advice from one of our key clients: "a lesson learned but not applied is just a mistake" (BG Eric Peck, Kansas National Guard).

During the course of Phase II, we were able to apply lessons learned from previous projects in a constant process of continuous improvement.

9.2.1 Understanding User Constraints

One of the major lessons learned was the need to understand the hardware and software constraints of target end users. The goal was for the technology we developed to be easily accessible and system agnostic. The platform chosen to accomplish that goal was the Internet, which presented its own unique challenges, given the variety of applications and environments used by people to access the web.

We learned that it is important to focus on a single version of a single browser, the one most commonly used by end users. Afterwards, if requested, we can then expand the system function to other browsers.

9.2.2 Engaging Users

Another lesson learned was the importance of early and continuous engagement with end users—those personnel who will eventually use the product in the field.

A critical advantage of the agile development process used by AlphaTRAC is its assumption that a product will change based on feedback. Without feedback from actual end users, a product may fail to meet user needs.

Based on this learning, AlphaTRAC identifies representatives of its target user group and works to gain the group's commitment for engagement before work begins on a project. Getting buy-in from these groups up front is critical to the success of agile development.

9.2.3 Engaging Stakeholders

Clients are critical stakeholders in the product development cycle. Often, as the source of funding, they have expectations about the end product. But sometimes they may be unaware of end user needs or their expectations may be at odds with end user requirements. That's why it is critically important that clients understand the choices being made along the product development path. Keeping clients involved in the agile development process and raising cost vs. risk decisions will help ensure client satisfaction and a successful product.

9.2.4 The Limits of Subcontracting

Another lesson learned related to the use of subcontractors.

In the early stages of the project, AlphaTRAC used subcontractors to assist in areas where we lacked specific expertise. What we learned, however, is that without clearly defined objectives—typical during the early research phase of a project—subcontractor efforts may be less than optimal. We learned that it is important for us to develop a clear understanding of what we intend to subcontract to ensure we get the work we need.

9.2.5 System Launch

Launching a successful commercial product and launching a successful government product can be two very different endeavors.

Launching a government product often requires securing ongoing transitional funding from an operational agency that represents the target end users of a product. Arranging transitional and operational funding has a long lead time, and the effort of identifying appropriate agencies and working the details can be time-consuming. Beginning such efforts early enough to ensure that funding is available is critical to prevent a lapse in product support or development.

9.3 Conclusions

Applying these lessons learned helped ensure that, as our product offerings grew during Phase II, we did not repeat mistakes; instead, we set ourselves up for success.

AlphaTRAC's goal remains to revolutionize crisis decision-making. Having created a platform-based training and experience-gathering system, we hope to quickly apply it to many other crisis decision spaces, including law enforcement, disaster response, sustainability missions, transportation safety, and wildland fire response.

In addition to expanding our offerings, we will continue to listen to our current end users and improve our products in ways that are both scientifically sound and user friendly.

With the generous funding and support we have received from our federal partners, we have advanced well along the path of revolutionizing crisis decision-making. This SBIR Phase II project will act as the foundation for our continued efforts toward this goal.

10 ABBREVIATIONS AND ACRONYMS

AAR	After action review
ADT	Agribusiness Development Team
AI	Artificial intelligence
CERDEC	Communications-Electronics Research, Development, and Engineering Center
CLIN	Contract line item
DARPA	Defense Advanced Research Projects Agency
DARPA	Defense Advanced Research Projects Agency

DHS	Department of Homeland Security
DHS	Department of Homeland Security
DoD	Department of Defense
DOE	Department of Energy
DPSI	Domestic Preparedness Support Initiative
DVTE	Digital Virtual Training Environment
FEMA	Federal Emergency Management Agency
FY	Fiscal year
GIS	Global information system
GUI	Graphical user interface
HAZMAT	Hazardous material
HPT&E	Human Performance Training and Education
IAFC	International Association of Fire Chiefs
NGB	National Guard Bureau
NIMS	National Incident Management System
ONR	Office of Naval Research
ONR	Office of Naval Research
RPD	Recognition-primed decision
RRTO	Rapid Reaction Technology Office
RRTO	Rapid Reaction Technology Office
SACCADE	System to Aid Counterinsurgency Campaign Analysis, Design, and Evaluation
SBIR	Small Business Innovation Research
SLDT	Squad Leader Decision Trainer

SME	Subject matter expert
STEP	Supporting Technology Evaluation Program
TCIP	Technologies for Critical Incident Preparedness
TECOM	Training and Education Command
TRL	Technology Readiness Level
USMC	U.S. Marine Corps
VBS	Virtual Battle Space

APPENDIX A.   PROJECT COLLATERAL

The documentation prepared in support of this contract is appended to this document.

AlphaACT Platform

- "The AlphaACT Decision Support System for Emergency Responders"
- "An Information Paper on Crisis Decision-making Training Technology"

AlphaACT HAZMAT

- *AlphaACT HAZMAT User Guide*
- *AlphaACT HAZMAT Quick Reference*
- *AlphaACT HAZMAT Technical Description*
- *AlphaACT HAZMAT at Urban Shield 2010*
- *STEP Evaluation Report: AlphaACT HAZMAT version 2011.03.09.09.41*
- "New Training Program Strives to Capture and Recreate User Experiences"

360Recall

- *360Recall User Guide*

XCapture ADT

- *XCapture ADT User Guide*
- *XCapture ADT Mobile User Guide*
- *XCapture ADT Storyboard Report Quick Reference*
- *XCapture ADT: Final Project Report*

AI

- *AlphaACT Pattern Recognition Technology*

AlphaACT FIRE

- *AlphaACT FIRE User Guide*
- *AlphaACT FIRE Decision Space: A Research Report*
- *AlphaACT FIRE Application*

- "AlphaACT FIRE Simulation Training Program"

AlphaACT USMC (SLDT)

- *Squad Leader Decision Trainer: Usability Evaluation: TBS*
- SLDT overview handout describing system features

Approved for public release; distribution is unlimited.

The AlphaACT Decision Support System for Emergency Responders

An T. Oskarsson & C. Reed Hodgin

The AlphaACT Decision Support System for Emergency Responders

An T. Oskarsson & C. Reed Hodgin
AlphaTRAC, Inc.

We first present cognitive psychological theories relevant to crisis decision making. Next we describe the AlphaACT™ (Alpha Advanced Crisis Technology) decision support system, a software application designed to support a range of military and civilian emergency responders. The essential components of the system are as follows: (a) a user interface that walks the decision maker through a multi-step decision process inspired by the recognition-primed decision model and case-based reasoning theory; (b) a pattern recognition engine that prompts the user for diagnostic information and retrieves similar cases; and (c) a community-wide shared knowledge base of cases that grows as the system is used. AlphaACT's objective is to train and enable responders in crisis situations to think like experienced decision makers, and to quickly build their store of available experiences. The first AlphaACT application under development will support key decisions made by first responders managing a hazardous materials emergency.

BACKGROUND

Human error has been found to be responsible for 70% of aviation accidents (Sniezak, Wilkins, Wadington, & Baumann, 2002). During crisis and emergency situations, good decision making is critical because the primary goal is to prevent or mitigate extremely negative consequences. Events are often unexpected, life-threatening, and occur under conditions of great urgency, stress, instability, and uncertainty.

An approach to decision research that is well aligned with crisis decision-making is naturalistic decision-making (NDM) (Lipshitz, Klein, Orasanu, & Salas, 2001). NDM focuses on people who use their experience to make decisions in real-world contexts, and aims to examine how successful decision makers size up the decision problem and make reasonable decisions that are compatible with the situation. According to this view, experienced decision makers can skillfully use their experience and prior knowledge to assess a situation and appraise decision options — a process sometimes colloquially referred to as "intuition" — and quickly settle on a course of action (Klein, 2003). The NDM perspective emphasizes the importance of studying complex decision making under conditions of uncertainty, time pressure, and stress. Crisis decision making involves all of these factors, often to an extreme degree, and under rapidly changing conditions.

Recognition-primed Decisions (RPD)

The most cited and prototypical NDM model is the RPD model (Klein, 1993; 1998). It is considered by some to be the most appropriate framework for describing how proficient decision makers operate, especially under conditions of time pressure and uncertainty (Lipshitz, et al. 2001). According to RPD, often the goal of the decision maker is to rapidly find and select the first reasonable and workable solution. We choose here to focus on the variations of the RPD model that can involve less typical situations. In our view, RPD essentially propose the following major steps in the decision process:

- Characterize the decision problem and diagnose the situation
- Recognize in memory a similar situation

- Achieve a better understanding of the current situation through comparison with the recognized situation (considering cues, goals, expectations, & actions)
- Mentally simulate the indicated course of action to gauge whether it will succeed, making modifications if needed

Originally based on a cognitive task analysis of firefighters, replications with other groups (e.g., design engineers, offshore oil installation managers, commercial aviation pilots, British army officers) have found that RPD strategies were used by experienced decision makers in 80-95% of cases (Klein, 1993). Research on judgment heuristics lends indirect support for RPD. For example, recognizing cases based on similarity is consistent with the representativeness heuristic, a mental rule-of-thumb, whereby judgments depend on the degree of assumed similarity between cases (Kahneman & Tversky, 1973).

Beliefs in "the adaptive decision maker" and "fast & frugal heuristics" (Payne, Bettman, & Johnson, 1993; Todd & Gigerenzer, 2001) support the notion that suitable and efficient decisions can often be made based on the consideration of minimal information (e.g., Take-the-Best heuristic, recognition heuristic). In satisficing choice strategies, options are considered one at a time and searching stops when an option is considered to be "good enough." Along these lines, the mechanism underlying sequential sampling process models assumes that, rather than taking a predetermined quantity of information, sampling of each option occurs until evidence sufficient to favor one option over the other has accumulated (Busemeyer & Townsend, 1993). One can argue that the measure of "rational" decision making depends on the extent to which the decision works well in our environment, not whether it adheres to a set of formalisms.

Case-based Reasoning (CBR)

The theory of CBR resembles the basic process underlying the RPD model (Kolodner, 1993, 1997; Riesbeck & Schank, 1989). CBR focuses on the mind's ability to apply analogs to solve real-world problems. More often than not, solutions are not constructed from scratch; instead, previous experience brings to mind old problems that suggest possible solutions to new problems. "History repeats itself," and

solutions that worked in one situation are likely to be applicable in similar situations.

Support for CBR can be found in psychology and artificial intelligence literature (Kolodner, 1993; Noh, Lee, Kim, Lee, & Kim, 2000; see Bloomfield & Moulton, 2008, for an applied example). CBR can be found in the world around us (e.g., a doctor's diagnosis based on a prior patient case, a lawyer preparing arguments based on legal precedents, a mechanic fixing an engine by recalling a car with similar symptoms), and in everyday personal problem solving. CBR involves:

- Retrieval: Selection of a similar source case from memory
- Adaptation: Revision of the proposed solution, if needed
- Learning: Retention of the solution to form a new case; update experience

Successful CBR requires recognizing the applicability of an old situation to a new one. Knowledge and experience relate to the number and richness of cases in the decision maker's memory, and to the ability to encode into memory the case information that later will facilitate efficient retrieval of appropriate source cases. According to Ross (1986, 1989), the difference between novices and experts is that novices have fewer relevant experiences to draw upon and do not encode cases and details as well, making it difficult to retrieve appropriate source cases.

CBR retains the value of specific case details. Through induction processes, CBR methods can acquire knowledge with ease—making CBR especially useful when knowledge is incomplete and information is limited. This kind of structured analogical reasoning tends to be a good approach for rich, complex domains in which there are many qualitatively different ways to generalize a case. Critics of CBR argue that their theories rely too much on observational methods and anecdotal evidence. However, all inductive reasoning in circumstances involving scarce data is less amenable to statistical generalizations and regression methods. This is especially relevant to crisis decision making, since crises are by definition infrequent occurrences.

THE AlphaACT SYSTEM

One common objective for a decision support system is to help users analyze more and more information in order to come up with an optimal decision. The authors of this paper took this approach in the past, when we assisted U.S. Department of Energy (DOE) emergency responders in preparing for and dealing with hazardous material emergencies - and our efforts were met with resistance. We were told that decisions are typically made with limited or wrong information, and that often a "90% solution now is better than a 100% solution later". First responders were wary of succumbing to "paralysis by analysis", and becoming ineffectual when lives could be lost if one did not act fast.

It became apparent that the most effective decision makers were the ones who were consistently able to quickly generate successful solutions based on a few pieces of information, by drawing on their prior experiences with similar events. We observed that their cognitive processes and decision strategies

were compatible with the fundamentals of RPD and CBR theory. We therefore took an alternate approach to designing the AlphaACT™ system, and focused on helping decision makers use a sufficient amount of data to diagnose the situation and quickly arrive at a workable solution.

This led us to our primary objectives for AlphaACT. Firstly, we aim to support decision makers in following a decision process that is guided by the RPD framework. Secondly, the system helps decision makers efficiently use and look for information that is important for recognition of appropriate cases. Finally, the system builds and expands the decision makers' knowledge store of available cases. Accomplishing these objectives would result in a system that can train user to think like experienced decision makers. In the next sections we describe the essential components of AlphaACT: A pattern *recognition engine* that searches for the key unknown information and similar cases, an expansive and growing *knowledge base* of cases, and a user interface walking the user through our *decision process*.

Recognition Engine

Research in biological neural systems has led to attempts to simulate their functionality as cognitive architecture in computer software. Practical applications have resulted in artificial neural network systems with great computational capacity. Connectionist and neural networks can process information in parallel and in a nonlinear and distributed fashion, and they have a capacity to adapt with new data (Glockner & Betch, 2008; Newell & Broder, 2008).

AlphaACT uses a simple neural network, or "recognition engine", to quickly and efficiently search through large relational knowledge bases and recognize patterns in data. It is a multi-layer fully connected network that uses a sigmoid symmetric activation function and is trained using the Rprop training algorithm (described by Igel & Husken, 2000). With each new input submitted by the user, the recognition engine determines case matches from the knowledge base and the next piece of key data for situation diagnosis. This enables a question & answer interview interface, dynamically identifying the next question for which an answer is likely to lead to convergence onto matching cases in the knowledge base. Even if the user does not know the answers, the questions teach the user to focus on and gather the critical information.

Other potential advantages of the recognition engine include an ability to fill in missing data, abstract a prototypical case from partial data, and detect "poor" data that is inconsistent with the overall pattern of activation. Furthermore, it can periodically re-train and update its weights when new cases, cues, and decisions are entered into the database, so that the engine's algorithm improves with use.

Knowledge Base

A knowledge base of cases serves as the foundation of the AlphaACT system. The knowledge base is initially created using a streamlined version of the applied cognitive task analysis method (Militello & Hutton, 1998), whereby knowledge is elicited during structured interviews with subject

matter experts. Training materials are also a source of information.

In later stages of database development, the system employs an innovative approach to knowledge acquisition in which decision makers can add new cases, cues, and decisions into the knowledge base through a semi-automated process. As the system is used by a community of first responders for training and after-action reviews, competitive "gaming", and field response, the centralized knowledge base expands. This increases the amount of "experience" from which a user can draw. In addition, over time, the relative predictive validity of event information in determining decisions improves as the system's recognition engine "re-trains" on updated databases and takes into account the collective experience and input from a community of users. Description of these functions is beyond the scope of this paper; however, a shared and expansive knowledge base is vital to AlphaACT's utility.

Decision Process

The AlphaACT system is not a strict representation of the RPD model. Rather, it is *inspired* by RPD and CBR, and intended to facilitate the fundamental cognitive processes underlying these models. To this end we structured the decision process into the following steps: Characterize, Recognize, Analyze, Customize, Dramatize, and Utilize. We next describe the process in some detail and explain how each step is supported in the AlphaACT HAZMAT prototype.

AlphaACT FOR HAZMAT EMERGENCIES

Whenever a chemical is accidentally released into the environment, first responders need to decide within minutes whether to declare a state of emergency, the alert level, whether to evacuate and/or shelter people in place, the best safe route for evacuation, and the physical distance to which protective actions should be taken. The incident commander determines where to set up the command post and how to secure the area. For our first application, we chose to focus on these key decisions that occur during the initial stages of a hazmat emergency.

Step 1: Characterize. The decision maker receives initial event information and sizes up the situation. AlphaACT prompts the decision maker to provide known event information that is important for retrieving an appropriate case from the database. In AlphaACT HAZMAT, the user can use a scroll-down menu to input information about the context (e.g., weather, wind direction, terrain) and the "target" (e.g., physical state of the substance, number and type of containers). Users are able to click on links and scroll over terms to view pictures or textual explanations. See Figure 1 for an example screen.

Step 2: Recognize. The decision maker further assesses the situation, answering key questions that facilitate efficient recognition of possible matching cases. AlphaACT uses a question & answer interview interface to ask the user for observations and cues that are likely to diagnose the event. This is done in a "smart" order, as each question presented is based on what information has been entered thus far. The

recognition engine quickly weights and combines cues to retrieve cases and diagnostic questions in the database. Answers are processed and recognition is iteratively updated.
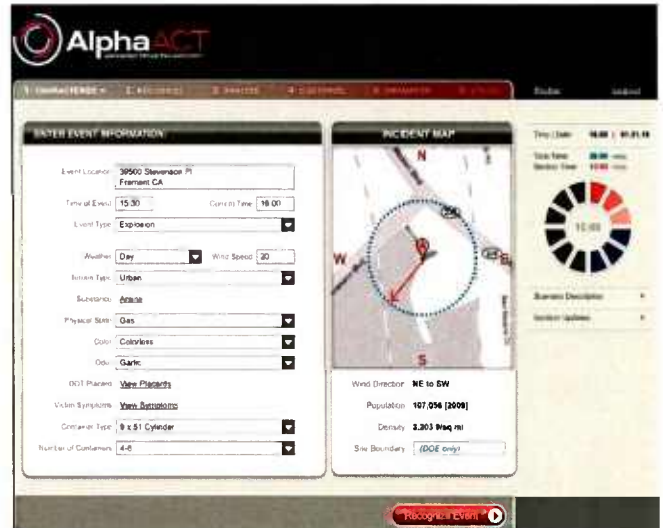
Figure 1. Example screen from the Characterize decision step.

Figure 2 depicts an example Recognize screen in AlphaACT HAZMAT. Here the system deems that the question "What is the estimated container size" is likely to help convergence towards matching cases. After an answer is submitted, the recognition engine selects a new question to ask (e.g., "Is anyone nearby experiencing nausea or vomiting?") The next probable questions can also be displayed, so that the user can plan to obtain the indicated information if they so choose. In Figure 2, multiple matching cases are presented so that the user – especially novices - can see the range of possible protective action distances and event classification. The user can continue to answer questions or select a case (or cases) for further analysis.

Step 3: Analyze. The decision maker examines the case(s) selected from the database in more detail. He or she can perform side-by-side comparisons between the selected case and the present emergency to determine if it is good enough to work from. The user takes into consideration differences in the particulars of the current situation, as well as their present needs and goals. For example, in the HAZMAT application, the user is able to read a description of the past case and access other supplementary information, such as a material safety data sheet that shows the recommended personal protective equipment, first aid information, and chemical incompatibilities. This information can serve to generate expectancies, goals, and actions.

Step 4: Customize. This step includes features that allow the user to "customize" the selected case when the case selected from the database differs from the present emergency. In AlphaACT HAZMAT, an analytical model can predict the resulting difference in the recommended decision. In other words, in this step users can run "what if" analyses to see how changes in information might affect their decisions.

Step 5: Dramatize. The decision maker plays out the decision mentally (or with the team) to assess the feasibility of

performing the decision actions. In this step, he or she uses checklists, visual displays, and other tools to conduct mental rehearsal of the recommended decision, evaluate its viability and appropriateness for the present circumstances, and make modifications if necessary. To illustrate, in Figure 3, users are able to "drag and drop" the command post and traffic control points onto a map, a list of high-value targets are highlighted on the map, and a protective action checklist is provided.
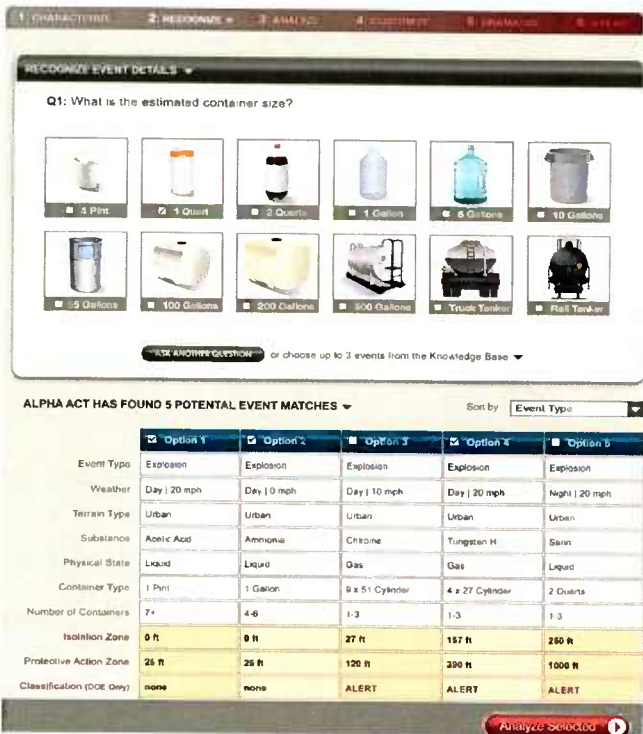

Figure 2. Example screen from the Recognize decision step.

Step 6: Utilize. The decision maker executes the course of action and the system assists in communication and implementation of the decision. Resources and features (such as the ability to share, print, and email maps, reports, and forms) are available. Afterwards, the new case and the cues that prompted recognition, as well as the actual decision and its outcome, are entered into the central database of cases.

AlphaACT HAZMAT will be able to operate in training as well as in response mode. The training version presents a scenario at the beginning of a session, and the scenario "unfolds" as the user moves through the decision process. New information is intermittently "injected" into the scenario in real time. Various types of performance feedback are also provided; Indicators of the user's decision success, skill level, and statistics (e.g., average decision time) are displayed. The scenario's critical information is explained, and the user's inputs and decision process are critiqued.

Feedback from Chemical Emergency Responders

We presented the AlphaACT concept and solicited feedback at workshops involving eight DOE sites in 2009. Participants included incident commanders, emergency directors, fire chiefs, security officers, and technical staff.

Several common themes emerged. Firstly, there was consensus that the AlphaACT decision process is an approach used by DOE emergency decision makers. Participants believed that AlphaACT could bring significant advances in the support of emergency responders, and that it should be extended beyond hazmat to include other materials, such as biological, radiological, nuclear, and explosive. Use of the tool to promote knowledge sharing across the DOE complex would be a substantial benefit, providing "experience compression" to the novices and "experience expansion" to the experts.

A pilot study was also conducted to gather evaluation data for a prototype of AlphaACT HAZMAT. Seven inexperienced (with no emergency response experience) and five experienced (with an average of 26 years experience) participants read a brief scenario about a hypothetical HAZMAT emergency. They imagined they were the Incident Commander and listed the information they would consider to help them size up the situation. After playing with AlphaACT for about 30 minutes, participants completed another size-up questionnaire with a different scenario. Lastly, they completed a satisfaction survey.
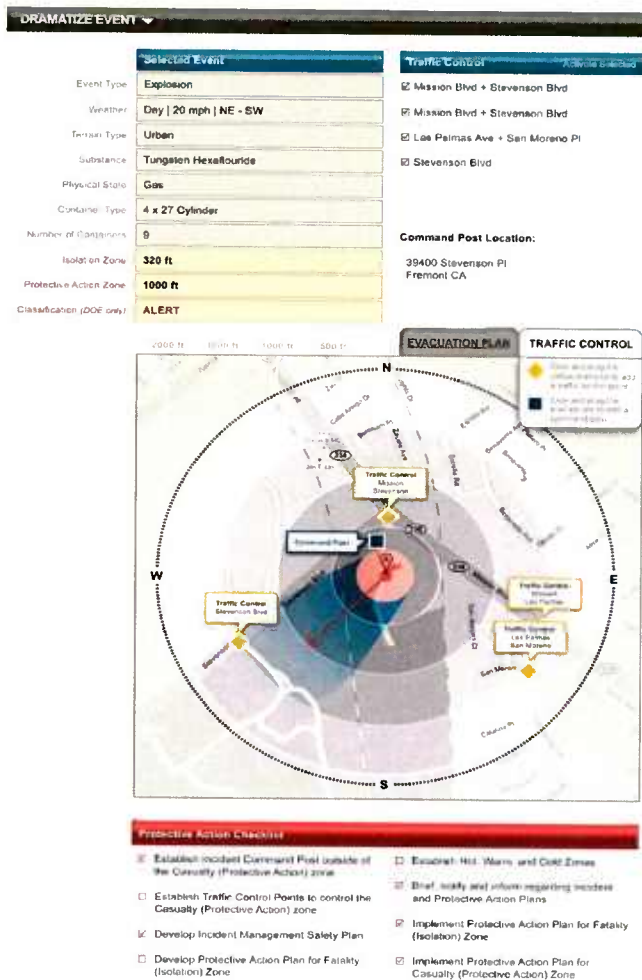
Figure 3. Example screen from the Dramatize decision step.

Survey results. Participants rated their overall satisfaction with AlphaACT, its decision process, and its Q&A interview. They also rated its ease of use, utility, their willingness to use

AlphaACT, and whether they believed it would help them make good decisions. The mean ratings were all favorable, ranging between 4.0 and 4.4 on a scale of 1 to 5, and all were significantly above the neutral point of 3 ($p < .05$). Likely due to the small sample, the only difference found between the inexperienced and experienced was that the inexperienced participants reported being more willing to use AlphaACT ($M = 4.8$ vs. 4.0, respectively, $p < .05$).

Questionnaire results. To test whether participants learned to consider information critical for sizing up a HAZMAT emergency situation, we analyzed whether participants listed more key items of information *after* they played with AlphaACT HAZMAT, compared to *before* they played with it. On average, 8.1 pieces of critical information were listed *after* playing with AlphaACT HAZMAT, while 5.1 items were listed *before* playing with the system. This difference was statistically significant ($M = 3.0, p < .05$). No experience effects or scenario order effects were found.

SUMMARY & DISCUSSION

A number of psychological theories support the core principles of the AlphaACT system. This case-based system is designed to emulate how successful decision makers think in crisis situations, and trains users to follow a decision process inspired by CBR theory and the RPD model.

A theoretical issue to consider is whether the RPD model should be treated as a prescriptive model. Although it may accurately describe how experts operate when making emergency decisions, some may argue that a decision aid should still aim to support normative and rational decision making. There can be skepticism about a system that relies on experts' cognitive processes, because of work by (for example) Meehl (1954) and Swets, Dawes, and Monahan (2000), which convincingly explain how actuarial judgments rendered by statistical models tend to outperform clinical judgment of experts. These issues highlight concerns that some have with the NDM approach (Bazerman, 2001).

However, AlphaACT applies optimizing principles to produce decision options, utilizing statistical algorithms to process information and recognize patterns in the data. To some extent the system "mechanizes" situation assessment and recognition in a way that mitigates possible biases and problems with expert validity. Although the user experiences a subjective feeling of satisficing, the system's recognition engine maximizes the search and retrieval of matching cases and question prompts, based on the user's input.

A pilot study in which people evaluated the AlphaACT HAZMAT prototype yielded promising results. The preliminary findings showed that the system was favorably evaluated by users and suggested that familiarity with AlphaACT HAZMAT could lead to rapid learning. Further studies examining the system's effectiveness are warranted.

AlphaACT's utility will be further tested when it is applied to other domains. Prototypes serving a spectrum of emergency responder communities are under development. For example, a combat patrol application trains the detection of improvised explosive devices and supports response to a complex attack. Our hope is that AlphaACT will lead to better decision outcomes in emergency situations, and to significant advances in crisis decision making.

REFERENCES

Bazerman, M. (2001). The study of 'real' decision making. Journal of Behavioral Decision Making, 14, 353-384.

Bloomfield, L.P., & Moulton, A. (2008). MIT Cascon System for Analyzing International Conflict, accessed from http://web.mit.edu/cascon/ on April 16, 2008.

Busemeyer, J.R. & Townsend, J.T. (1993). Decision field theory: A dynamic-cognitive approach to decision making in an uncertain environment. Psychological Review, 100(3), 432-459.

Glockner, A., & Betsch, T. (2008). Modeling option & strategy choices with connectionist networks: Towards an integrative model of automatic & deliberate decision making. Judgment & Decision Making, 3(3), 215-228.

Igel, C., & Husken, M. (2000). Improving the Rprop learning algorithm. Proceedings of the Second International ICSC Symposium on Neural Computation (eds. H. Bothe and R. Rojas), 115-121, ICSC Academic Press.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. Psychological Review, 80, 237-251.

Klein, G.A. (1993). A recognition-primed decision model of rapid decision making. In G.A. Klein, J. Orasanu, R. Calderwood, & C.E. Zsambok (Eds) Decision Making in Action: Models & Methods. Ablex Publishing, Norwood, CT.

Klein, G.A. (1998). Sources of Power: How People Make Decisions. MIT Press, Cambridge, Massachusetts.

Klein, G.A. (2003). Intuition at Work: Why Developing Your Gut Instincts Will Make You Better at What You Do. Doubleday Business, New York, NY.

Kolodner, J. (1993). Case-based Reasoning. Morgan Kaufmann Publishers, San Mateo, CA.

Kolodner, J. (1997). Educational implications of analogy. American Psychologist, 52(1), 57-66.

Lipshitz, R., Klein, G.A., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making, Journal of Behavioral Decision Making, 14, 331-352.

Meehl, P.E. (1954). Clinical versus statistical prediction: A theoretical analysis and a review of the evidence. Minneapolis, MN: University of Minnesota Press.

Militello, L.G., & Hutton, R.J.B. (1998). Applied cognitive analysis (ACTA): A practitioner's toolkit for understanding cognitive task demands. Ergonomics, Special Issue, 41(11) 1618-1641.

Noh, J.B., Lee, K.C., Kim, J. K., Lee, J.K., & Kim, S.H. (2000). A case-based reasoning approach to cognitive map-driven tacit knowledge management. Expert Systems with Applications, 19, 249-259.

Newell, B., & Broder, A. (2008) Cognitive processes, models & metaphors in decision research. Judgment & Decision Making, 3(3), 195-204.

Payne, J., Bettman, J., & Johnson, E. (1993). The Adaptive Decision Maker. Cambridge University Press, New York, NY.

Riesbeck, C., & Schank, R. (1989). Inside Case-based Reasoning. Lawrence Erlbaum Associates, Northvale, NJ.

Ross, B. (1986). Remindings in learning: Objects & tools. In S. Vosniadou & A. Ortony (Eds.), Similarity, Analogy, & Thought. Cambridge University Press, New York, NY.

Ross, B. (1989). Some psychology results on case-based reasoning. In K.J. Hammond (Ed.), Proceedings: Second Workshop on Case-based Reasoning (DARPA), Morgan Kaufmann Publishers, San Mateo, CA.

Swets, J.A., Dawes, R.M., and Monahan, J. (2000). Better decisions through science, Scientific American, 283, 4, 70-75.

Sniczak, J., Wilkins, D.C., Wadington, P.L., & Baumann, M.R. (2002). Training for crisis decision making: Psychological issues and computer-based solutions. Journal of Management Information Systems, 18(4), 147-168.

Todd, P., & Gigerenzer, G. (2001). Putting naturalistic decision making into the adaptive toolbox. Journal of Behavioral Decision Making, 14, 353-384.

An Information Paper on
Crisis Decision-Making Training Technology

Published by the Technology Council
of the
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August 1, 2012

Overview/Problem Identification

Gaining control of a crisis is difficult. Lives and property hang in the balance. With limits on time, severe consequences of failure and a host of other difficulties, the experience of a firefighter becomes crucial. Effective decision-making, perhaps more than any other skill, is critical to successful incident command.

Successful decision-making is often based on a person's ability to remember similar experiences and decisions and apply or adapt this information to the current situation. It should come as no surprise that experience is often the key to defusing potentially catastrophic situations.

But the fire and emergency service community is facing a looming experience gap. Veteran firefighters are being lost to retirement at an increasing pace, and there is often a significant gap in expertise between novice and veteran firefighters. The experiences and tactics of firefighters can also change significantly from one locale to another.

A new training technology has been developed which will help firefighters build their decision-making skills by preserving the experiences of veterans and helping to transfer them more effectively to a new generation.

Technology Background

Current approaches to improving decision-making capabilities focus on solutions that present more information in new and innovative ways. Incident management applications are abundant in the first responder market, and many are helpful in making sense of the often chaotic flow of information that firefighters face when responding to an emergency. However, despite improvements in technology, decision-making in a crisis has not improved to the same levels. Why?

One explanation may be that some incident commanders are focused only on one aspect of the incident, whereas many elements must be addressed simultaneously.

Decisions made during crises share a common set of characteristics:

- Time urgency
- Complex event or decision characteristics
- Rapidly changing event or decision conditions
- The surrounding environment is chaotic
- High physical and emotional stress
- Severe consequences for decision failure
- Poor data availability and quality
- Competing demands for decision-maker attention
- Frequent interruptions during the decision-making process

By itself, more information, displayed better, does not necessarily improve decision making. A new approach may be in order.

Decision research in the last ten years has identified the naturalistic decision model as the one most often used successfully by crisis decision makers. The naturalistic model focuses on the recognition of changes in a situation to initiate decision making. This process is used approximately 75 percent of the time by highly experienced decision makers and is recognized throughout the fire and emergency service community as a consistently effective approach.

Derived from extensive field studies of military and emergency response decision makers, the Recognition-primed Decision (RPD) model implements a formalized adaptation of the naturalistic model.

The RPD model "describes how decision makers can recognize a plausible course of action as the first one to consider" (Klein 2004, 6). It factors in an incident commander's prior knowledge, training, and expertise into a mental assessment of appropriate actions to take. This approach can simplify potentially complex decisions, in contrast to evaluating various options against an acceptable baseline. The RPD model seeks to "codify the informal and intuitive planning strategies the skilled Army and USMC teams used" (Klein, 2004, 6). One can see the relevance of the RPD model to solving the problems faced by the fire and emergency service.

Technology Overview

The Recognition-primed Decision model has been adapted into a new approach to decision training and built as a platform technology that can be applied to multiple applications and fields of use.

The AlphaACT® platform uses a modified version of Klein's RPD model, characterized by six steps in which the decision maker:

- Sizes up the situation using available information
- Searches a knowledge base for the first past event that adequately matches current conditions
- Evaluates the past event to see if it fits the situation at hand
- Tailors the past event to reflect the current event
- Mentally rehearses the decision to verify it is likely to work
- Puts the decision into play

The AlphaACT platform uses the latest in artificial intelligence (AI) to simulate the RPD process, quickly recognizing patterns and cues in event characteristics from experiences gathered from first responders.

Since experiences are key to the training platform's success, additional technology is being developed that facilitates the capture of after action reviews (AARs), lessons learned, and firefighter stories. This scenario authoring tool allows the sharing of information within the firefighter community and feeds the database of first responder events used in training.

The first application of the AlphaACT platform was in AlphaACT HAZMAT, a National Incident Management System (NIMS)-compliant product for hazardous materials events that let users practice decision-making in real time.

Step:	Where the decision maker:
1. Characterize	Sizes up the situation
2. Recognize	Finds similar events in the knowledge base
3. Analyze	Evaluates the events to see if they fit current conditions
4. Customize	Tailors the selected event to current conditions
5. Dramatize	Mentally rehearses the decision
6. Utilize	Puts the decision into play
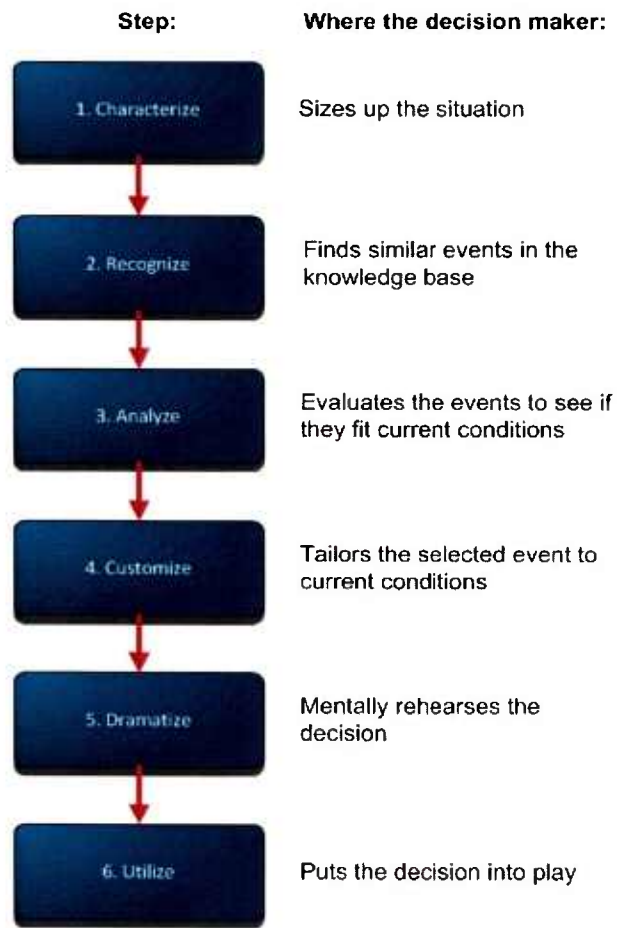
Figure 1   The AlphaACT decision process

AlphaACT HAZMAT presents users with a scenario that includes the often incomplete and contradictory information that would be encountered during an actual incident. Then it lets users decide how to proceed while the clock is ticking and tells them afterwards how well they did. The following figure shows the Characterize page of AlphaACT HAZMAT.
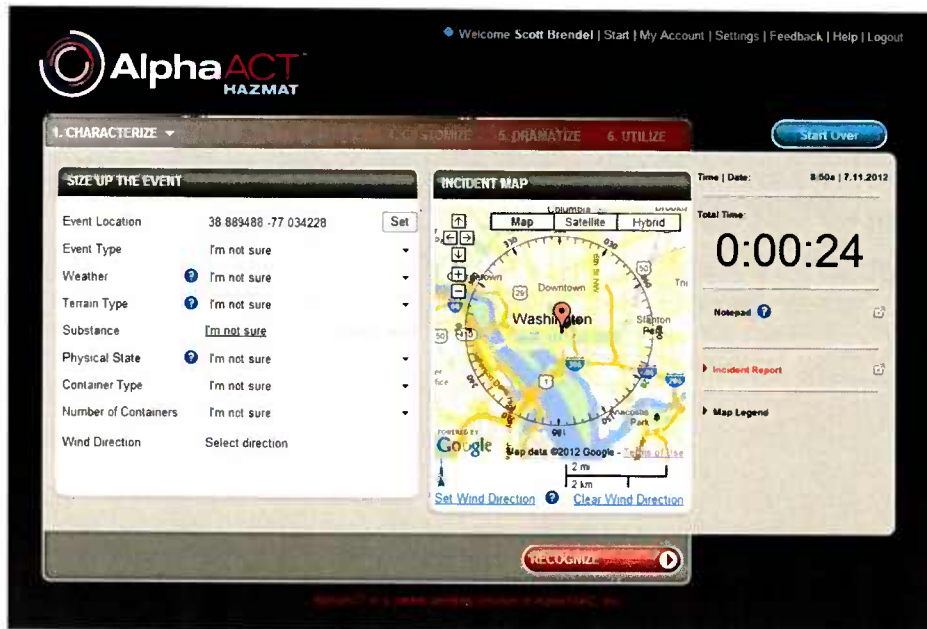
Figure 2   The Characterize page

The AlphaACT platform can be adapted for a range of decision-making applications, including training tailored to the fireground. Such a training solution would operate as a hosted, web-based application that can be used for self-paced, online training and in instructor-led, classroom training. The application would also foster the exchange of ideas and lessons learned through virtual communities of interest based on social networking technology.

Technology Council Advisory Group Efforts

The IAFC Technology Council put together an Advisory Group (TCAG) to be an advocate for the needs of the first responder community with regard to crisis decision-making technology. As part of this mission, they became knowledgeable in the technology behind the AlphaACT platform, tested its operation through the on-line system, and provided feedback on features and designs of the technology.

The Technology Council feels that applying a unique approach to Klein's RPD process in the design of new training technology will benefit the first responder decision maker. By drawing upon lessons learned and previous experiences from past incidents and the knowledge from veteran responders, an effective training platform can be built.

Many contemporary approaches to decision-making training focus on dealing with the vast amount of information present at an emergency incident. Although important in determining one's actions, the decision process needs to be balanced with experiences from similar events.

The AlphaACT technology with its artificial intelligence component provides the path to bring into the training platform past incidents and the decisions that were made (with accompanying lessons learned and smart practices) in its mitigation.

AlphaACT HAZMAT, a hazardous materials incident-based training scenario, was used during this review. The training platform can be adapted to various topics and simulations. An AlphaACT FIRE system is presently being developed for fire suppression training. The CTAG will also be involved in its evolution.

About the IAFC Technology Council

The IAFC Technology Council was established in 2008 as a council to provide a component within the IAFC to concentrate on emerging and existing technology and issues relating to the use of technology in the fire and emergency services fields to assist firefighters and chief officers and emergency managers in their endeavor to be a cutting edge organization. The IAFC has always considered technology an important area of concern for the emergency services. The establishment of this council is a reflection of the importance that the IAFC attaches to emerging technology to protect our most valuable resource – our personnel and to assist in delivery of services to our citizens.

Disclaimer

The IAFC Technology Council does not endorse nor recommend any commercial products or services. The views and opinions of this paper are for informational purposes only.

Bibliography

- "AlphaACT HAZMAT." *www.alphatrac.com*. AlphaTRAC, Inc. Web. 5 June 2012.
- McDermott, James. "Turn Around Leadership." Editorial. *Fire Engineering* June 2012: 12-15. Print.
- Ross, Karol G., Gary A. Klein, Peter Thunholm, John F. Schmitt, and Holly C. Baxter. "The Recognition-Primed Decision Model." *Military Review* (2004): 6-10. July-Aug. 2004. Web.

AlphaACT HAZMAT

User Guide

April 2013

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success. We specialize in crisis decision-making solutions for hazardous materials incidents.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

Contents

Figures

1 INTRODUCTION

AlphaACT® HAZMAT is a web-based, crisis decision training solution designed to help first responders learn how to deal with hazardous material (HAZMAT) events. An application integrated into a web portal, it uses training scenarios to help you improve your decision-making skills, even when event information is sketchy or incomplete.

With AlphaACT HAZMAT, you learn by doing. The system presents you with the often murky, changeable facts of an event scenario and helps you decide what to do. It helps accelerate and broaden learning by exposing you to scenarios that you may not have otherwise faced.

With AlphaACT HAZMAT, you can:

> Take self-paced training
> Test yourself against the clock
> Tailor the system to your preferences and track your learning progress
> Compare your results with those of others using the Community scoreboard
> Join discussions of emergency management issues through the Community forums

This guide is for emergency management and response professionals who wish to learn how to use AlphaACT HAZMAT.

2 HOW AlphaACT HAZMAT WORKS

AlphaACT HAZMAT lets you practice crisis decision-making using scenarios that present the kind of information you'd encounter during an actual incident. It helps you use the observable characteristics of a hazardous chemical release to identify similar events from a knowledge base and then use that information to determine the appropriate protective actions to take.

This structured approach to emergency response decision-making is based on a six-step process shown in the following figure.

Where you:

Step	Description
1. Characterize	Size up the situation
2. Recognize	Find similar events in the knowledge base
3. Analyze	Evaluate the events to see if they fit current conditions
4. Customize	Tailor the selected event to current conditions
5. Dramatize	Mentally rehearse the decision
6. Utilize	Put the decision into play
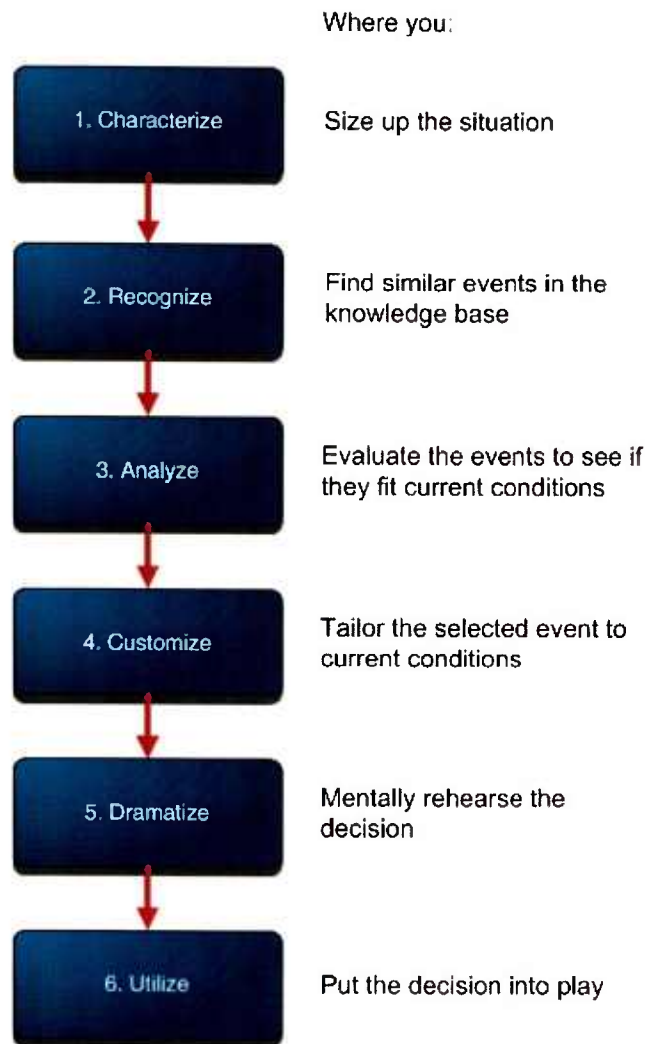
Figure 1   The AlphaACT HAZMAT decision process

As you'll see, the AlphaACT HAZMAT interface is designed around this structured approach.

Using realistic though fictional incident scenarios, AlphaACT HAZMAT simulates the flow of information as you'd experience it during a response to an actual event. Some of the scenarios include audio and visual cues—things like verbal witness reports and images of the event scene—to heighten the sense of realism.

After you select a training scenario to play, the system presents an initial dispatch message.

Run a Training Session

Incident
Rich Media: Punctured Drum of Ammonia in Nampa, Idaho

Location
3806 South Powerline Road, Nampa, ID 83686

Time of Occurrence
1:00 PM

Initial Dispatch
Report of an ammonia spill at 3806 South Powerline Road in Nampa. Please respond

[Back]   [Start Scenario]

Figure 2   The initial dispatch message

After starting the scenario, you receive further information about the event as you are hypothetically en route to the scene.
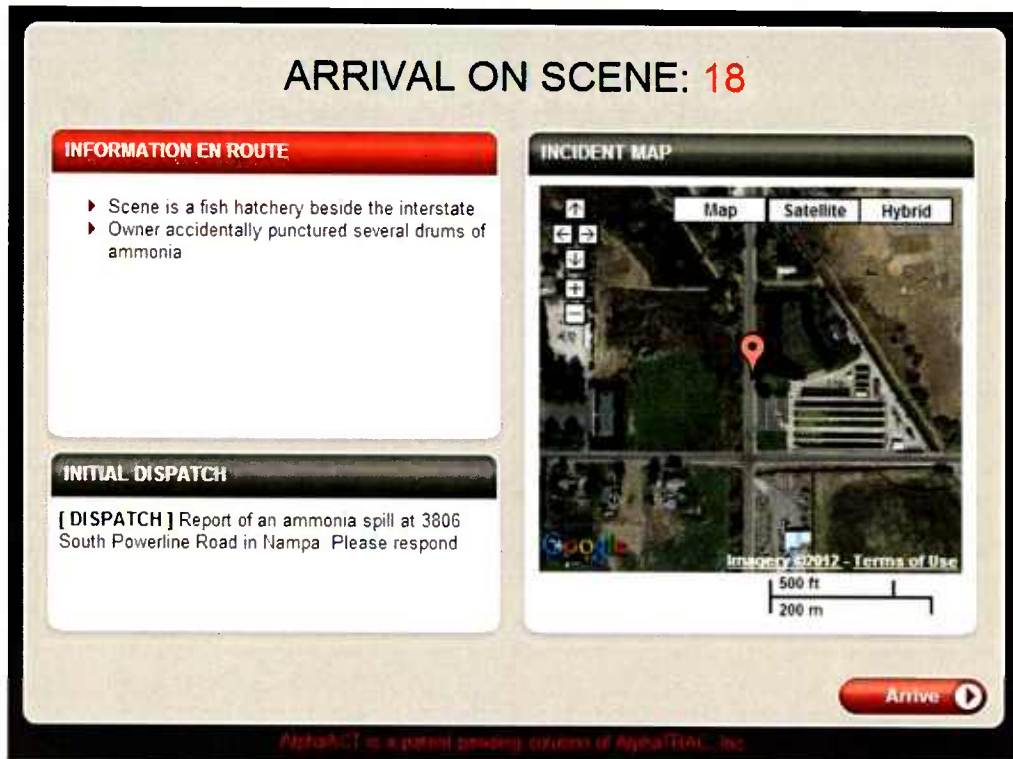
Figure 3   Information received en route

When you "arrive at the scene" (and the Characterize page), you get more details in the form of an incident report, which presents the kind of information you would determine about the event as you size up conditions and talk with witnesses and victims.

2.1   Characterize

On the Characterize page, AlphaACT HAZMAT presents an incident report describing the event, displays a map showing the incident location, and starts a timer to track how long it takes you to complete the scenario.
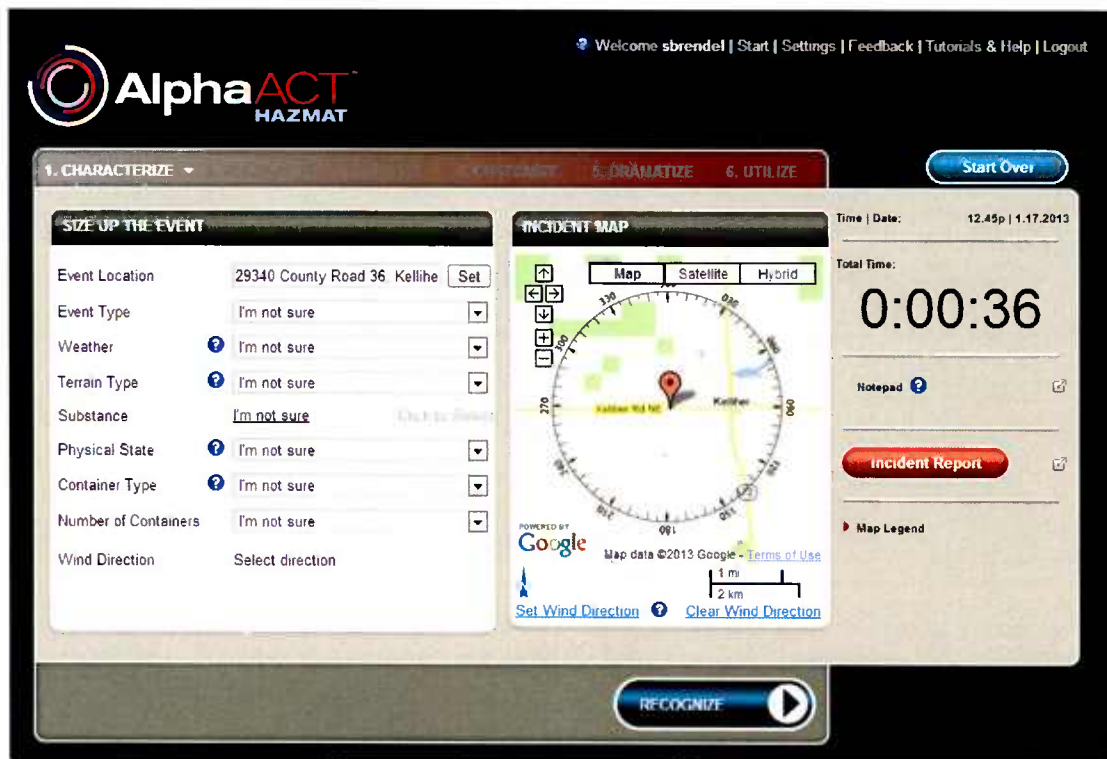
Figure 4   The Characterize page

The system prompts you to provide the initial information known about the event (which, for training purposes, is contained in the incident report). This may include:

- The event type
- The weather conditions
- The terrain type
- The substance that was released
- The physical state of the substance
- The number and type of containers involved
- The wind direction

The incident report (which includes the initial dispatch message and the information you received en route) may or may not include all the information you need to assess the situation, forcing you to deal with the same kind of ambiguity you might encounter during real crisis events.
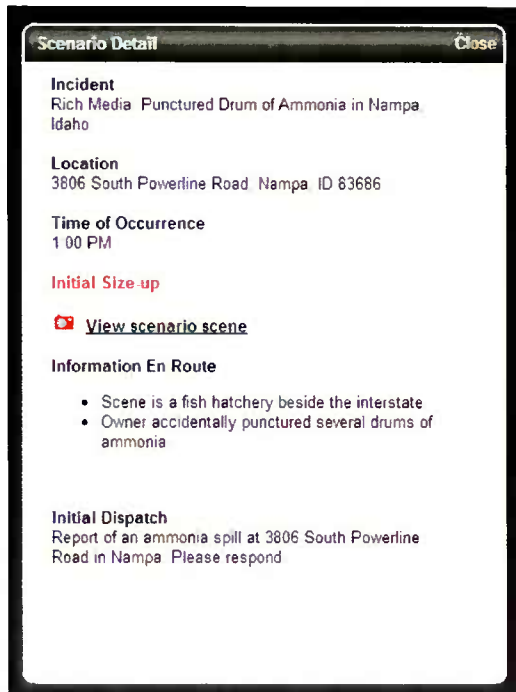
Figure 5   The incident report

Some scenarios—called rich media scenarios—include a link that lets you view an image of the event scene and listen to the comments of witnesses and victims, as shown in the following figure.

Figure 6   A scenario with rich media elements

Working from the incident report, you enter the information you know about the event on the Characterize page. You can also use the Notepad to take notes about your choices and decisions. Once done, you click Recognize.

2.2   Recognize

AlphaACT HAZMAT searches its knowledge base for events with characteristics that are similar to the conditions you entered, then computes the likelihood of the events matching current conditions and presents the top five events along the bottom part of the page.
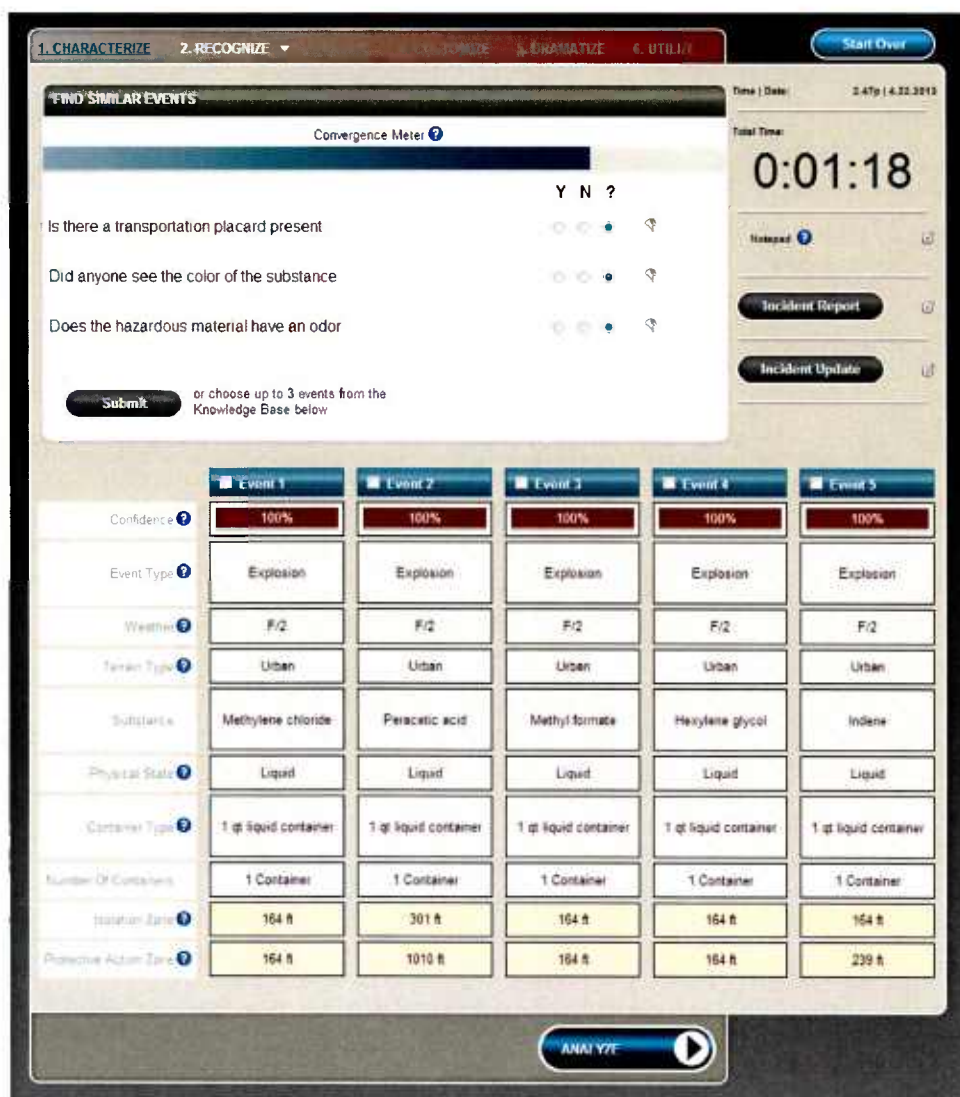
Figure 7   The Recognize page

Along the top of the Recognize page, AlphaACT HAZMAT asks questions that probe for additional information that can be used to narrow the search for similar scenarios and improve the system's confidence in the events it presents.

Clicking on the camera icon that appears beside some of the questions will reveal images to help clarify the options. These images are examples; they are *not* related to the scenario being worked.

While you work the scenario, incident updates—information about changing event conditions that you need to take into account—may appear, just as they would during a real event. For scenarios that include audio and visual elements, you can scan the event scene image using a magnifying viewer and listen to witness or victim accounts of what happened.
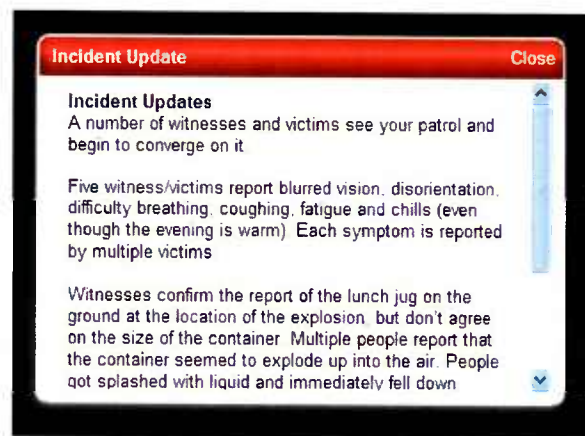
Figure 8   An incident update

As you continue to answer questions:

➤ The convergence meter at the top of the page shows how close you are to identifying a good enough event with a useful Protective Action Zone and Isolation Zone

Figure 9   The convergence meter

➤ The confidence meters above each of the events shown on the bottom half of the page show how sure AlphaACT HAZMAT is that the given event matches your inputs
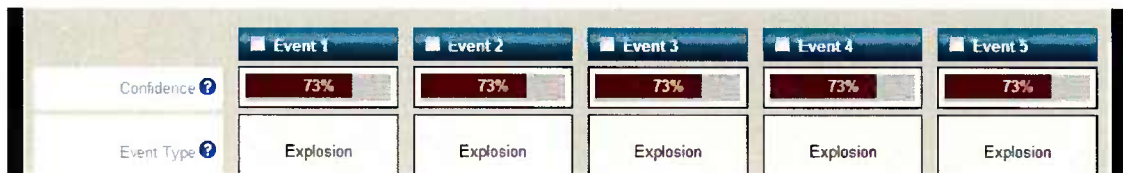
Figure 10   The confidence meters

The automated interview—of questions posed by the system and the answers you provide—will continue until you select one, two, or three of the scenarios that best match the limited information that is known and click Analyze.

2.3   Analyze

On the Analyze page, you examine the events you selected on the Recognize page to determine how closely they match the conditions of the scenario you're working on.

Figure 11   The Analyze page

As the preceding figure shows, AlphaACT HAZMAT presents maps of the event scene that show:

➤ The Isolation Zone—the area closest to the release where fatalities are likely
➤ The Protective Action Zone—the area immediately outside the Isolation Zone where serious and irreversible health effects to people are likely

The system also provides links to data sheets that contain information about a substance's characteristics, incompatibilities, potential hazards, the symptoms it produces in victims, and recommendations regarding personal protective equipment, first aid, and firefighting measures.

Figure 12   An emergency hazard information sheet

Once you've selected the event to use as the basis of your decision, you click Customize.

2.4   Customize

In Customize, you can adapt the scenario you selected to more closely reflect known conditions by modifying its characteristics.
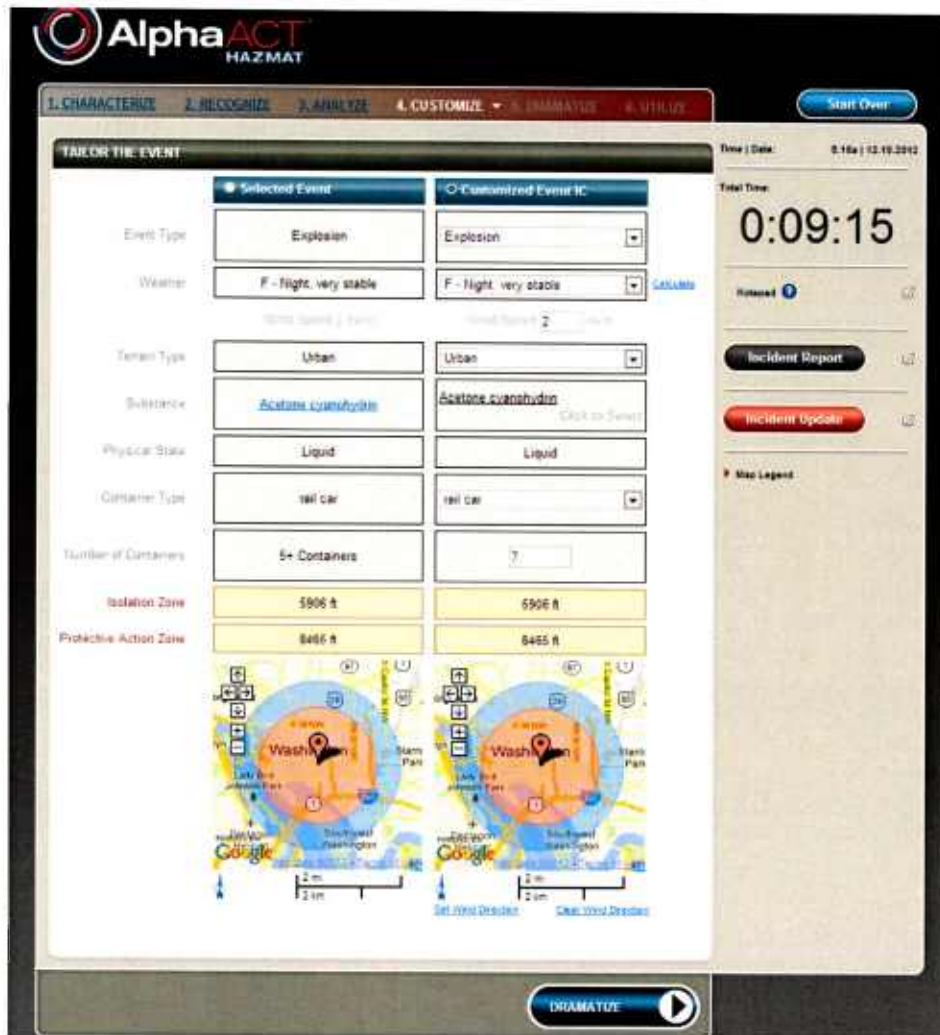
Figure 13   The Customize page

The Customize page shows the event you selected alongside a panel where you can modify its characteristics. Among the differences shown—crucial to your decision—are the maps showing the Isolation Zone and Protective Action Zone. As you make changes to event characteristics, the system automatically updates the results on the incident map.

Incident updates may still appear, and the Customize page allows you to adjust for them. Once you've tailored the event to current conditions, you click Dramatize.

2.5   Dramatize

Using the Dramatize page, you can rehearse the actions you intend to take.
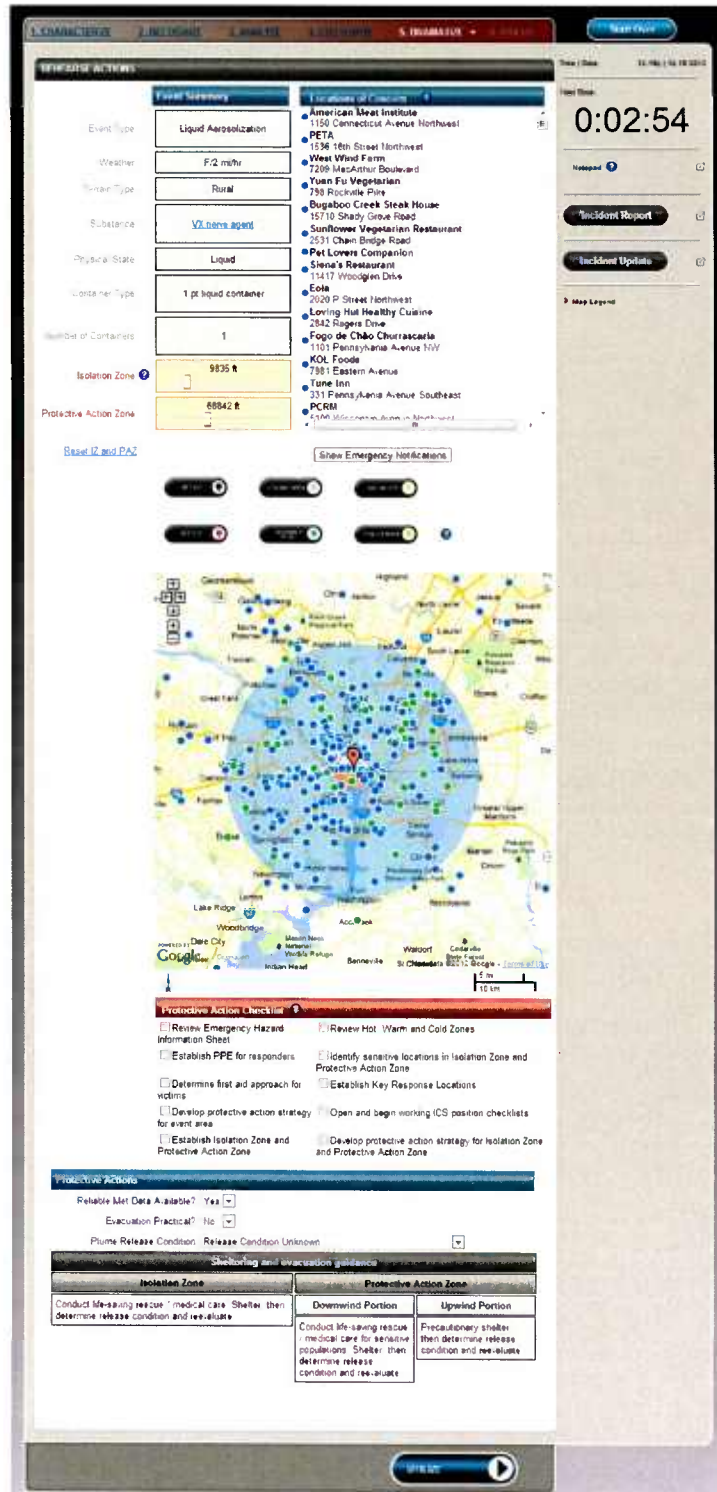
Figure 14   The Dramatize page

The Dramatize page shows the event summary information.

Event Summary	
Event Type	Explosion
Weather	F/2 mi/hr
Terrain Type	Rural
Substance	Octafluoro-sec-butene
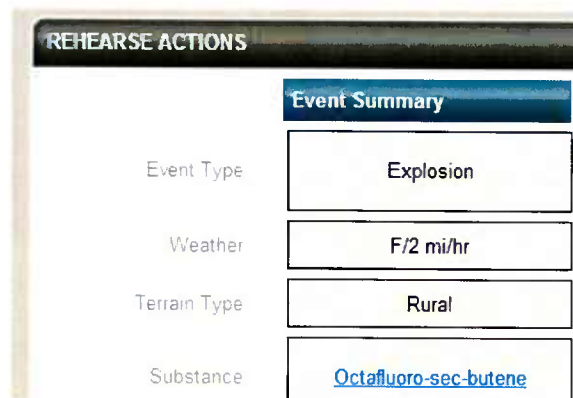
Figure 15   The event summary on the Dramatize page

The incident map shows the Isolation Zone and the Protective Action Zone. If you set the wind direction, the incident map shows the Hot Zone and the Warm Zone under a separate tab. The page includes slider controls that let you manually adjust the size of the zones.

Isolation Zone ❓	3107 ft
Protective Action Zone	8301 ft
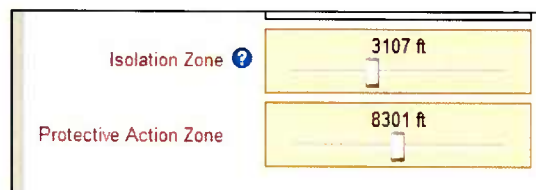
Figure 16   Slider bars used for zone adjustment

The system also identifies nearby locations of concern that merit special consideration during evacuation planning. This includes:

➤ Sensitive or restricted population facilities (such as nursing homes, schools, or jails)
➤ Critical infrastructure facilities (such as public health centers, banks, or government facilities)
➤ Emergency response facilities (such as fire stations, police stations, or hospitals)

You can adjust the settings for which locations of concern are displayed from the Settings page.

The Dramatize page also lists several protective actions to consider in the form of a checklist.

Protective Action Checklist ❓

☐ Review Emergency Hazard Information Sheet

☐ Establish PPE for responders

☐ Determine first aid approach for victims

☐ Develop protective action strategy for event area

☐ Establish Isolation Zone and Protective Action Zone

☐ Review Hot, Warm and Cold Zones

☐ Identify sensitive locations in Isolation Zone and Protective Action Zone

☐ Establish Key Response Locations

☐ Open and begin working ICS position checklists

☐ Develop protective action strategy for Isolation Zone and Protective Action Zone

Figure 17   The protective action checklist on the Dramatize page

On the Dramatize page, you decide where to establish key response locations, including:

➤ The Incident Command Post
➤ Traffic control points
➤ Staging areas
➤ Assembly points
➤ Decontamination sites
➤ Evacuation centers

Reset IZ and PAZ
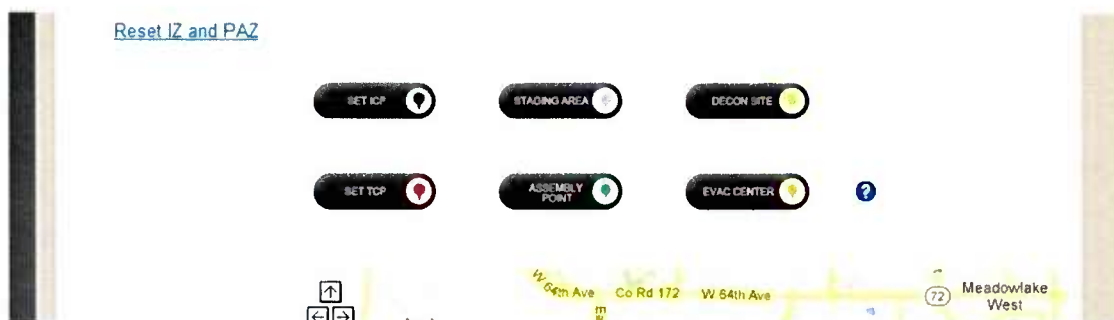
Figure 18   Buttons for setting key response locations on the Dramatize page

From the Dramatize page, you can specify the recipients of emergency notifications.

Show Emergency Notifications
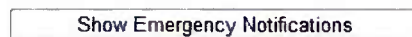
Figure 19   Accessing the emergency notifications panel

The emergency notifications panel lets you identify the organizations you plan to notify of the event and the message you intend to send.

Figure 20   The emergency notifications panel

Once you've completed the Dramatize page, you click Utilize.

2.6   Utilize

Once the key decisions have been made, the Utilize page of AlphaACT HAZMAT:

- ➤ Summarizes the event conditions you selected
- ➤ Lists your selections for response locations
- ➤ Provides access to checklists you can use to put your plan into action
- ➤ Compiles your notes from the Notepad
- ➤ Lists the emergency notifications you intend to make
- ➤ Summarizes your protective action decisions for sheltering and evacuation

Figure 21   The Utilize page

Having completed the training scenario, you can review how well you did by clicking on Session Feedback. You can rate and provide feedback on the scenario you just completed, information which will appear in the Community forum for that scenario.

3 GETTING STARTED

3.1 What You Need

AlphaACT HAZMAT operates from computers and laptops that can run:

- Internet Explorer version 8
- Google Chrome

AlphaACT HAZMAT use is based on subscriptions and requires an account.

3.2 Requesting an Account

To request an account, go to www.alphaact.com/registration and follow the instructions there to sign up. Once your account has been activated, you can log in.

3.3 Logging In and Out

Before logging in, you must have an active account.

To log in:

1. Go to www.alphaact.com.

2. Click Login.

   The Login link is on the upper right corner of the page.

Figure 22   The Login link

The system presents the Login page.

Figure 23   The Login page

3. Enter your user name and password.

4. Press Enter or click Login.

To log out:

1. Click Logout.

   The Logout link is on the upper right corner of the page.

Figure 24   The Logout link

3.4 Getting Help

AlphaACT HAZMAT comes with a Help page that can be accessed from any other page of the system. The Help page includes:

➤ Product documentation
➤ Video tutorials on system use

You must be logged in to access the Help page.

To get help information:

1. Click Tutorials & Help.

  ▪ On the web portal pages, help is accessed from a tab along the top of the page.

Figure 25   Getting help from the web portal pages

  ▪ On the training mode pages, help is accessed from one of the links along the upper right corner of the page.

Figure 26   Getting help from the training mode pages

The system shows the Help page, which gives you access to different types of information.
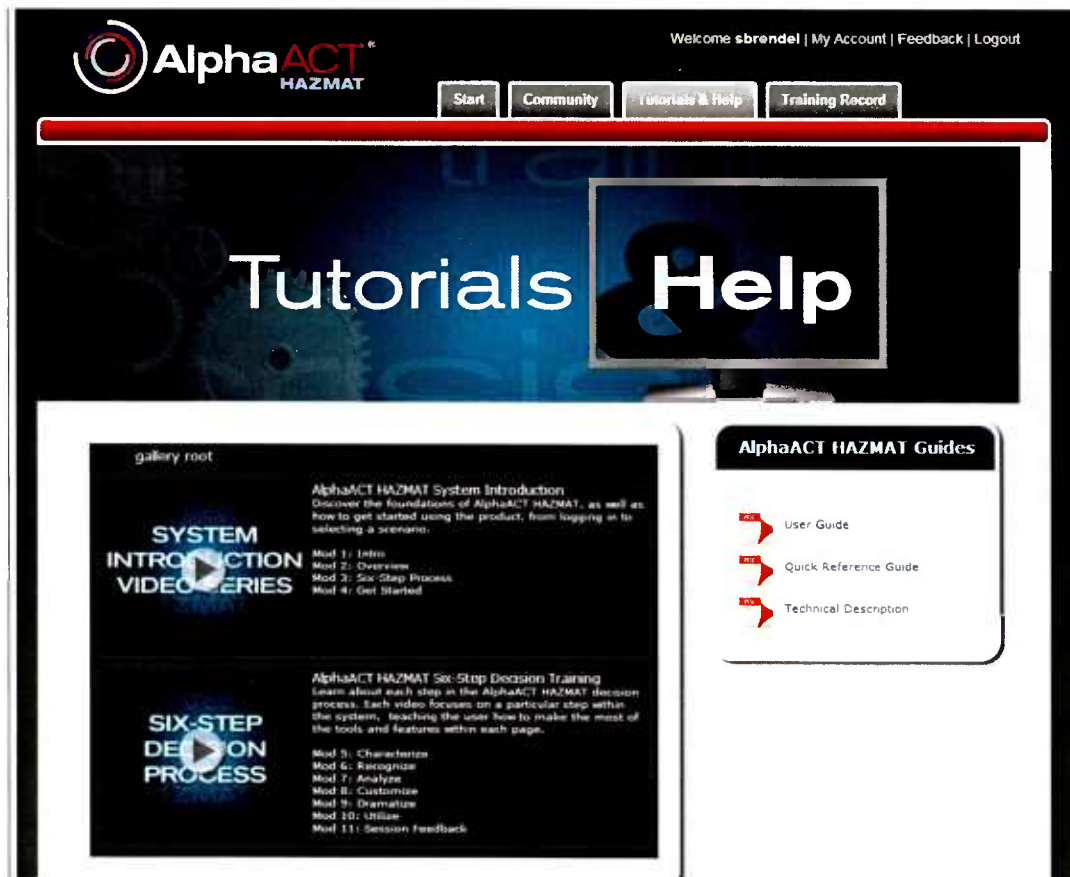
Figure 27   The Help page

4 USING THE TRAINING MODE

This section presents an overview of how to run a scenario in training mode. It also includes sections that delve into greater detail on some of the associated functions.

4.1   Running a Scenario

AlphaACT HAZMAT is a scenario-based training solution. It presents you with the facts of a fictional situation involving the release of a hazardous chemical. Then, under the simulated pressure of a ticking clock, it asks you to decide what protective actions you need to take to safeguard those who may be in danger.

The training scenarios in AlphaACT HAZMAT read like very brief short stories that describe the conditions you'll need to take into account as you determine the best course of action. Some scenarios include audio and visual elements, such as the spoken words of on-scene responders or witnesses, as well as images of the event scene you can scan as you size up the situation.

4.1.1   Logging In and Selecting a Scenario

To run a scenario:

1. Log in to the system.

    The system presents the Start page:

Figure 28   The Start page

2. Click Start Training Mode.

    The system presents a list of training scenarios that shows:

    *   The scenario title
    *   Whether you have played it (and, if so, how many times)
    *   The highest score you achieved
    *   The difficulty of the scenario
    *   Whether it has audio or visual (rich media) cues

Figure 29   The scenario list

The scenario selection panel includes tabs that let you search for scenarios based on their degree of difficulty or rich media content. A filter box lets you search for a scenario based on words in its title and all fields of its description.

3. Click the title of the scenario you wish to play.

    The system presents the initial dispatch message for the scenario along with two options:

    ▪ You can click Start Scenario to begin training
    ▪ You can click Back to return to the preceding page and select a different scenario

Run a Training Session

Incident
Rich Media Punctured Drum of Ammonia in Nampa Idaho

Location
3806 South Powerline Road Nampa ID 83686

Time of Occurrence
1 00 PM

Initial Dispatch
Report of an ammonia spill at 3806 South Powerline Road in Nampa Please respond

Back   Start Scenario
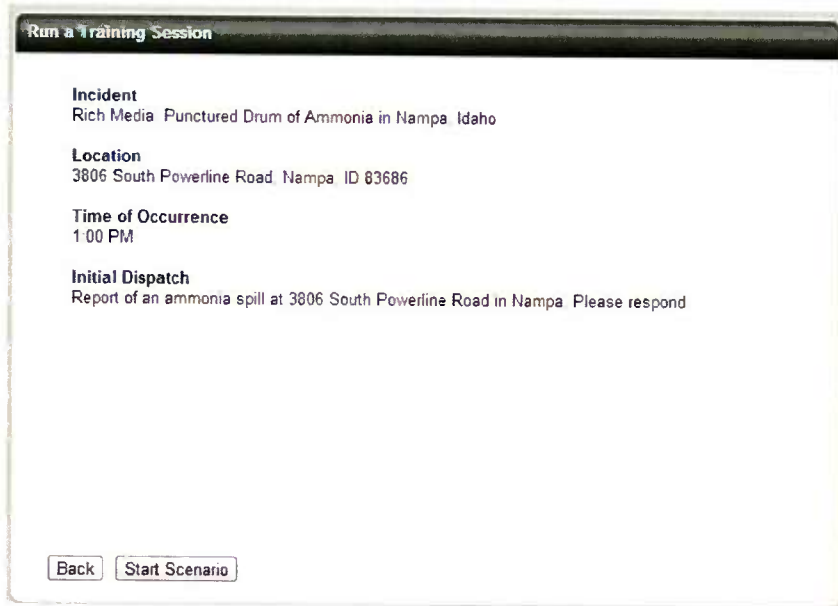
Figure 30   The initial dispatch message

4. Click Start Scenario.

The system displays a panel containing the information you receive while hypothetically en route to the scene. A timer shows a countdown to when you will automatically "arrive at the scene" and gives you the option to arrive quicker.

Figure 31   Information received en route

4.1.2   The Decision Process

5.   Click Arrive.

Characterize The system presents the Characterize page, which shows:

- Fields for the information you can select or enter about the event
- A map of the incident area, on which you can set the wind direction
- The Notepad, which you can use to take notes about your approach to the scenario
- The timer, which starts to measure how long it takes you to work the scenario
- The incident report, which provides information about the event
- A legend for the incident map

Figure 32   The Characterize page

▶ **Tip**: The incident report window can be opened in two ways:

- To open it, click the Incident Report button.

    It opens a scrollable window.
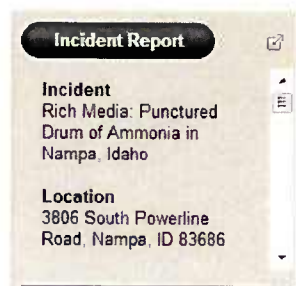
Figure 33   Opening the incident report

- To open a pop-up view, click the small icon to the right of the Incident Report button.

Scenario Detail   Close

Incident
Rich Media Punctured Drum of Ammonia in Nampa, Idaho

Location
3806 South Powerline Road, Nampa, ID 83686

Time of Occurrence
1 00 PM

Initial Size-up

View scenario scene

Information En Route

- Scene is a fish hatchery beside the interstate
- Owner accidentally punctured several drums of ammonia

Initial Dispatch
Report of an ammonia spill at 3806 South Powerline Road in Nampa Please respond

Figure 34   Opening the incident report in the pop-up view

Once the window opens, you can move it to a new position by clicking and dragging it by the bar at its top.

6. Enter information you know about the event into the fields.

   ►Tip: The system is designed to handle ambiguity. If you're not sure about an answer, leave it set to the default (which is *I'm not sure*).

   ►Tip: When you need to select a substance, the system opens a window that includes a filter field at the top. As you begin entering the substance name, the system will narrow the list it presents to match the characters you enter.
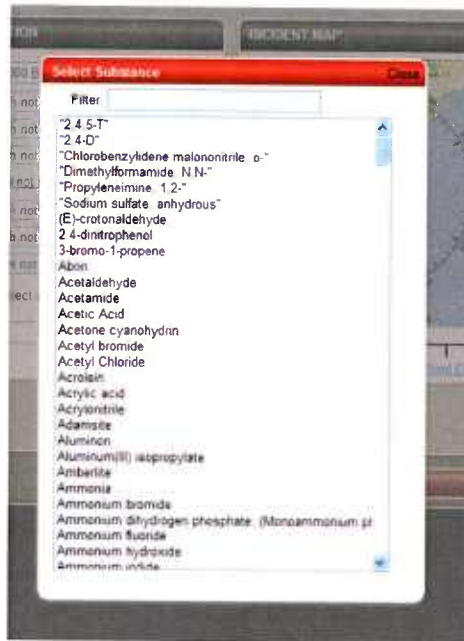
Figure 35   Selecting a substance

7. Once you've captured the known information, click Recognize.

   Recognize The system presents the Recognize page, which includes:

   - The convergence meter, which shows how close you are to identifying a good enough event with a useful Isolation Zone and Protective Action Zone
   - Questions the system asks to help determine better events to present
   - The top five events that best match the information you've provided so far
   - The incident report
   - Incident updates, which appear with changes to incident conditions

Figure 36   The Recognize page

►**Tip**: Clicking the camera icon beside the answer options shows images that may help you decide on the answer. Keep in mind that these images are examples; they are *not* related to the scenario you're working on.

►**Tip**: The Incident Report and Incident Update buttons flash red to indicate that they have not yet been opened.

8. Answer the questions as best you can by clicking the appropriate radio buttons and clicking Submit.

▶ Reminder: The system is designed to handle ambiguity, so if you're not sure about an answer, then leave it set to the default (which is **?**).

The system immediately adjusts the events it presents at the bottom of the page based on the answers you gave. Then it presents other questions, based on what it knows already about the event and the patterns it has learned.

9. Continue answering questions until you have determined a good enough set of events to choose from.

The first thing to look at is the convergence meter, which gives you an indication of the system's overall confidence in the choices it has presented.
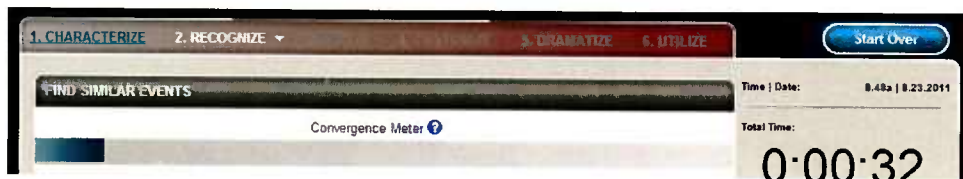
Figure 37   The convergence meter

Once the convergence meter indicates an appropriate level of certainty, look at the confidence meters above the events shown at the bottom of the page. Like horizontal thermometers, they show how sure the system is that the events match your inputs. The closer they inch to the right, the more certain they are.
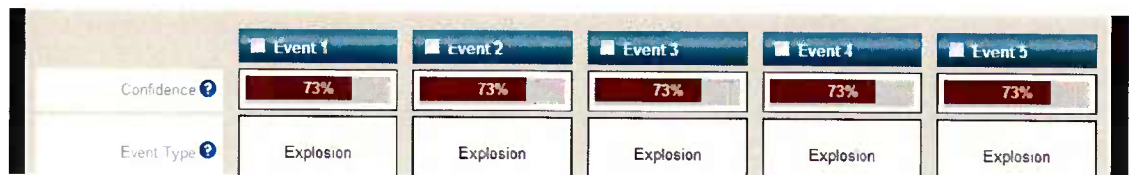
Figure 38   The confidence meters

10. Select one, two, or three of the events that best match the information that is known by clicking the appropriate check boxes, then click Analyze.

Analyze The system carries the selected events to the Analyze page, where you can examine the characteristics of the event(s) you've chosen and the resulting Isolation Zone and Protective Action Zone.

The Analyze page includes:

- The event summaries of the events you selected

- Incident maps for the events selected
- The incident report
- Incident updates
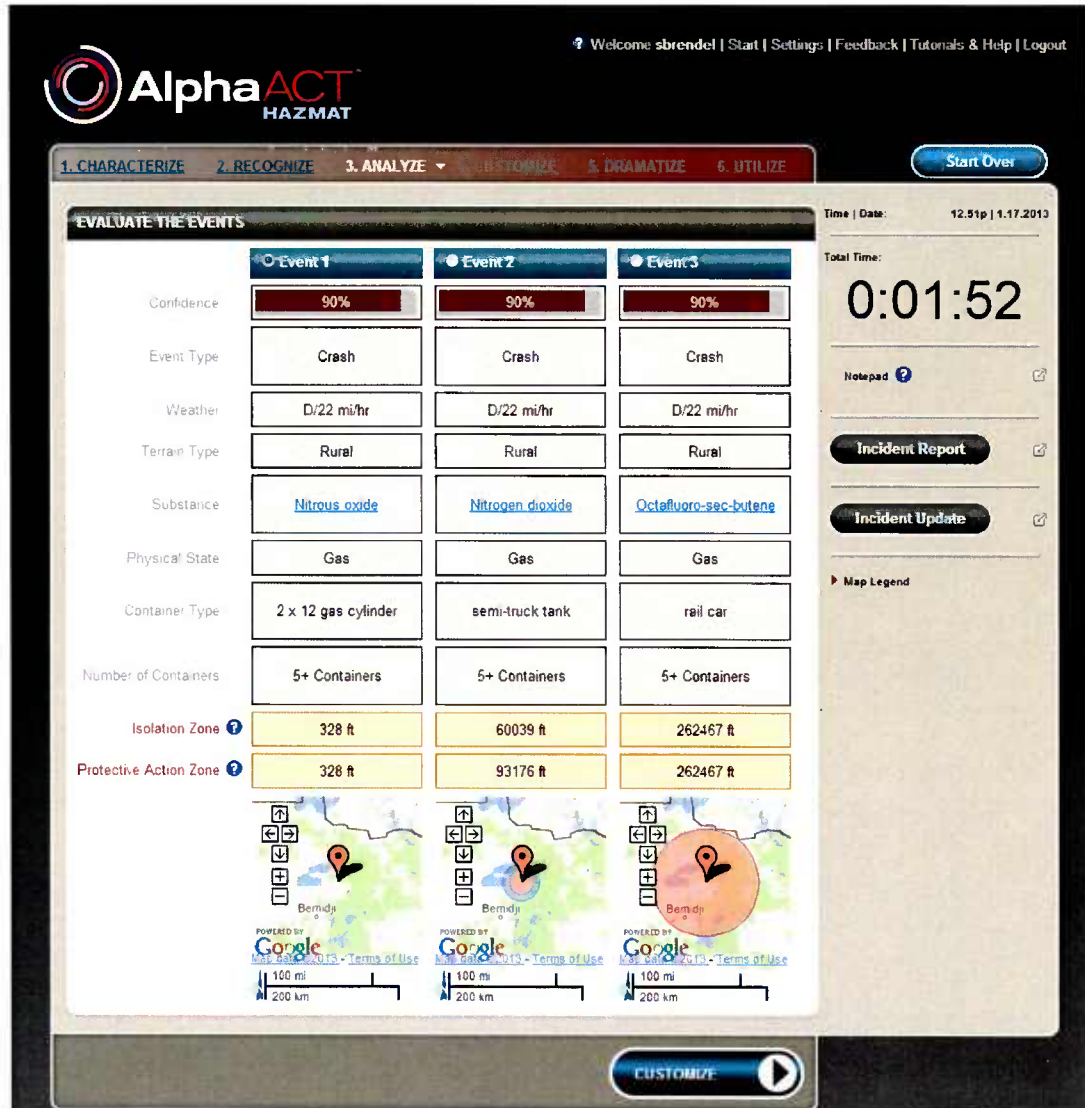
Figure 39   The Analyze page

►**Tip**: Clicking on the substance name will display an emergency hazard information sheet with information about its characteristics, incompatibilities, potential hazards, the symptoms it produces in victims, and recommendations regarding personal protective equipment, first aid, and emergency response measures.

Emergency Hazard Information Sheet

AlphaACT HAZMAT

| Chemical Name | Cyanogen chloride | Page 1 of 3 |

1. Product Identification

Synonyms — Chloroformonitrile; Chlorine cyanide; Carbononitridic chloride; CK

CAS Number — 506-77-4
Physical State — gas
Color — colorless   **Product Use** — production of chemicals
Odor — a pungent odor, an acrid odor, a choking odor

2. Hazards Identification

NFPA Ratings

Health — 4

Fire — 0

Reactivity — 2

Special — N/A

U.S. DOT Labeling

The placard is 2.3
The placard is 6

INHALATION HAZARD 2

3. Victim Symptoms

- drowsiness
- extreme headaches
- nausea
- skin burns
- difficulty in breathing
- vomiting

- dizziness
- elevated blood pressure
- skin rash
- disorientation
- a coma
- skin irritation

- unconsciousness
- dilated pupils
- frostbite
- death
- bluish skin color

Figure 40   An emergency hazard information sheet

11. Select the event that best matches current conditions and click Customize.

Customize The system carries the selected event to the Customize page, where you can modify the characteristics of the event to more closely reflect current conditions and incident updates, then examine the resulting changes to the Isolation Zone and Protective Action Zone.

The Customize page includes:

- The summary of the event you selected
- A summary you can customize
- Incident maps for both events
- The incident report
- Incident updates
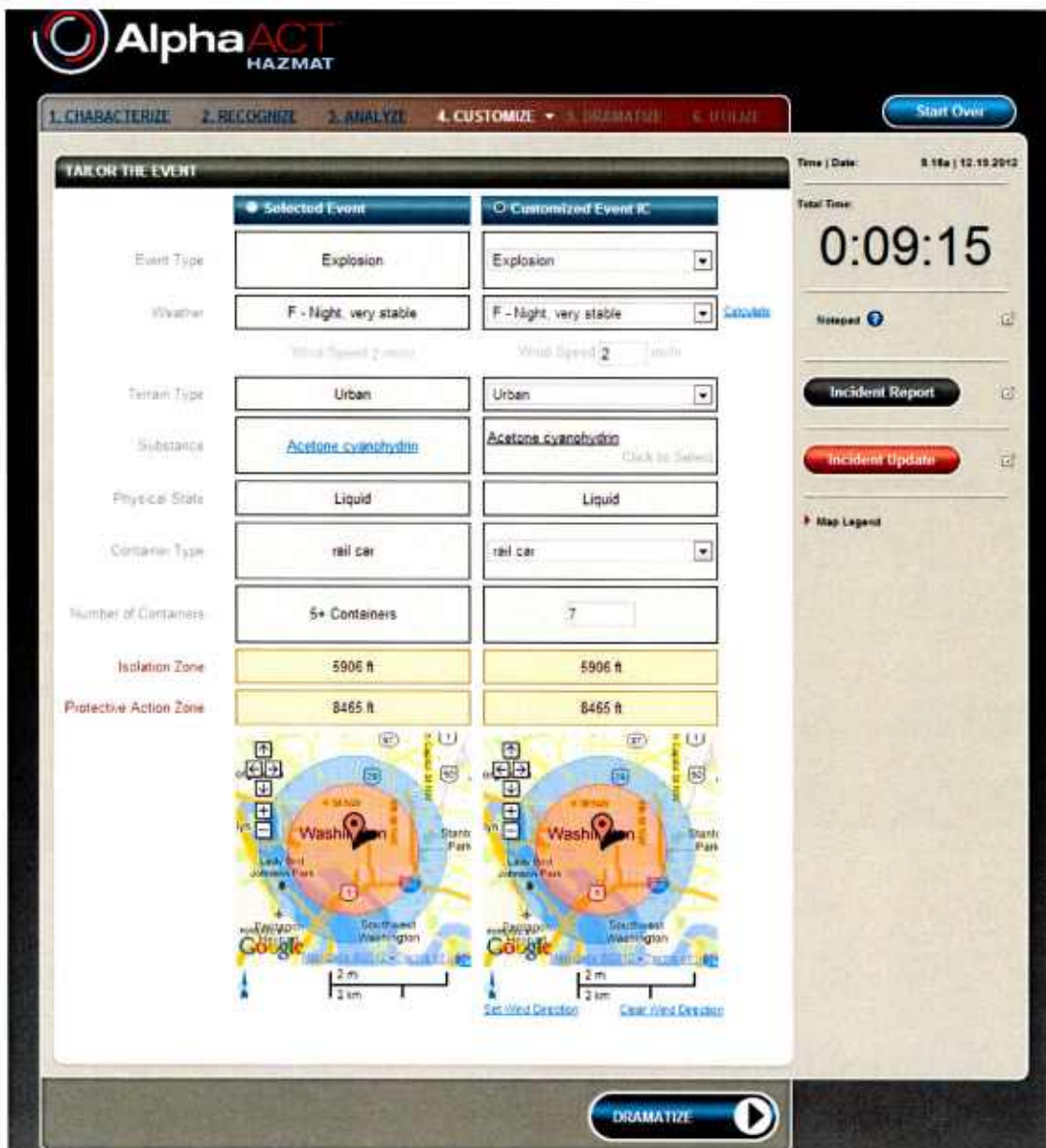
Figure 41   The Customize page

As you alter the characteristics of the customized event, the system immediately adjusts the Isolation Zone and Protective Action Zone.

►**Reminder**: The Incident Update button flashes red to indicate that it has not yet been opened.

►**Tip**: You can adjust the event location on the customized incident map by clicking and dragging the marker icon that identifies the center point of the release.
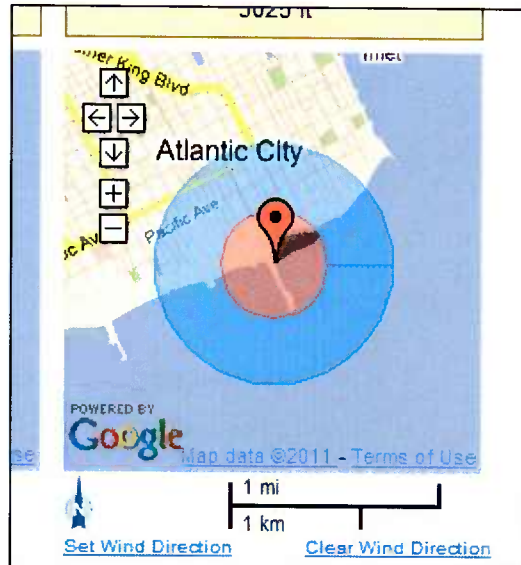

Figure 42   The center point of the release

12. Click Dramatize.

   Dramatize The system carries the customized event to the Dramatize page, which includes:

   - The event summary for the customized event
   - The incident map showing either the Isolation Zone/Protective Action Zone view or the Hot Zone/Warm Zone view
   - Locations of concern within the affected area
   - Buttons for setting key response locations
   - A button to open the emergency notifications panel
   - A protective action checklist
   - The incident report
   - Incident updates
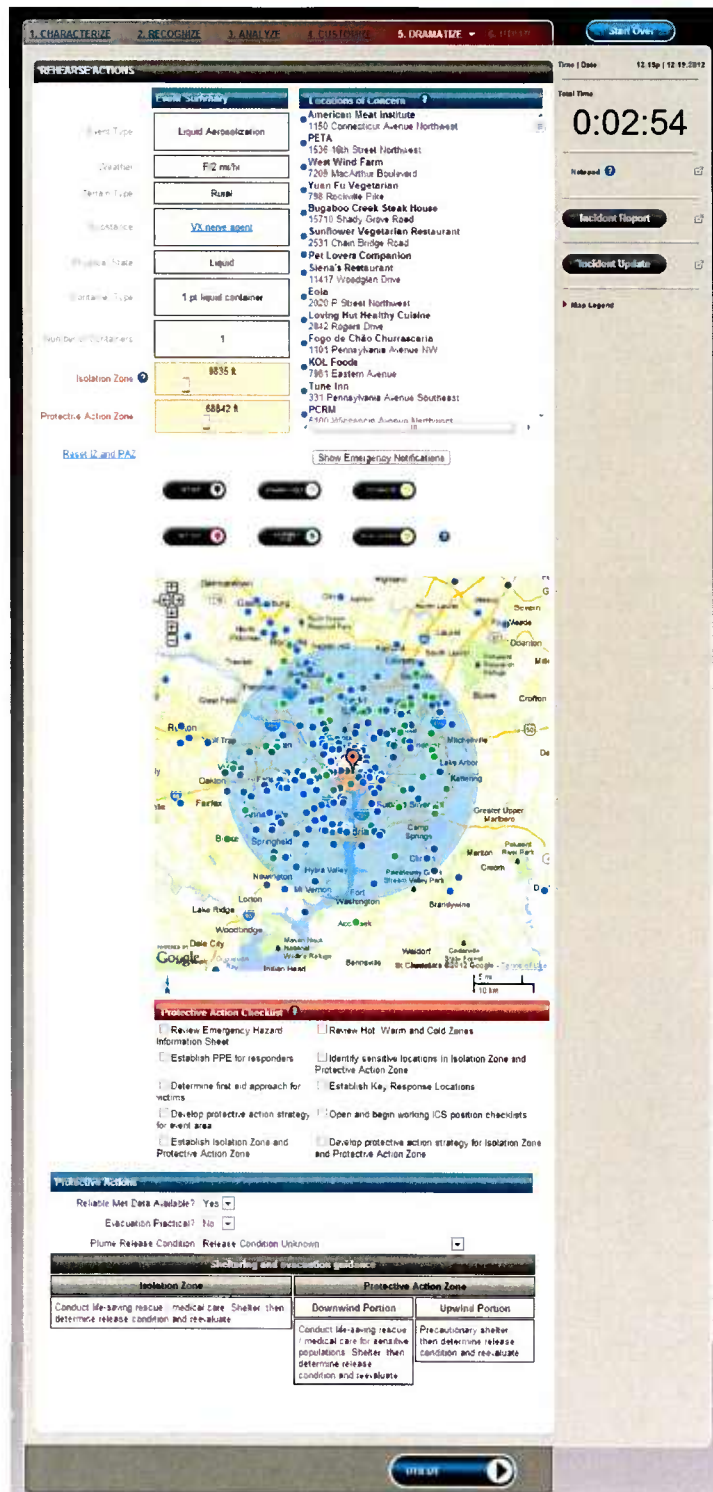
Figure 43   The Dramatize page

On the Dramatize page, you can:

- Manually resize the Isolation Zone and Protective Action Zone (and therefore the Hot Zone and Warm Zone) using the slider bars
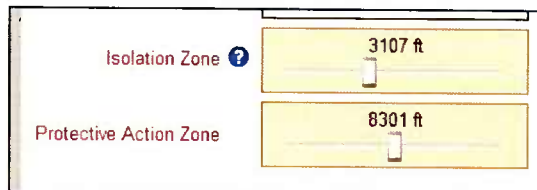
Figure 44   Slider bars used for zone size adjustment

- Identify and examine locations of concern that fall within and near the Isolation Zone and Protective Action Zone (as well as the Hot Zone and Warm Zone)

Figure 45   Locations of concern in the Isolation Zone and Protective Action Zone

- Review the protective action checklist to rehearse the plan you intend to put into effect
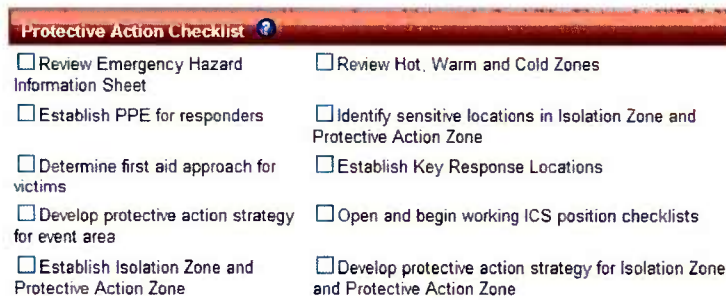
Figure 46   The protective action checklist

- Set key response locations by clicking to select them and then clicking again to place them on the map (see Section 4.3), including:

  - An Incident Command Post
  - Traffic control points
  - Staging areas
  - Assembly points
  - Decontamination sites
  - Evacuation centers

Figure 47   Buttons for setting key response locations on the Dramatize page

▶**Tip**: If you place a response location within the Isolation Zone, Protective Action Zone, Hot Zone or Warm Zone, the system reminds you of the potential danger that may present to people.

- Specify the recipients of emergency notifications.
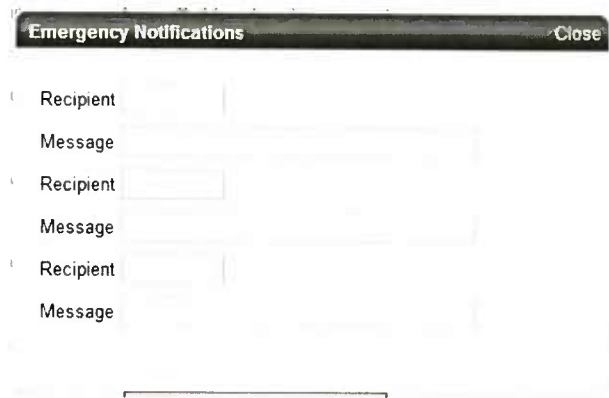
Figure 48   The emergency notifications panel

13. Click Utilize.

Utilize The system stops the clock and carries the information to the Utilize page, which includes:

- The event summary
- The map showing:
  - The Isolation Zone and Protective Action Zone
  - The Hot Zone and Warm Zone
  - The key response locations you set
  - Locations of concern that merit special consideration during evacuation planning
- The addresses of the key response locations
- Reports and position checklists
- Notes you've taken using the Notepad

Figure 49   The Utilize page

On the Utilize page, you can review, check off, and print the position checklists for those on the incident management team.

Figure 50   Position checklist

This concludes the training scenario.

4.1.3 Finishing Up

14. Click Session Feedback.

The system shows how well you did on the training scenario, including:

- Your final score
- The scoring breakdown
- The total time it took to complete the scenario
- A comparison of your analysis and decisions to the actual event the scenario was based on

Figure 51   The Session Feedback page

At this point, you can:

- Try another scenario

- Complete an after action review (AAR) of the scenario you just completed (as described in Section 5)
- Rate the scenario you just completed (as described in Section 4.5)

4.2   Setting the Wind Direction

AlphaACT HAZMAT lets you set the wind direction on the incident map of the Characterize and Customize pages.

Figure 52   The incident map

To set the wind direction on the incident map:

1. Click Set Wind Direction.

2. Move the mouse over the map.

    The wind direction arrow appears and follows the mouse as you move it around the map.

3. Point the arrow in the direction the wind is blowing and click.

    The wind direction arrow locks to the compass when you click.

To remove the wind direction from the incident map:

1. Click Clear Wind Direction.

The arrow disappears from the map.

To change the wind direction on the incident map:

1. Click Clear Wind Direction.

    The arrow disappears from the map.

2. Click Set Wind Direction.

3. Move the mouse over the map.

    The wind direction arrow appears and follows the mouse as you move it around the map.

4. Point the arrow in the direction the wind is blowing and click.

    The wind direction arrow locks onto the new point of the compass.

4.3   Setting Key Response Locations

AlphaACT HAZMAT lets you set key response locations needed for an event from the Dramatize page. The following table shows the kinds and number of locations you can set.

Response location	Number
Incident Command Post	1
Traffic control points	Up to 10
Staging areas	Up to 3
Assembly points	Up to 3
Decontamination sites	Up to 3
Evacuation centers	Up to 3

Buttons for the different types of response locations appear just above the incident map on the Dramatize page.

Reset IZ and PAZ

Figure 53   Buttons for setting key response locations

To place a response location on the map:

1. Click the button of the response location you wish to place (but do not hold it down).

    This selects the location type.

2. Move the mouse to the point on the map where you wish to place the response location and click again.

    For location types with multiple locations (for example, traffic control points), you must click on the response location button each time before you position it on the map.

    ▶**Warning**: If you place a response location within the Isolation Zone, Protective Action Zone, Hot Zone or Warm Zone, the system reminds you of the potential danger that may present to people.

To move a response location you've already set:

1. Click and hold the icon for the response location you wish to move.

2. Drag the icon to its new location and drop it.

    ▶**Warning**: If you place a response location within the Isolation Zone, Protective Action Zone, Hot Zone or Warm Zone, the system reminds you of the potential danger that may present to people.

To remove a response location from the map:

1. Double click the icon.

The system returns the location to the "inventory" of locations still available to place.

4.4   Taking Notes during Sessions

AlphaACT HAZMAT lets you take notes while you work on a scenario using the Notepad. You can take notes on the six pages of the AlphaACT HAZMAT decision process and the Session Feedback page.

When you start a new scenario, the contents of the Notepad are cleared so you can start over.

To use the Notepad once you've begun a scenario:

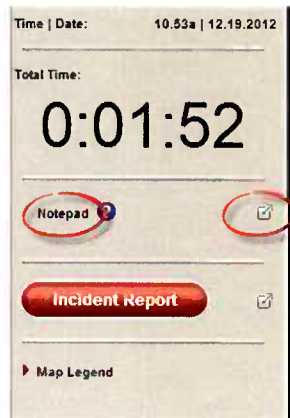1. Click Notepad OR the icon to the right of the Notepad.

Figure 54   Opening the Notepad

The Notepad opens in a separate window.

Figure 55   The Notepad ready for input

2. Move the cursor to the box at the bottom of the Notepad window, enter your notes, and click Post.

The system adds your notes to the other notes you've recorded during scenario play, along with a time and date stamp.

3. Move to the next page of AlphaACT HAZMAT.

The Notepad will close, but it won't lose the notes that you've taken. To reopen it, simply click Notepad OR the icon to the right of the Notepad again.

4.5   Rating Scenarios

After you complete a scenario, you can rate it using a five-star scale and provide comments on the Session Feedback page.

Figure 56   Rating a scenario

To rate the scenario and provide feedback:

1. Mouse over the stars from left to right until you have highlighted as many stars as you wish to award.

Ratings can be awarded as whole or half stars.

2. Enter your comments in the comment box.

3. Click Post comment.

    The system will post your rating and comments on the Session Feedback page and on the forum page dedicated to feedback for this particular scenario.

To view the comments made by users on this scenario, click Go to the Forum.

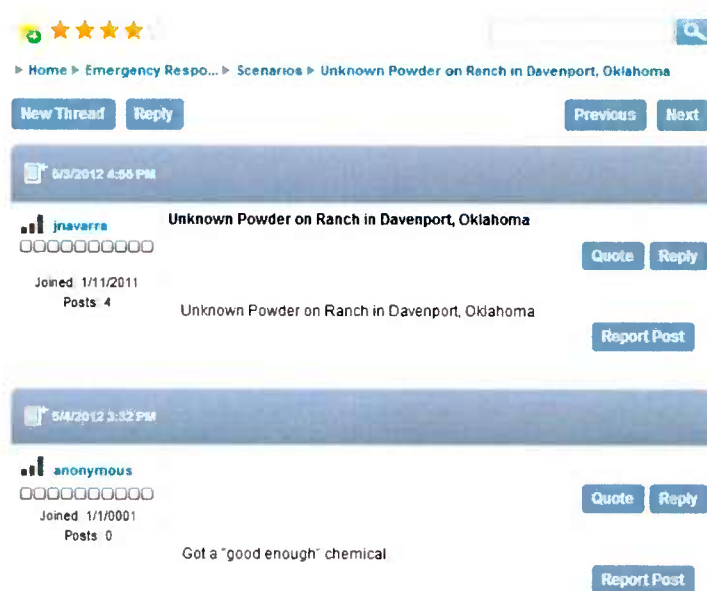   The system will show you the posts from all users who have commented on this scenario.

Figure 57   Viewing comments on a scenario

To view comments for another scenario:

1. Click the Community tab.

2. Click Scenarios.

3. Click the thread for the scenario you wish to review.

    The system will show you the posts from all users who have commented on this scenario.

5 CONDUCTING AFTER ACTION REVIEWS

AlphaACT HAZMAT lets you conduct an AAR after you have completed a training scenario.

The AAR summary can be printed or saved for future reference and used as a source of lessons learned.

Once you've completed a scenario, from the Session Feedback page:

1. Click Complete AAR.

   The system leads you through a series of pages that ask you to rate yourself on a particular task and note the things that went well or that caused problems.
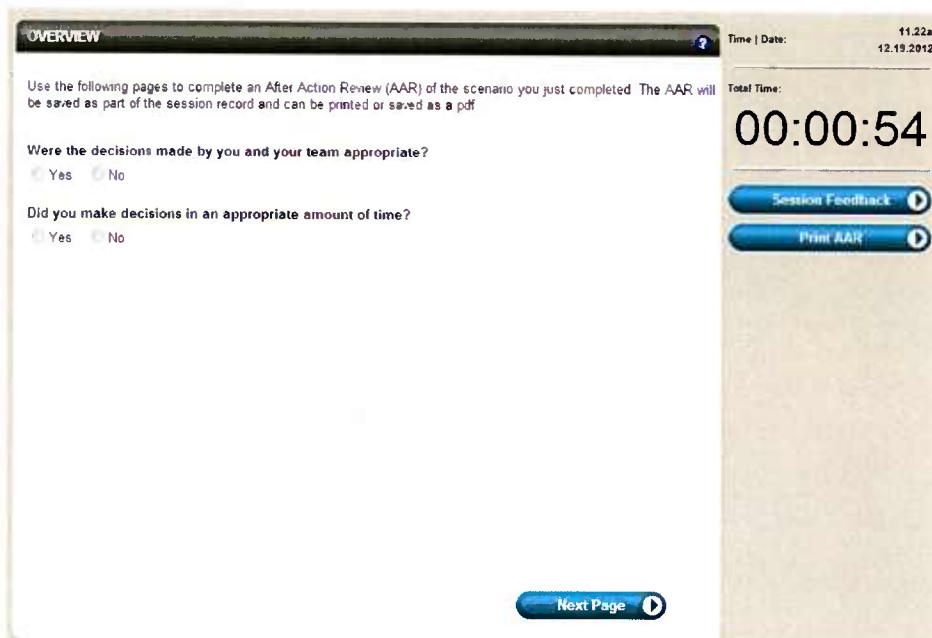

Figure 58   Completing an AAR

   At the end of it, you can print or save a copy of the AAR, or you can return to the Session Feedback page.

2. To:

   Print a copy of the AAR:

   a. Click Print AAR

b. Under Destination, select the printer from the print dialogue box

c. Click Print

Save a copy of the AAR:

a. Click Print AAR
b. Under Destination, click Change and select Save as PDF from the print dialogue box
c. Click Save
d. Select the folder in which you'd like the pdf file saved
e. Provide a filename for the file
f. Click Save

Return to the Session Feedback page: click Session Feedback

6 TRACKING PERFORMANCE

This section describes how the difficulty of scenarios is rated and how your plays of them are scored.

6.1 Scenario Difficulty

The difficulty of scenarios is based on the amount of information known initially, as well as incident updates provided during the course of play.

Scenarios where very little information is known up front tend to be more difficult than scenarios where more information is known.

Incident updates affect scenario difficulty in two ways:

➤ When they provide information about the event that was previously unknown, it tends to simplify the scenario
➤ When they provide information about an event that requires you to adapt to changing conditions, it tends to increase the difficulty of a scenario

6.2 How Sessions Are Scored

When playing a scenario in AlphaACT HAZMAT, you have to piece together information about the event based on what you know about it, just as you would in a real event. But no matter what assumptions you make, there is a set of facts behind every event, and the same is true of the training scenarios in AlphaACT HAZMAT. Each training scenario is based on a specific set of conditions that affect the resulting consequences.

When you play a training scenario, your goal is to determine what the actual event conditions are. AlphaACT HAZMAT helps you through the process of deduction, but in the end, you may get some event conditions right and some wrong. When scoring your results, AlphaACT HAZMAT compares the actual event conditions the scenario is based on to the event conditions that you decided on as you played the scenario.

The scoring methodology also attempts to realistically balance the conflicting needs of the timeliness of a decision against its accuracy, reinforcing the principle that a good-enough decision made quickly is often better than a more accurate decision made too late.

Scoring is based on the following criteria:

➤ The outcome, based on:
  ▪ *Case similarity:* How accurately the characteristics of the event you selected and customized match the characteristics of the event the scenario is based on
  ▪ *Isolation Zone accuracy:* How closely the Isolation Zone distance of the event you selected and customized matches the distance of the event the scenario is based on
  ▪ *Protective Action Zone accuracy:* How closely the Protective Action Zone distance of the event you selected and customized matches the distance of the event the scenario is based on

➤ The process, as measured by:
  ▪ *Overall time:* How long it takes you to work the scenario from the beginning of the Characterize step to the end of the Dramatize step
  ▪ *Characterize/Recognize time:* How quickly you move through the Characterize and Recognize pages
  ▪ *Analyze/Customize time:* How quickly you move through the Analyze and Customize pages
  ▪ *Dramatize time:* How quickly you complete the Dramatize page
  ▪ *Customize action:* Whether you take appropriate action on the Customize page
  ▪ *Dramatize action:* Whether you take appropriate action on the Dramatize page

Scoring is based on a total of 1,000 possible points per scenario as shown in the following table.

Criteria	For	Points available	Points awarded
Outcome	Case similarity: Correctly matching the characteristics of the event the scenario is based on, including: • Event type • Weather (by matching either class or wind speed) • Terrain type • Substance released • Physical state of the substance • Container size • Number of containers	300	Match 7 = 300 Match 6 = 275 Match 5 = 250 Match 4 = 225 Match 3 = 200 Match 2 = 125 Match 1 = 50 Match 0 = 0
	Isolation Zone accuracy: Correctly matching the Isolation Zone distance on Customize	200	*Described at the end of this table
	Protective Action Zone accuracy: Correctly matching the Protective Action Zone distance on Customize	200	
Subtotal		**700**	

Process	Overall time: Completing the scenario (from the beginning of Characterize to the end of Dramatize) in a certain amount of time	100	Completion time:
			
			≤ 10 min = 100
			  11 min = 80
			  12 min = 60
			  13 min = 40
			  14 min = 20
			  15 min = 0

	Characterize/Recognize time: Completing the two steps within 2 to 6 minutes	50	Completing the steps within the time range = 50 Completing the steps in less than or more than the time range = 0
	Analyze/Customize time: Completing the two steps within 1 to 4 minutes	50	
	Dramatize time: Completing the Dramatize step within 1 to 4 minutes	25	
	Customize action: Taking any action on the Customize page (Example: Modify any characteristic of the selected event)	25	Any action = 25 No action = 0
	Dramatize action: Taking any action on the Dramatize page (Example: Place traffic control points on the incident map)	50	
Subtotal		**300**	
Total		**1,000**	

* Based on selected ÷ actual zone distance (%):

$\geq 221\%$ =   +20 points
201-220%   =   +50 points
175-200%   =   +80 points
150-174%   =   +110 points
125-149%   =   +140 points
91-124%   =   +170 points
75-90%   =   +95 points
50-74%   =   +20 points
25-49%   =   −25 points
1-24%   =   −50 points

The scoring reflects that it is better to overestimate than underestimate the sizes of the Isolation Zone and Protective Action Zone.

If either the selected or actual distance is 0, points are awarded as follows:

➤ If the selected zone distance was 0 when the actual zone distance was > 0, then an emergency existed but was overlooked. Score = −100 points.

➤ If the selected zone distance was > 0 when the actual zone distance was 0, then an emergency did not exist and the decision to implement protective actions constituted a false alarm. Score = −50 points if the error was > 300 feet; +100 points if zone distance was between 300 feet and 1 foot.

➤ If both the selected and actual zone distances were 0, then the user correctly matched. Score = +200 points.

Results are rated as follows.

Score		Rating
From	**To**	
-200	400	Needs improvement
401	600	OK
601	800	Good
801	1,000	Excellent

6.3   Viewing Your Scores

AlphaACT HAZMAT posts your scores on your Start page so you can easily track your progress. It also shows you the top scores of those in the community.
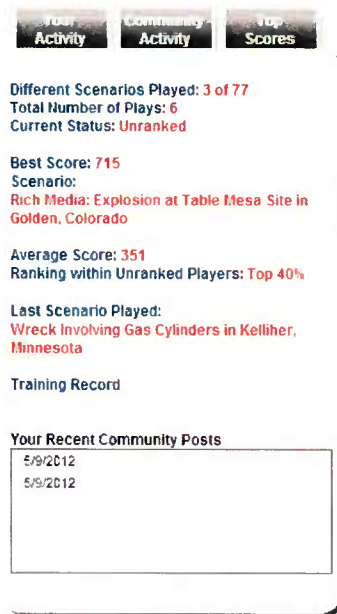

Figure 59   Viewing your scores

Among other things, your Start page serves as a leader board that shows the top performers and their scores. You can use this information to see how your own performance compares to that of others, without other people knowing how well you did (unless, of course, you are one of the top performers).

6.4   Viewing Your Training Record

AlphaACT HAZMAT tracks your training and summarizes it in a personal training record that also lets you compare your performance against the performance of others in the community.

The training record does not include scenarios that you started but did not complete (completion being measured by your arrival on the Session Feedback page).

To view your training record, click Training Record tab on the Start page.

Different Scenarios Played: 3 of 77
Total Number of Plays: 6
Current Status: Unranked

Best Score: 715
Scenario:
Rich Media: Explosion at Table Mesa Site in Golden, Colorado

Average Score: 351
Ranking within Unranked Players: Top 40%

Last Scenario Played:
Wreck Involving Gas Cylinders in Kelliher, Minnesota

Training Record

Your Recent Community Posts
5/9/2012
5/9/2012

Figure 60   Opening your training record

The system shows a view summarizing your use of AlphaACT HAZMAT, as shown in the following figure.

Figure 61   The training record page

7 COMMUNITY FORUMS

The Community lets AlphaACT HAZMAT users discuss topics of interest and share information.   It is an email-like approach to information sharing that you'll find very familiar.

Forums are established around major topics of interest; threads are created within a forum to address sub-topics. Contributions are made to a thread as a post. The capability also allows you to send private emails to individuals within the community (much like Facebook).

Forums are moderated by members of the community to ensure that the discussions remain focused, civil, and free of spam and inappropriate submissions.

After logging in, your Start page will show the topics under discussion.

The Community tab at the top of the page allows you to enter and navigate the forums and contribute to the discussions by either replying to a post or creating a new thread to begin a discussion of a new sub-topic.
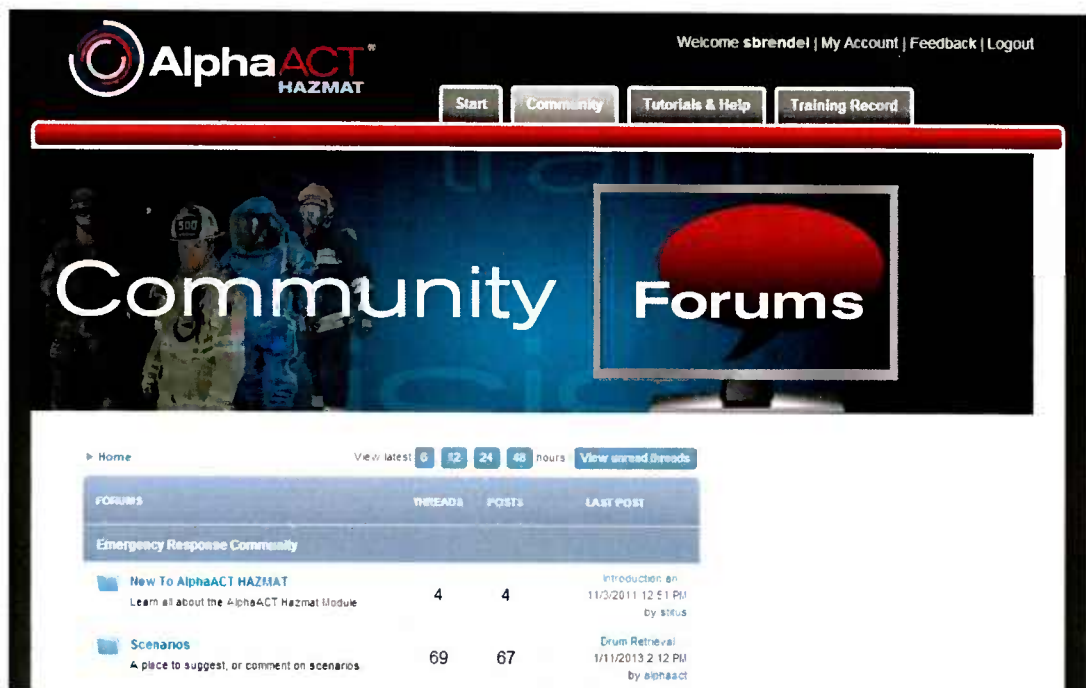

Figure 62   The Community

7.1   Basic Options

From any point within the Community, you can:

> Adjust settings for how you interact with the forums
> View only the posts and threads you have created
> Search the forums
> Return to the Community home page

These options are available using the links at the top of the Community pages.

7.2 Navigating the Forums

To navigate the forums:

1. After logging in, click the Community tab at the top of the page.

Figure 63   The Community tab

The system lists the forums (the major topics) within your community, along with information regarding their activity.

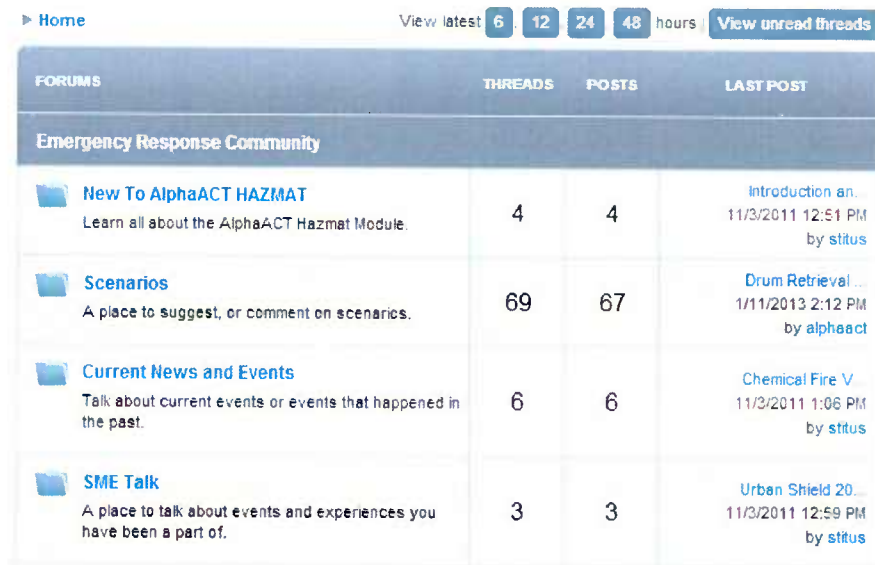*Figure 64   The Community forums*

At this point, you can:

- Enter a forum or thread
- View the most recent posts made to the forums
- View unread threads
- Review the profile of people who made recent posts

To enter a forum:

1. Click the name of a forum.

The system lists the threads (the sub-topics) within the forum and shows information regarding their activity.

Figure 65   Threads in a forum

To enter a thread:

1. Click the name of a thread.

The system lists the posts in the thread.

Figure 66   Posts in a thread

Postings and replies are handled as emails and sent to the forum moderator before being posted to the thread.

7.3   Replying to a Post

When replying to a post, you can include the text of the post you're replying to or you can reply without it.

To reply to a post *and include the original post*:

1. From the post you wish to reply to, click Quote.

Figure 67   Replying to a post using Quote

The system presents an email template showing the original post in the top part of the email's body.
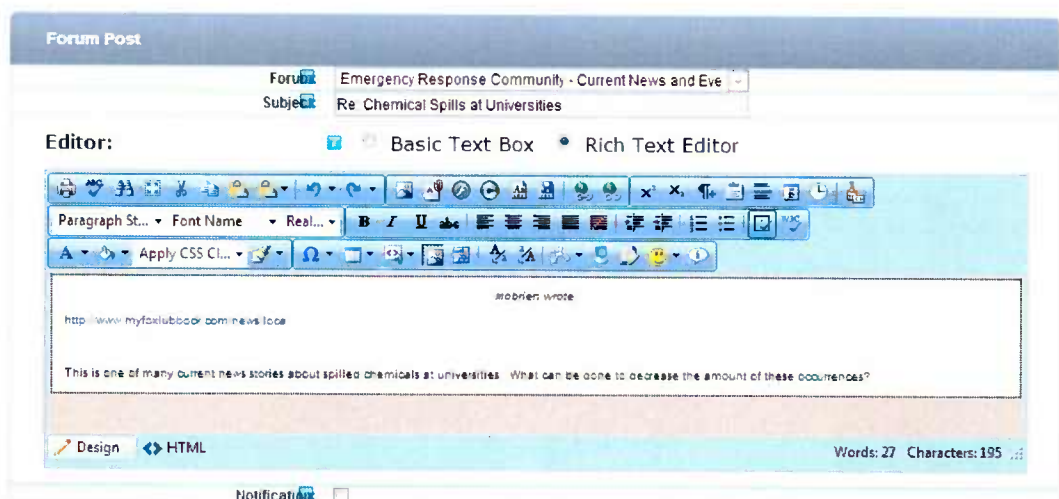
Figure 68   The email template for replies

2. Place the cursor within the body of the email—either above or below the original text—and add your remarks.

3. Click Submit.

To reply to a post *without* including the original post:

1. On the post you wish to reply to, click Reply.

Figure 69   Replying to a post using Reply

The system presents an email template.

2. Place the cursor within the body of the email and add your remarks.

3. Click Submit.

7.4   Creating a New Discussion Thread

To create a new thread:

1. From a thread page, click New Thread.
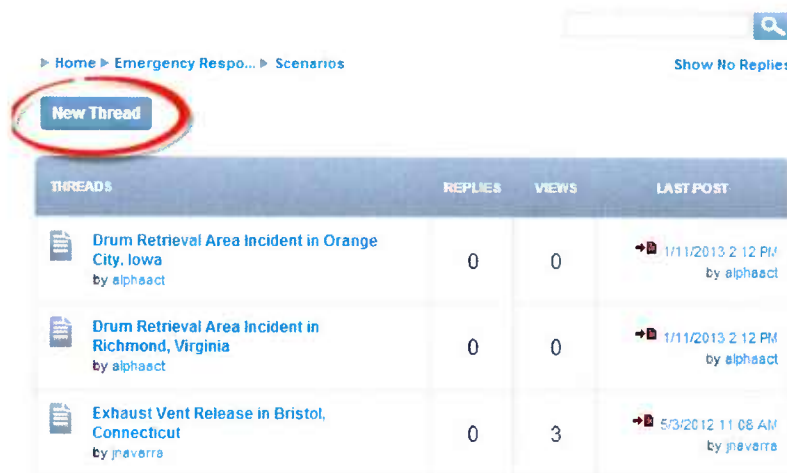
Figure 70   Creating a new thread

The system presents a forum post email which you'll complete to set up the new thread.

2. Enter the name of the thread in the Subject line.

Make it as brief and descriptive as a heading in a document (for example, no more than three to five words). You'll be able to explain the purpose of the thread in the next step.

Figure 71   Naming the thread using the Subject line

3. Enter an explanation of the purpose of the thread in the body of the forum post email.

Keep it brief and to the point (for example, no more than one sentence).

4. Select the Thread Status using the dropdown at the bottom of the forum post email if appropriate.

5. Click Submit.

The system sends the email to the forum moderator, who will review it and add it to the forum if appropriate.

7.5 Viewing the Posts and Threads You Created

To view only the posts you made:

1. Click My Posts.

    The system shows your posts and identifies the forums they appeared in.

To view only the threads you created:

1. Click My Threads.

    The system shows the threads you created along with information about the activity in them.

7.6 Searching the Forum

To search the forum:

1. Click Search.

    The system shows the Search Forum page.

2. Enter the search parameters, then click Search.

    The system displays a page summarizing the posts that meet the search criteria you have specified.

7.7 Adjusting Settings

To adjust the settings for the Community pages:

1. Click My Settings.

    The system shows the User Settings page.

2. Click Forum Settings, then Edit Settings.

    The system shows the settings you can adjust.

3. To put the changes into effect, click Update.

8 MANAGING ACCOUNT AND SYSTEM SETTINGS

AlphaACT HAZMAT lets you manage your learning experience through two different pages:

➤ Through the My Account page, you can review information about your current subscription, change your password, and manage certain aspects of your user credentials.

➤ Through the Settings page, you can adjust how the AlphaACT HAZMAT application works to better meet your preferences.

Since some aspects of these administrative functions are still under development, this section only discusses those that are ready for use.

8.1 Reviewing Your Current Subscription

The My Account page provides information about your current subscription, including the date when it expires.

8.2 Changing Your Password

AlphaACT HAZMAT lets you change your password as often as you need.

To change your password:

1. Log into the system and click My Account.

2. Click Manage Password.

   The system prompts you to provide your current password and the new password, then asks you to confirm the new password.

3. Enter the requested information and click Change Password.

   The system acknowledges the password change.

8.3   Changing Measurement Units

AlphaACT HAZMAT lets you show distances in either metric or English units, depending on your preference. By default, it shows distances in English units.

These settings are changed from within the training mode.

To show metric units of measure:

1.   Click Start Training Mode.

Figure 72   Starting a training mode
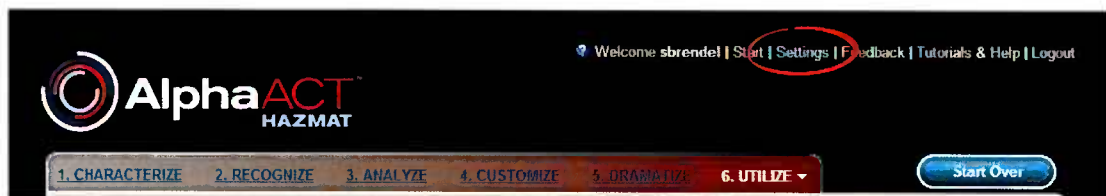
2.   Click Settings.

Figure 73   The Settings link

This presents the System Settings page.

Figure 74   The System Settings page

3. Check the Use Metric System of Measure box.

To show English units of measure:

1. Click Start Training Mode.

2. Click Settings.

3. Uncheck the Use Metric Units box.

8.4   Displaying or Hiding Locations of Concern

The incident maps in AlphaACT HAZMAT can show you the location of many different kinds of facilities of concern for impacts and protective actions, including:

➤ Sensitive and restricted population facilities (like schools, hospitals, and jails)
➤ Emergency response locations (like fire and police stations)
➤ Critical infrastructure facilities (like public health centers, banks, and governmental facilities)

These facilities often require special consideration when it comes to evacuation planning. They are shown on the incident maps on the Dramatize and Utilize pages, so you are aware of their location relative to the area affected by an event.

AlphaACT HAZMAT lets you decide which types of facilities will appear on the incident map.

To set the facilities you want to appear on the maps:

1. Click Start Training Mode.

Figure 75   Starting a training mode
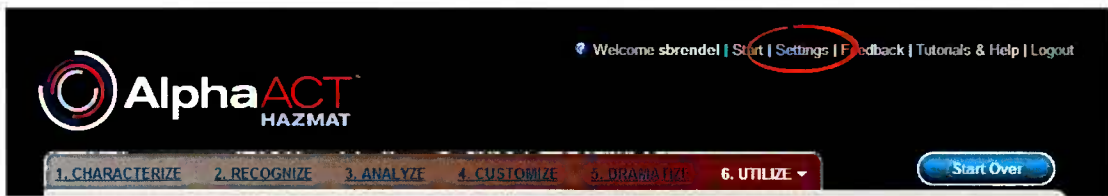
2. Click Settings.

Figure 76   The Settings link

This presents the System Settings page.

Figure 77   The System Settings page

3. Under Locations of Concern, click on the category to open the list of locations.
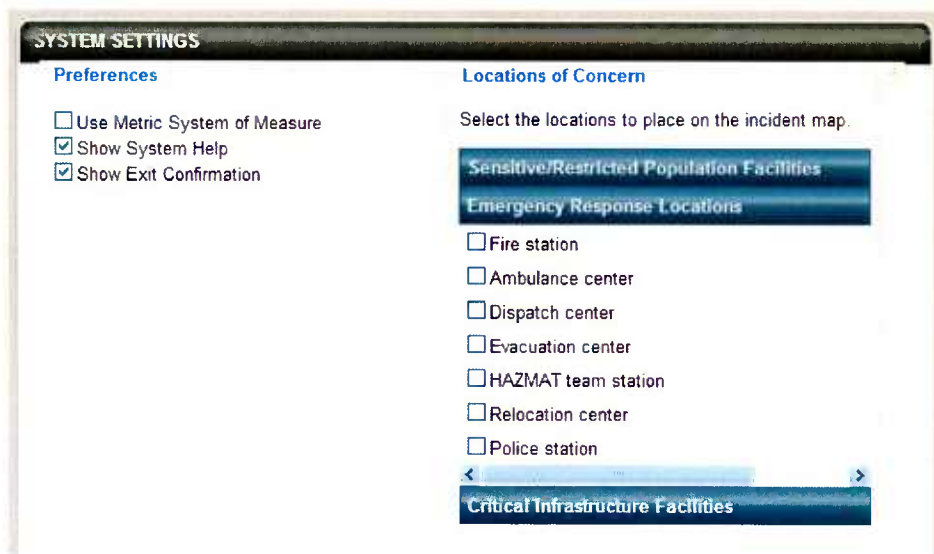
Figure 78   Opening a locations of concern category

4. Select the facilities you want displayed on the incident map by checking or unchecking the appropriate boxes.

These facilities will only show up on the incident maps that appear on the Dramatize and Utilize pages.

9 REPORTING PROBLEMS

If you discover a system problem or would like to ask a question or suggest a new feature, click Feedback and use the feedback page to notify us (you must be logged in to do so).

Figure 79   The Feedback link

If you have questions or comments about AlphaACT HAZMAT, don't hesitate to contact our team.

Customer support is available Monday through Friday from 9:00 a.m. to 5:00 p.m. Mountain Time by:

➤ Calling (303) 428-5670
➤ Emailing support@alphatrac.com

CHARACTERIZE
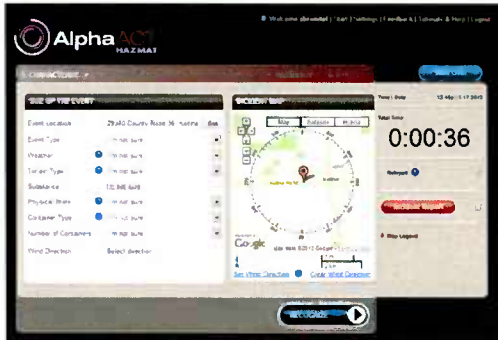
Purpose   Enter known scenario conditions

Tasks
- Use dropdowns to enter known information
- Use the mouse to set wind direction
- Select a substance from the substance list by clicking "I'm not sure"
- Click Recognize

RECOGNIZE
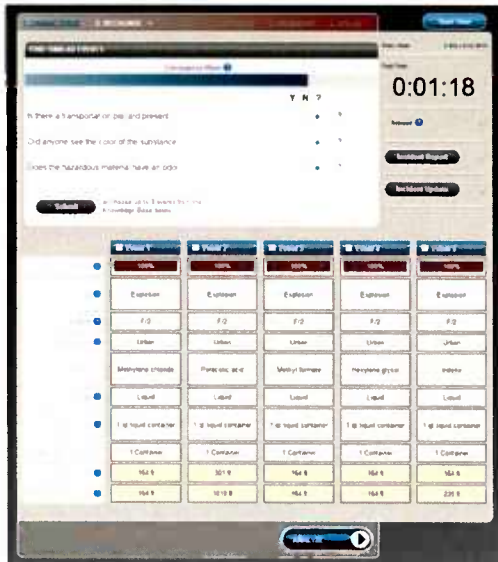
Purpose   Narrow the search for similar cases

Tasks
- Answer the questions posed by the system
- Watch for the arrival of incident updates
- Check the convergence meter to see how close you are to a good enough case
- Select up to three scenarios that best match scenario conditions
- Click Analyze

ANALYZE

Purpose Evaluate the cases to see if they fit scenario conditions

Tasks
- Compare the cases against scenario conditions
- Examine the Isolation Zone and Protective Action Zone sizes
- Review the substance data sheets for potential impacts
- Select a case to tailor
- Click Customize

CUSTOMIZE
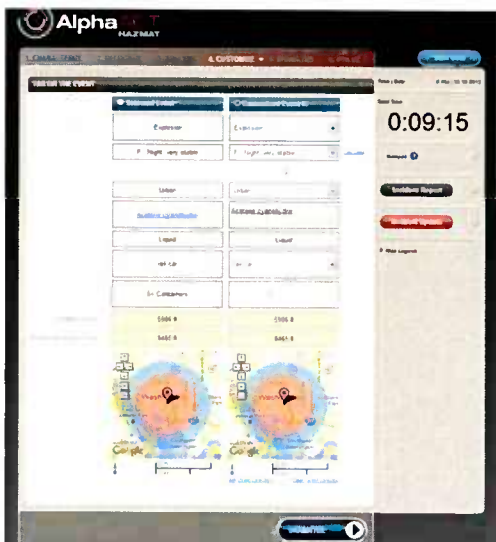
Purpose Tailor the case to scenario conditions

Tasks
- Watch for the arrival of incident updates
- Modify the event characteristics to match scenario conditions
- Review the effects on the Isolation Zone and Protective Action Zone sizes
- Click Dramatize

DRAMATIZE
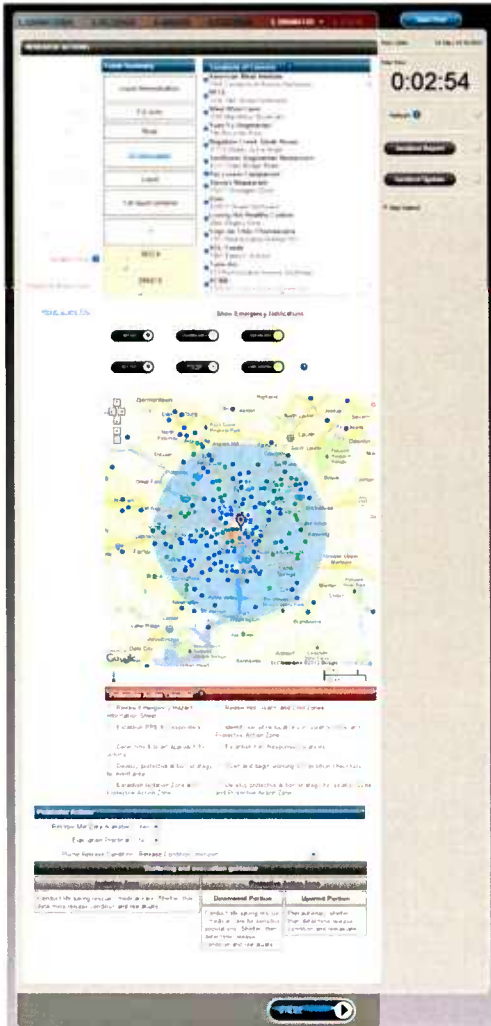
Purpose   Mentally rehearse the decision and actions

Tasks
- Review the scenario summary
- Review the protective action checklist
- Review the locations of concern within the zones for evacuation planning
- Place key response locations on the incident map
- Specify what emergency notifications to make
- Click Utilize

UTILIZE
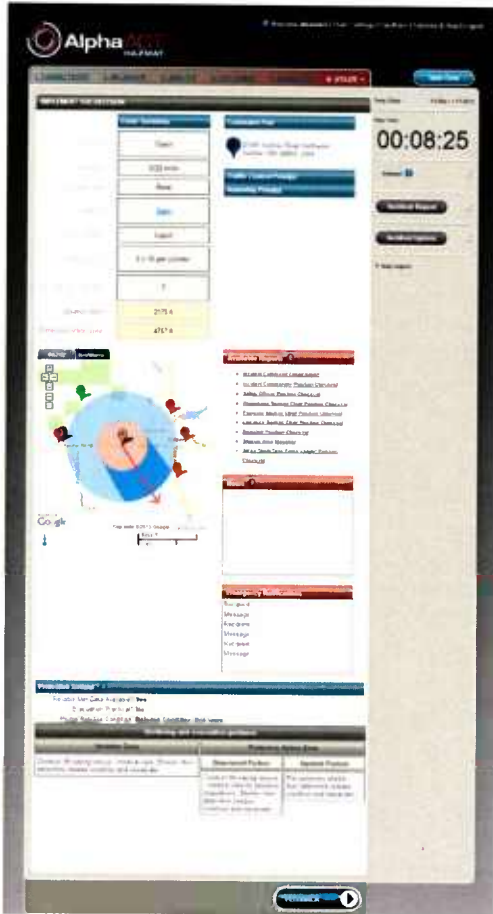
Purpose   Put your decision into play

Tasks
- Review the details of your decision
- Review position checklists as needed
- Review meteorological and plume release conditions
- Evaluate the practicality of evacuation
- Click Session Feedback to see how well you scored

AlphaACT HAZMAT

Technical Description

July 2012

Prepared by

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success. We specialize in crisis decision-making solutions for hazardous materials incidents.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

AlphaACT technology is a patent-pending solution of AlphaTRAC, Inc.

AlphaACT and AlphaTRAC are registered trademarks of AlphaTRAC, Inc.

Contents

Figures

1 INTRODUCTION

Among the most difficult of decisions to make are those made in crisis: an unstable situation of extreme danger or difficulty. Crisis decisions share a common set of characteristics:

- Time urgency
- Poor or incomplete information
- Complex event or decision characteristics
- Rapidly changing conditions
- A chaotic environment
- High physical and emotional stress
- Competing demands for decision maker attention
- Frequent interruptions during decision-making
- Severe consequences for decision failure

AlphaACT® HAZMAT is a web-based training solution for first responders who deal with hazardous material releases. Using training scenarios, AlphaACT HAZMAT helps users improve their decision-making skills, even when event information is sketchy or incomplete.

Based on the recognition-primed decision model, the system uses the observable characteristics of a release to identify similar events from a knowledge base and then use that information to help you determine the appropriate protective actions to take.

This document presents an in-depth description of AlphaACT HAZMAT and the methodologies and technical principles on which it was built. It includes the following sections:

- Section 2: AlphaACT HAZMAT: Scope of Use
- Section 3: The Recognition-primed Decision Model
- Section 4: How AlphaACT HAZMAT Works
- Section 5: System Design
- Section 6: Technical Design Basis
- Section 7: Technical Specifications
- Section 8: Information Security
- Section 9: Standards Compliance
- Section 10: Quality Assurance
- Section 11: Abbreviations and Acronyms
- Section 12: References

2 AlphaACT HAZMAT: SCOPE OF USE

AlphaACT HAZMAT's scope of use is defined by the boundaries of the decision-making processes it was intended to address as characterized by:

> The people who make the decisions
> The decisions they make
> The environment in which the decisions are made

AlphaACT HAZMAT was designed for decision makers including:

> Emergency responders required to make decisions on the fly during an emergency
> Incident Commanders
> Emergency Operations Center (EOC) managers
> Members of National Incident Management System (NIMS) Incident Command Structure (ICS) teams with delegated decision authority

AlphaACT HAZMAT is used to train people on decision-making regarding:

> Areas where protective actions may be necessary
> Protective actions for:
>   - Workers
>   - Members of the public
>   - Emergency responders
>   - Special groups and locations
> Personal protective equipment for emergency responders
> Locations for emergency response assets and activities

AlphaACT HAZMAT is a training tool for a decision-making environment that:

> Occurs in the early phase of an emergency (the first minutes to the first few hours)
> Encompasses the event scene, the Incident Command Post, and the EOC
> Is characterized by high stress, time urgency, limited or suspect information, high stakes, personal danger, multiple demands on the decision maker, and limited focus time

This scope of use was used as the basis for AlphaACT HAZMAT's design.

3 THE RECOGNITION-PRIMED DECISION MODEL

Decision research in the past decade has identified the *naturalistic decision model* as the one most often used successfully by crisis decision makers. The naturalistic model focuses on the recognition of changes in a situation to initiate decision-making, as opposed to the analytical approach of the rational choice model.

Derived from extensive field studies of military and emergency response decision makers, a formalized adaptation of the naturalistic model called the recognition-primed decision (RPD) model integrates two processes:

> ➤ How decision makers recognize and size up a situation
> ➤ How they evaluate the course of action by imagining it and mentally rehearsing process and outcomes

In recent years, decision researchers identified the RPD model as an approach often used by successful crisis decision makers (Klein 1993, 1998). It is considered the most appropriate framework for describing how proficient decision makers operate, especially under conditions of time pressure and uncertainty (Lipshitz et al. 2001). It is also the decision-making method prescribed for use in a wide range of crisis-prone environments.

The essential process of the RPD model is to recognize and apply past experiences as a way to find a solution to the problem at hand. The basic steps of the RPD model are to:

1. Size up the situation using available information
2. Search a knowledge base for the first event that adequately matches current conditions
3. Compare the past event to the situation at hand
4. Adapt and modify the past event to reflect the current event
5. Mentally rehearse the decision to verify it is likely to work
6. Put the decision into play

The RPD model is the approach in actual use 68% of the time by military commanders and 70% of the time by successful emergency response decision makers (Klein 1998).

The RPD model works because:

> ➤ *It is fast:* The first "good enough" solution is found and implemented, avoiding the need to characterize or compare all options to find the optimal solution
> ➤ *It reduces complexity:* An existing event is selected and adapted, avoiding the need for a full analysis; as a result, "paralysis by analysis" is avoided

➤ *It works with limited data:* Partial characterization of an event triggers recognition, helping to avoid "paralysis by data collection"

➤ *It detects and diagnoses poor data:* Information that doesn't fit the model is quickly detected, causing a change in the solution or rejection of the anomaly

➤ *It adapts to rapidly changing event conditions:* Expectations are developed for "what next" and, if not matched, the change is quickly captured and the decision modified

➤ *It converts chaos into order:* It converts a confusing situation into a recognized analog

➤ *Most important of all:* It aligns with the way effective decision makers think

AlphaACT HAZMAT employs a pattern recognition engine to implement the RPD model.

4 HOW AlphaACT HAZMAT WORKS

AlphaACT HAZMAT is a training solution that lets you practice decision-making in real time. It presents you with a scenario that includes the often incomplete and contradictory information you'd encounter during an actual incident. Then it lets you decide how to proceed while the clock is ticking and tells you afterwards how well you did.

AlphaACT HAZMAT uses a structured approach to emergency response decision-making that is based on an adaptation of the RPD process, as shown in the following figure.

Where you:

1. Characterize — Size up the situation

2. Recognize — Find similar events in the knowledge base

3. Analyze — Evaluate the events to see if they fit current conditions

4. Customize — Tailor the selected event to current conditions

5. Dramatize — Mentally rehearse the decision

6. Utilize — Put the decision into play
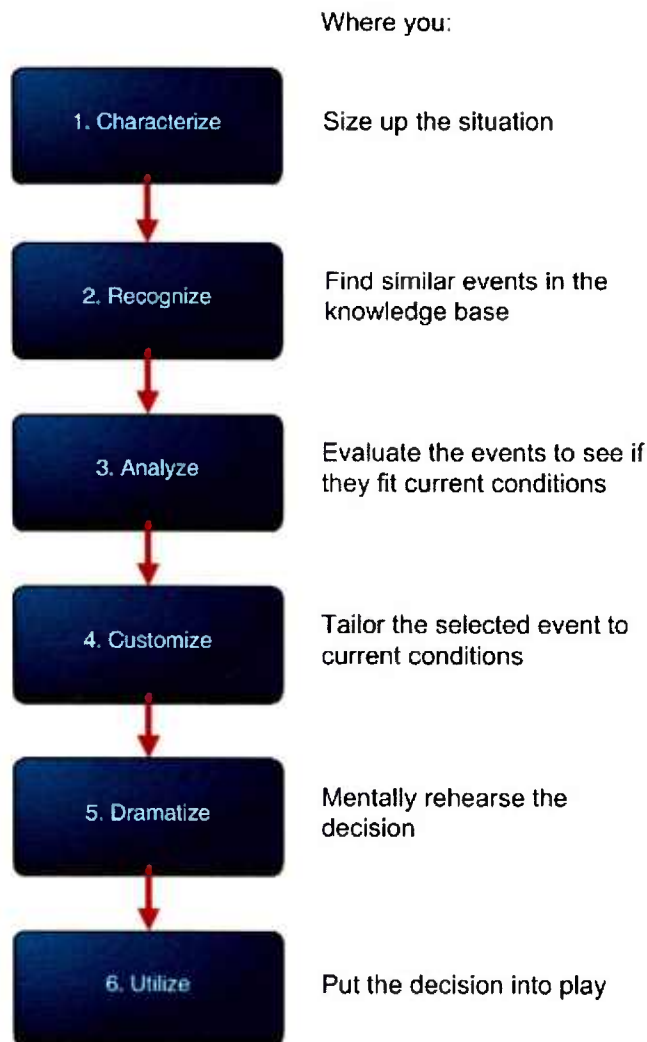
Figure 1   The AlphaACT HAZMAT decision process

The AlphaACT HAZMAT interface is based on this structured approach.

Using realistic though fictional incident scenarios, AlphaACT HAZMAT simulates the flow of information as you'd experience it during a response to an actual event. Some of the scenarios include audio and visual cues—things like verbal witness reports and images of the event scene—to heighten the sense of realism.

4.1   Getting Started

After you select a training scenario to play, the system presents an initial dispatch message.

Figure 2   The initial dispatch message

After starting the scenario, you receive further information about the event as you are hypothetically en route to the scene.
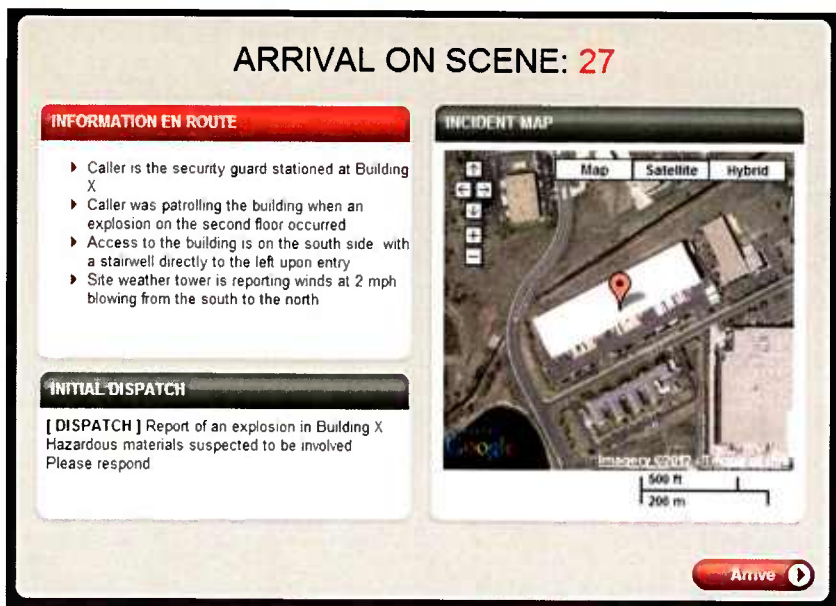
Figure 3   Information received en route

When you "arrive at the scene" (and the Characterize page), you get more details in the form of an incident report, which presents the kind of information you would determine about the event as you size up conditions and talk with witnesses and victims.

4.2 Characterize: Sizing up the Situation

Using the Characterize page, you size up the situation much as an Incident Commander would upon first arriving at the scene of an actual event.
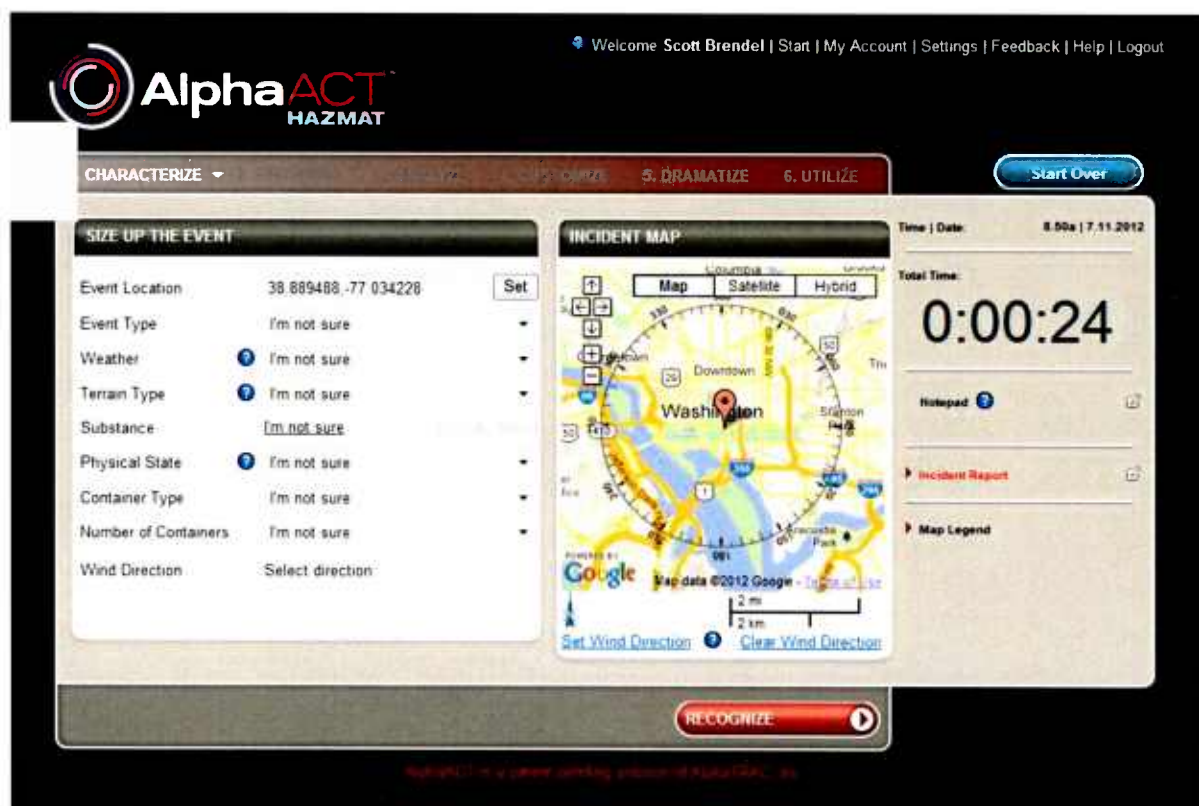
Figure 4   The Characterize page

The system prompts you to enter the initial information known about the event (which, for training purposes, is contained in the incident report). This may include:

- The event type
- The weather conditions
- The terrain type
- The substance that was released

> The physical state of the substance
> The number and type of containers involved
> The wind direction

The incident report may or may not include all the information you need to assess the situation, forcing you to deal with the same kind of ambiguity you might encounter during real crisis events.

Working from the incident report, you enter the information you know about the event on the Characterize page then move on to the next step by clicking Recognize.

4.3 Recognize: Finding Similar Events

AlphaACT HAZMAT searches its knowledge base for events with characteristics that are similar to the event conditions you entered. Then it computes the likelihood of the events matching current scenario conditions and presents the top five events. These are shown on the Recognize page.
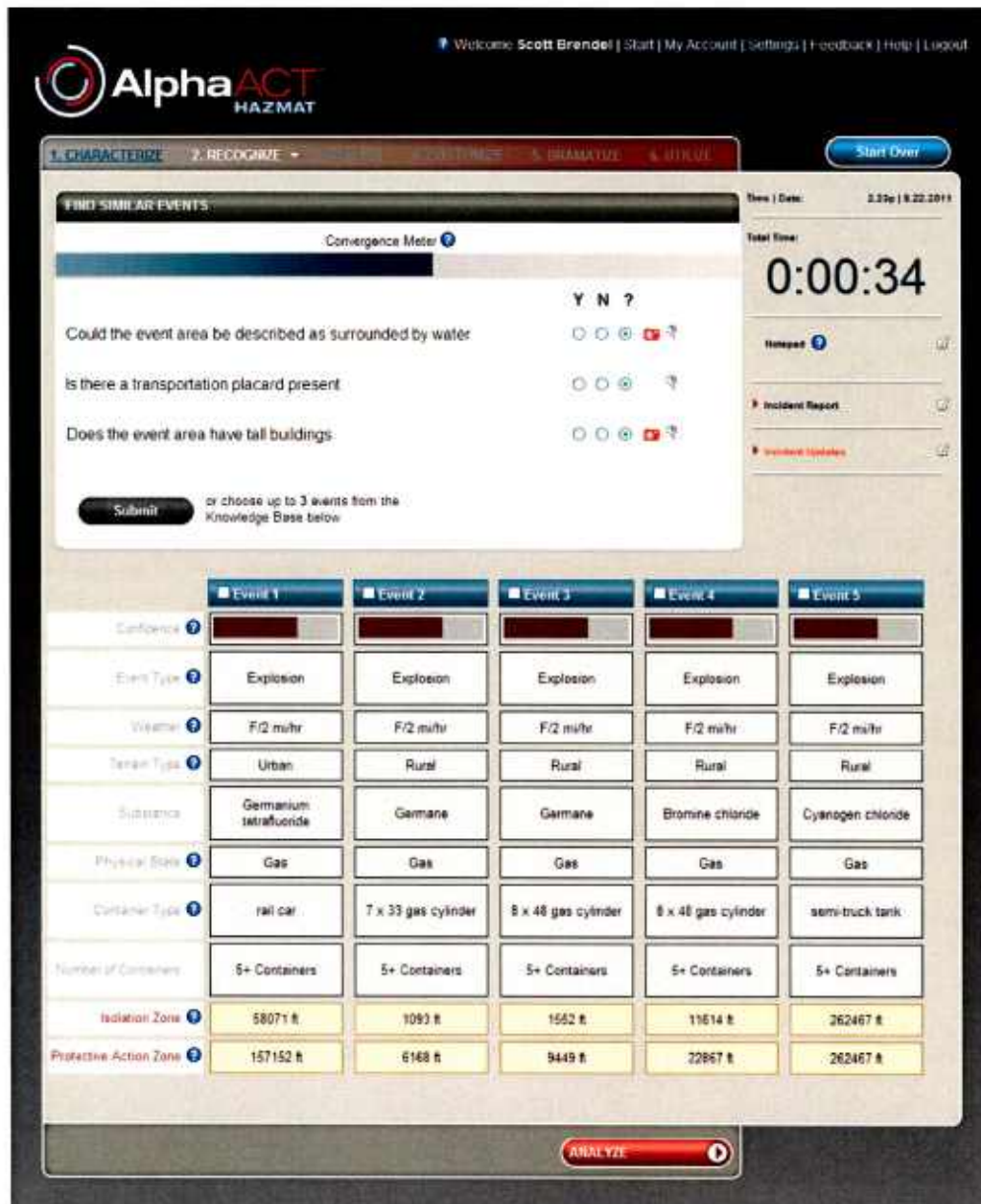
Figure 5   The Recognize page

AlphaACT HAZMAT next walks you through questions that probe for additional information that can be used to narrow the search for similar events.

While you are working the scenario, incident updates—information about changing event conditions that you need to take into account—may appear at any time, just as they would during a real event.

As you continue to answer questions:

➤ The convergence meter at the top of the page shows how close you are to identifying a good enough event with a useful Isolation Zone and Protective Action Zone

➤ The confidence meters above each of the events shown on the bottom half of the page show how sure AlphaACT HAZMAT is that the given event matches your inputs for the situation

The automated interview—of questions posed by the system and the answers you provide—ends when you select up to three of the scenarios that best match the limited information that is known and click Analyze.

4.4 Analyze: Evaluating the Events

On the Analyze page, you examine the events you selected on the Recognize page to determine how closely they match the conditions described in the scenario you're working on.

Figure 6   The Analyze page

AlphaACT HAZMAT presents maps of the impacted area centered on the event scene that show:

➤ The Isolation Zone—the area closest to the release where fatalities are likely
➤ The Protective Action Zone—the area immediately outside the Isolation Zone where serious and irreversible health effects to people are likely

Through emergency hazard information sheets, the system provides information about the substance's characteristics, incompatibilities, the potential hazards it presents, the symptoms it produces in victims, and recommendations regarding personal protective equipment, first aid, and firefighting measures.

Once you've decided which event to use as the basis of your decision, you select it and click Customize.

4.5   Customize: Tailoring the Selected Event

On the Customize page, you adapt the scenario you selected to more closely reflect known conditions by modifying the characteristics of the selected event.

Figure 7   The Customize page

The Customize page shows the selected (base) event to the left with the results of your customization on the right. Among the differences shown—crucial to your decision—are the maps showing the resulting sizes of the Isolation Zone and the Protective Action Zone.

As you make changes to event characteristics, the system automatically updates the results on the incident map. Once you've tailored the event to current conditions, you click Dramatize.

4.6 Dramatize: Rehearsing the Decision

Using the Dramatize page, you can mentally rehearse the actions you intend to take.
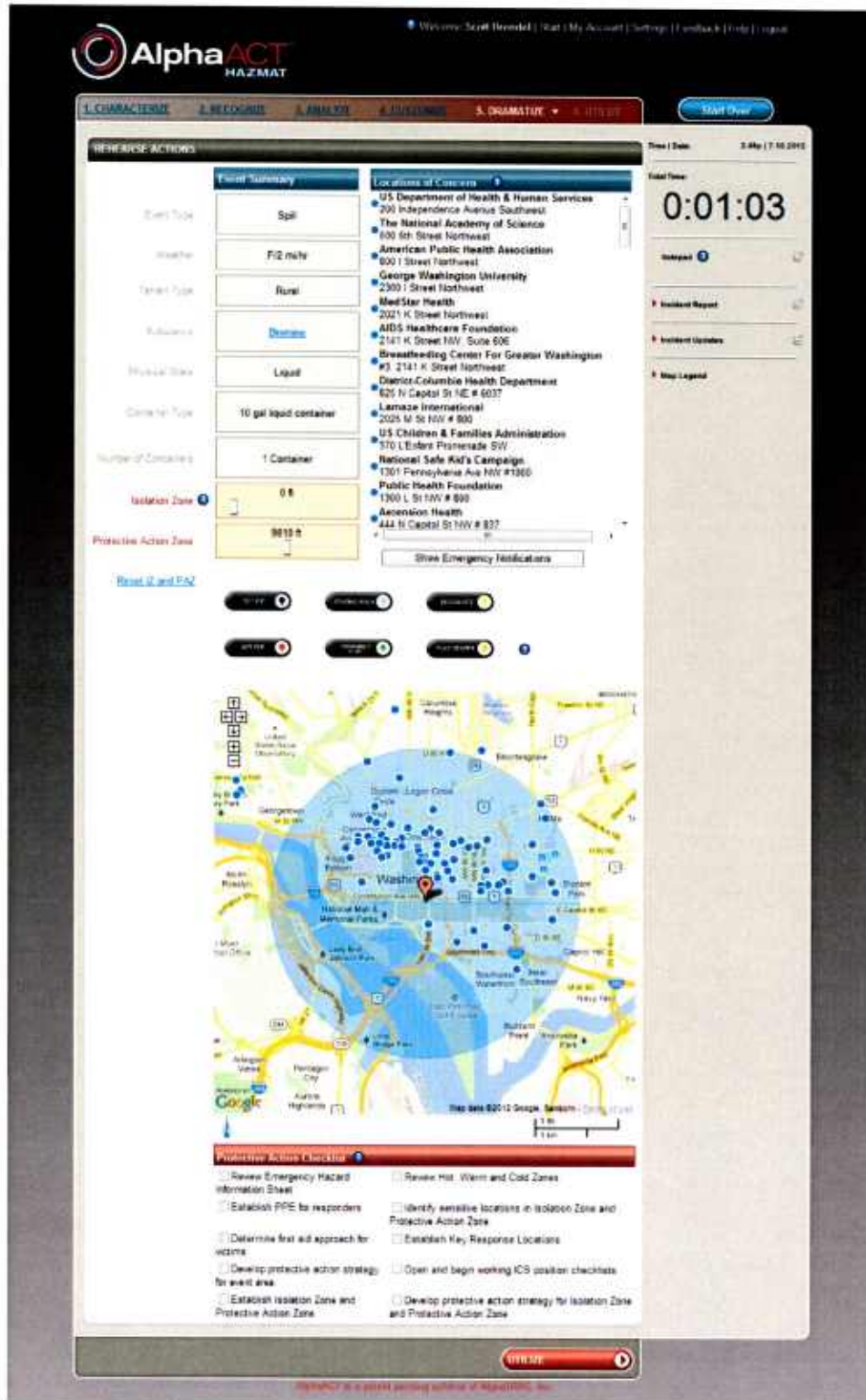
Figure 8   The Dramatize page

AlphaACT HAZMAT shows you the event summary information. It also lists several protective actions to consider.

The incident map shows the Isolation Zone and the Protective Action Zone. If you set the wind direction, the incident map differentiates the Protective Action Zone into a downwind portion and an upwind portion. A separate tab presents a map with an overlay of the Hot Zone and the Warm Zone (used for establishing decontamination plans and sites).

The system also identifies nearby locations of concern that merit special consideration during evacuation planning, including:

> Sensitive or restricted population facilities (such as nursing homes, schools, or jails)
> Critical infrastructure facilities (such as public health centers, banks, or government facilities)
> Emergency response facilities (such as fire stations, police stations, or hospitals)

These locations of concern are listed in an address table and shown symbolically on the incident map. Detailed information about each location of concern may be obtained by mousing over and selecting the location on the incident map.

The incident map is initially based on the Isolation Zone and Protective Action Zone distances determined in the Customize step. In the Dramatize step, the decision maker is allowed to change the size of the Isolation Zone or the Protective Action Zone based on judgment. For instance, the Protective Action Zone may be extended to include locations of concern that fall just outside the zone as originally calculated.

On the Dramatize page, you decide where to set up key NIMS-based response activities that will be crucial to event response, including:

> The Incident Command Post
> Traffic control points
> Staging areas
> Assembly points
> Decontamination sites
> Evacuation centers

You can also specify the recipients of emergency notifications.

Once done, you click Utilize.

4.7   Utilize: Putting the Decision into Play

Once the key decisions have been made, the Utilize page of AlphaACT HAZMAT:

- ➤ Summarizes the event conditions
- ➤ Lists your decisions about response locations
- ➤ Provides access to NIMS-compliant checklists you can use to put your plan into action
- ➤ Lists the emergency notifications you intend to make
- ➤ Summarizes your protective action decisions for sheltering and evacuation

The Utilize page is shown in the following figure.
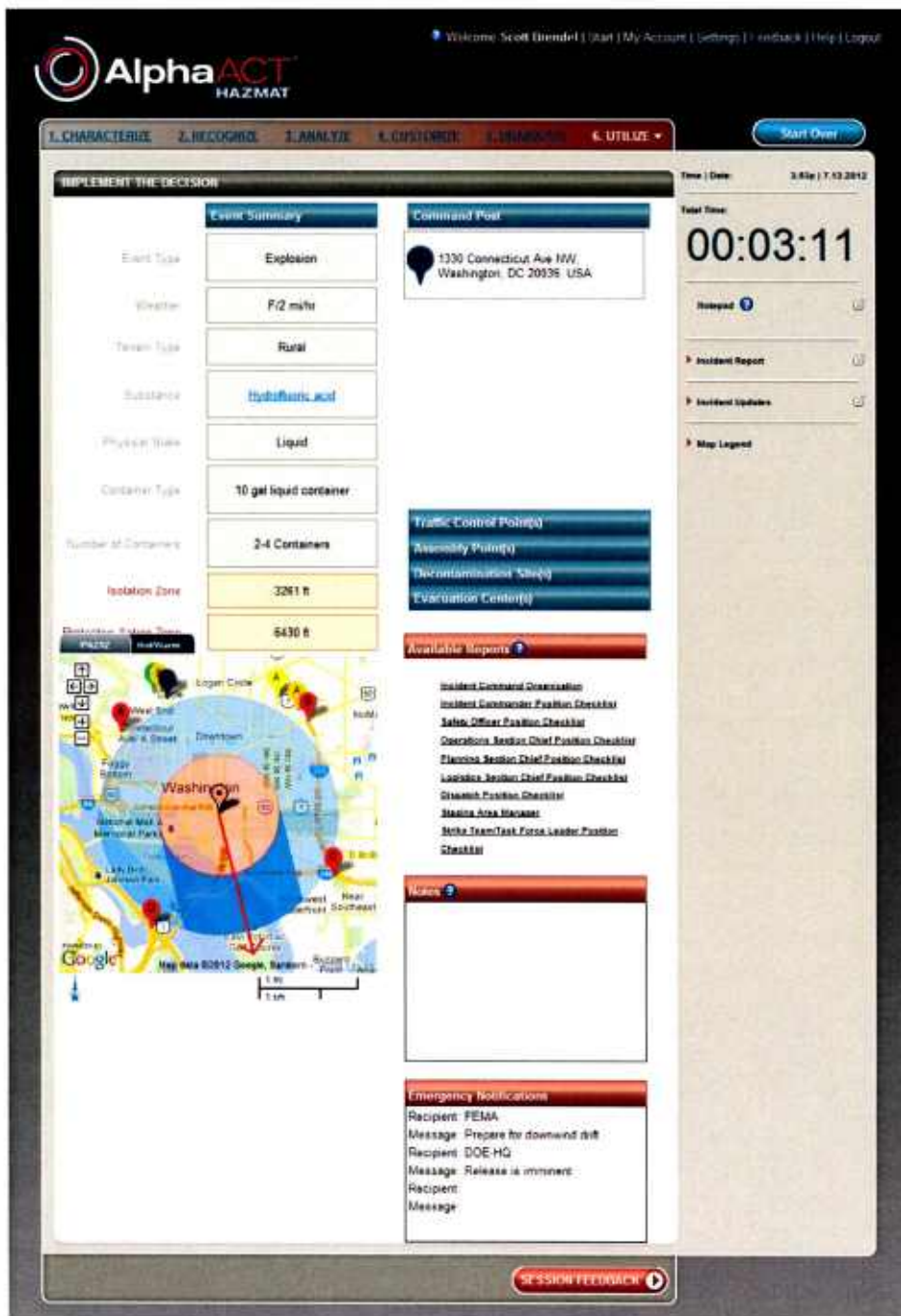
Figure 9   The Utilize page

This marks the completion of the training scenario. Afterwards, the new event and cues that prompted recognition, as well as the actual decision, are automatically entered into the knowledge base. This allows the knowledge base to grow and the system to adjust its search algorithm to improve subsequent event recognition and decisions.

4.8   Session Feedback

When playing a scenario in AlphaACT HAZMAT, you have to piece together information about the event based on what you know about it, just as you would in a real event. But no matter what assumptions you make, there is a set of facts behind every event, and the same is true of the training scenarios in AlphaACT HAZMAT. Each training scenario is based on a specific set of conditions that affect the resulting consequences.

When you play a training scenario, your goal is to determine what the actual event conditions are. AlphaACT HAZMAT helps you through the process of deduction, but in the end, you may get some event conditions right and some wrong. When scoring your results, AlphaACT HAZMAT compares the actual event conditions the scenario is based on to the event conditions that you decided on as you played the scenario.

The scoring methodology also attempts to realistically balance the conflicting needs of the timeliness of a decision against its accuracy, reinforcing the principle that a good-enough decision made quickly is often better than a more accurate decision made too late.

Scoring is based on the following criteria:

- ➤ The outcome, based on:
  - *Case similarity:* How accurately the characteristics of the event you selected and customized match the characteristics of the event the scenario is based on
  - *Isolation Zone accuracy:* How closely the Isolation Zone distance of the event you selected and customized matches the distance of the event the scenario is based on
  - *Protective Action Zone accuracy:* How closely the Protective Action Zone distance of the event you selected and customized matches the distance of the event the scenario is based on
- ➤ The process, as measured by:
  - *Overall time*: How long it takes you to work the scenario from the beginning of the Characterize step to the end of the Dramatize step
  - *Characterize/Recognize time*: How quickly you move through the Characterize and Recognize pages
  - *Analyze/Customize time*: How quickly you move through the Analyze and Customize pages
  - *Dramatize time*: How quickly you complete the Dramatize page
  - *Customize action*: Whether you take appropriate action on the Customize page
  - *Dramatize action*: Whether you take appropriate action on the Dramatize page

Scoring is based on a total of 1,000 possible points per scenario as shown in the following table.

Criteria	For	Points available	Points awarded
Outcome	Case similarity: Correctly matching the characteristics of the event the scenario is based on, including: • Event type • Weather (by matching either class or wind speed) • Terrain type • Substance released • Physical state of the substance • Container size • Number of containers	300	Match 7 = 300 Match 6 = 275 Match 5 = 250 Match 4 = 225 Match 3 = 200 Match 2 = 125 Match 1 = 50 Match 0 = 0
	Isolation Zone accuracy: Correctly matching the Isolation Zone distance on Customize	200	*Described at the end of this table
	Protective Action Zone accuracy: Correctly matching the Protective Action Zone distance on Customize	200	
Subtotal		**700**	

Process	Overall time: Completing the scenario (from the beginning of Characterize to the end of Dramatize) in a certain amount of time	100	Completion time:
			
			$\leq$ 10 min = 100
			  11 min = 80
			  12 min = 60
			  13 min = 40
			  14 min = 20
			  15 min = 0

	Characterize/Recognize time: Completing the two steps within 2 to 6 minutes	50	Completing the steps within the time range = 50 Completing the steps in less than or more than the time range = 0
	Analyze/Customize time: Completing the two steps within 1 to 4 minutes	50	
	Dramatize time: Completing the Dramatize step within 1 to 4 minutes	25	
	Customize action: Taking any action on the Customize page (Example: Modify any characteristic of the selected event)	25	Any action = 25 No action = 0
	Dramatize action: Taking any action on the Dramatize page (Example: Place traffic control points on the incident map)	50	
Subtotal		**300**	
Total		**1,000**	

* Based on selected ÷ actual zone distance (%):

≥ 221% = +20 points
201-220% = +50 points
175-200% = +80 points
150-174% = +110 points
125-149% = +140 points
 91-124% = +170 points
 75-90% =   +95 points
 50-74% =   +20 points
 25-49% =   −25 points
  1-24% =   −50 points

The scoring reflects that it is better to overestimate than underestimate the sizes of the Isolation Zone and Protective Action Zone.

If either the selected or actual distance is 0, points are awarded as follows:

> If the selected zone distance was 0 when the actual zone distance was > 0, then an emergency existed but was overlooked. Score = −100 points.
> If the selected zone distance was > 0 when the actual zone distance was 0, then an emergency did not exist and the decision to implement protective actions constituted a false alarm. Score = −50 points if the error was > 300 feet; +100 points if zone distance was between 300 feet and 1 foot.
> If both the selected and actual zone distances were 0, then the user correctly matched. Score = +200 points.

Results are rated as follows.

Score		Rating
From	**To**	
-200	400	Needs improvement
401	600	OK
601	800	Good
801	1,000	Excellent

4.9 After Action Reviews

AlphaACT HAZMAT lets you conduct an after action review (AAR) after you complete a training scenario. The system leads you through a series of pages that ask you to rate yourself on a particular task and note the things that went well or that caused problems.

The AAR can be saved for future reference and used as a source of lessons learned.

5 SYSTEM DESIGN

At a conceptual level, AlphaACT HAZMAT is comprised of a number of components:

- The knowledge base
- The pattern recognition system
- The geographical information system (GIS)
- The user interface
- Information outputs

This section presents an overview of each.

5.1 The Knowledge Base

At the heart of AlphaACT HAZMAT is the knowledge base, a database that serves as the foundation of the system and allows thousands of virtual decision scenarios to be built through data relationships.

The knowledge base includes data about:

- Event characteristics
- Cues
- Correlations of event characteristics to cues
- Consequence modeling results
- Cases

The knowledge base is also the repository for the training scenarios, which are based on the underlying data and used to help people learn how to come to appropriate decisions in the absence of clear and complete information.

5.1.1 Event Characteristics

Event characteristics are the factors that have a bearing on how dangerous the event could be and are used to model the consequences of a release.

The event characteristics in the AlphaACT HAZMAT knowledge base are categorized as:

- Event type
- Meteorological conditions
- Terrain type
- Substance
- Physical state of the substance
- Type and size of the container holding the substance
- Number of containers released

Each category contains a varying number of characteristics. The following table shows the event characteristics for all categories except for substance; substances addressed in AlphaACT HAZMAT are listed in Appendix A.

Table 1   Event characteristics

Category	Characteristic		
Event type	I'm not sure Spill Fire Explosion Crash Liquid aerosolization		
Meteorological conditions	I'm not sure Day or night with strong wind Day with light wind, clear skies Night with light wind, some clouds Night with near-calm weather conditions		
Terrain type	I'm not sure Urban Rural		
Physical state	I'm not sure Gas Liquid Powder		
Type of container	Gas cylinders • I'm not sure • 7 x 33 • 4 x 13 • 9 x 26 • 4 x 27 • 2 x 12 • 9 x 51 • 8 x 48 • 6 x 19	Liquid containers • I'm not sure • 1 pint • 1 quart • 2 quart • 1 gallon • 5 gallon • 10 gallon • 55 gallon drum • 100 gallon tank • 200 gallon tank • 300 gallon tank • Truck tank • Rail car	Particulate containers • I'm not sure • 1 pound • 5 pound
Number of containers	1 2-4 5+		

The AlphaACT HAZMAT knowledge base includes information about over 150 chemicals. Appendix A lists the substances currently known to AlphaACT HAZMAT.

5.1.2 Cues

Cues are observable indicators that identify or imply event characteristics. For example:

> ➤ The presence of smoke (a cue) might suggest the event is a fire (a characteristic)
> ➤ A garlicky odor (a cue) might suggest the chemical white phosphorus (a characteristic)
> ➤ Densely packed high-rise buildings (a cue) suggest an urban setting (a characteristic)

In AlphaACT HAZMAT, cues are expressed as questions asked by the system to help determine what the underlying event characteristics are when you don't know or are uncertain.

5.1.3 Correlating Cues to Characteristics

The knowledge base correlates cues to event characteristics.

The relationship between cues and characteristics is designated as one of three possibilities:

> ➤ +1 indicates a positive correlation between the cue and characteristic
> ➤ -1 indicates a negative correlation between the cue and characteristic
> ➤ 0 indicates that there is no correlation between the cue and characteristic

For example:

> ➤ Flames would be a definite indication of a fire, so the intersection of *Fire* and *Did anyone see flames* would get a +1
> ➤ Flames would clearly indicate that the event was *not* a liquid aerosolization, so the intersection of *Liquid aerosolization* with *Did anyone see flames* would get a -1
> ➤ Since flames (and therefore a fire) do not directly indicate the physical state of the substance (i.e., gases, liquids, or particulates), there is no correlation between the cue and the characteristics, so the intersection of *Liquid* with *Did anyone see flames* would get a 0

5.1.4 Cases

Cases are constructed from the many different combinations of event characteristics, cues, and the calculated consequences which determine the size of the Isolation Zone and Protective Action Zone. Initially, AlphaACT HAZMAT will include millions of cases.

As users introduce new cases through the use of AlphaACT HAZMAT, the new cases will be integrated with the existing cases, and AlphaACT HAZMAT will learn new patterns based on the larger base of information.

5.1.5 Scenarios

Each training scenario in AlphaACT HAZMAT is like a short story that describes what happened in a hypothetical event. Like most stories, a scenario is told from the point of view of the people involved in it—primarily the first responders who arrive on the scene after some event has taken place, but also the witnesses and victims who tell the first responders what they saw or what they think happened.

In AlphaACT HAZMAT, the scenario is presented in the form of an incident report—which tells the story as it is initially understood—and as incident updates, where you as the first responder learn of new, changing, or even conflicting information about the event. The incident report and incident updates provide the kind of information and concrete details needed to fill out the Characterize page and answer the questions on the Recognize page, information equivalent to event characteristics and cues.

AlphaACT HAZMAT presents the incident report at the outset of the training session, as if you had received the information from a dispatcher prior to arrival at the scene. Incident updates—up to two of them—can appear while you are working on the scenario, specifically on the Analyze and Customize pages.

Information found in scenarios typically includes event characteristics and cues you need to determine the right way to deal with the situation. This includes:

> Event location
> Event type
> Weather conditions
> Terrain type
> Substance
> Symptoms experienced by people following exposure
> Color and odor of the substance
> Physical state
> Container type
> Department of Transportation (DOT) placard
> Number of containers

The information is provided in the form of clues — for example, explaining the height of a container relative to a person, rather than identifying the actual container type. This helps people grapple with the ambiguity of the information they are likely to encounter during actual events when information may not be precise or complete.

5.2 The Pattern Recognition System

AlphaACT HAZMAT employs a pattern recognition engine (an artificial intelligence engine) to manage and analyze the knowledge base of decision experiences. By comparing patterns in information known about an event or scenario to experiences stored in the knowledge base, the pattern recognition engine identifies and presents:

> The events that are the most similar to the scenario
> The "next best question" to ask the user

AlphaACT HAZMAT uses a weighted attribute constellation search algorithm applied to a simple match score calculation for each event in the knowledge base against the current known information.

5.3 The Geographical Information System

A key feature of AlphaACT HAZMAT, crucial to its use in emergency response, is the incident map.   Incident maps are used:

> On the Characterize page to show the event location and to set or adjust wind direction
> On the Analyze page to show the Isolation Zone and Protective Action Zone of the events you're evaluating
> On the Customize page to let you see the results of the changes you make to event characteristics (including adjustments to wind direction)
> On the Dramatize page to help you identify the event's impact on locations of concern and to set key response locations for the emergency response assets you plan to deploy
> On the Utilize page to serve as a visual record of the event's impact and your planned response

In AlphaACT HAZMAT, incident maps and geospatial data are provided through integration with Google Maps. However, because AlphaACT HAZMAT specifies locations using geographic coordinates, it can be integrated with most other mapping systems.

The maps use several types of overlays which are calculated and drawn using geographic coordinates. One of the overlays—which displays the locations of concern on the Dramatize page—also uses Google keyword lookups (which can be selected and set on AlphaACT HAZMAT's Settings page).

5.4 The User Interface

AlphaACT HAZMAT is a web application integrated with and accessed through a web portal.

The web portal includes a rich set of information and social media features, including:

> A community forum that subscribers can use to share information and experiences
> A community scoreboard that lets you see how well you're doing compared to the top performers in your community
> Help and training information, including:
> - A product demonstration
> - Video tutorials on system use
> - A user guide and quick reference
> - Answers to frequently asked questions
> An account page that lets you review the status of your subscription
> A feedback page that lets you offer feedback on system use and learn about recent updates

The web applications is the part of the product that supports the six-step decision process that is described more fully in Section 4.

5.5 Information Outputs

5.5.1 Emergency Hazard Information Sheets

Identifying the substance released during an event is key to consequence assessment.   Once the substance has been identified, it is imperative that its properties be understood well enough for emergency responders to deal with it.

To that end, AlphaACT HAZMAT provides links to emergency hazard information sheets. Distilled from material safety data sheets developed by hazardous chemical manufacturers and other sources used by the emergency management community, these documents include information about:

> Chemical characteristics
> Incompatibilities
> Potential hazards
> The symptoms a substance produces in victims
> Recommended personal protective equipment
> First aid and firefighting measures

These documents can be viewed online and printed out.

5.5.2 Position Checklists

AlphaACT HAZMAT includes position checklists for personnel in the following key ICS roles, including:

- The Incident Commander
- The Dispatcher
- The Planning Section Chief
- The Operations Section Chief
- The Logistics Section Chief
- The Safety Officer
- The Staging Area Manager
- The Strike Team/Task Force Leader

The position checklists describe additional measures to be taken by key members of the Incident Command Team. They are based on NIMS checklists and are geared for the incident command structure recommended by NIMS.

6 THE TECHNICAL DESIGN BASIS

AlphaACT HAZMAT's technical design basis derives from emergency management principles that were established by DOE. This section describes:

- Protective action criteria
- Consequence assessment
- Dispersion modeling
- Event classification
- Protective actions

This section also discusses how AlphaACT HAZMAT can be used to conduct "what-if" modeling and help Incident Commanders determine the best placement of emergency response assets.

6.1 Protective Action Criteria

The fundamental basis for consequence-based decision-making is the comparison of downwind concentrations to protective action criteria (PACs). PACs are consequence levels that, if observed or predicted, indicate action is needed to prevent or limit exposure of people to the hazard.

As specified in DOE G 151.1-2 (DOE 2007), PACs for assessing hazardous chemical releases are to be based on the following guidelines in order of preference:

➤ Acute Exposure Guideline Level-2 (AEGL-2) promulgated by the Environmental Protection Agency (EPA)

➤ Emergency Response Planning Guideline-2 (ERPG-2) published by the American Industrial Hygiene Association

➤ Temporary Emergency Exposure Limit-2 (TEEL-2) developed by DOE

The primary PACs used by AlphaACT HAZMAT for chemicals are based on these guidelines. These guidelines specify the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

A Threshold of Early Lethality (TEL) is also employed to assist in identifying areas where acute or life-threatening concentrations may be expected. TELs are based on AEGL-3, ERPG-3, and TEEL-3 levels, the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects.

6.2   Consequence Assessment

Consequences are assessed during a timely initial assessment, conducted within minutes of the Incident Commander's arrival at the event scene, and during ongoing assessments, which occur until the event response has been terminated.

In DOE, PACs are used in consequence assessment by establishing the boundaries of protection zones and contamination zones.

6.2.1   Protection Zones

Protection zones are used to differentiate areas with different levels of health impacts to exposed persons, leading to different types of protective actions.

The distances to TEL and PAC are used to establish two zones:

➤ The *Isolation Zone* is the area closest to the release where fatalities are likely. The Isolation Zone is the area in which consequences exceed the TEL.

➤ The *Protective Action Zone* is the area immediately outside the Isolation Zone where serious and irreversible health effects to people are likely. The Protective Action Zone is the area in which consequences exceed the PAC but not the TEL.

These areas are important to know when setting emergency response locations and planning protective actions. In the following figure, the Isolation Zone is the inner circle, while the Protective Action Zone is the outer doughnut. Wind direction is shown via the arrow; also highlighted is the area that is downwind of the Isolation Zone.
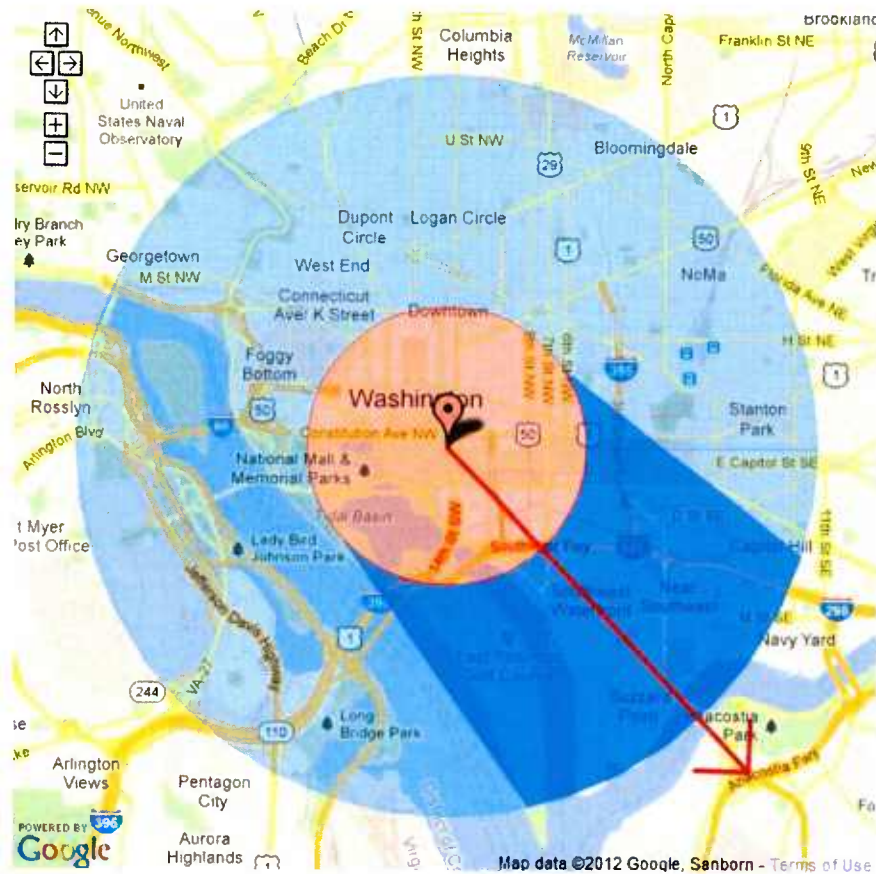
Figure 10   Protection zones

6.2.2   Contamination Zones

Contamination zones are used to differentiate areas with different levels of surface contamination. They are used to support the decontamination process and to limit the spread of contamination.

There are three levels of contamination zones:

➤ The Hot Zone is the area where the agent or contamination is in high concentration and high exposure. It includes the Isolation Zone, as well as the downwind portion of the

Protective Action Zone. Special protection is required for personnel in this zone. Contaminated personnel and equipment are typically moved from the Hot Zone to the Warm Zone for decontamination.

➤ The Warm Zone is the area where the agent or contamination is in low concentration or minimal exposure. It includes the portion of the Protective Action Zone not covered by the Hot Zone, as well as a section outside the downwind portion of the Hot Zone/Protective Action Zone. A lesser degree of personal protection may be required in this zone. Decontamination occurs in the Warm Zone.

➤ The Cold Zone includes all areas outside of the Hot and Warm Zones. Since there has been no exposure to the agent or contamination, there is no threat to human health or life, and special protective clothing is not required. Personnel and equipment in the Cold Zone should be either uncontaminated or already decontaminated.

Contamination zones are also important to know when setting emergency response locations, especially decontamination sites.

Figure 11   Contamination zones

6.3 Dispersion Modeling

The consequences from atmospheric releases of hazardous materials on receptors are estimated using atmospheric dispersion modeling. An atmospheric dispersion model calculates the air concentration, integrated exposure, and ground deposition, as applicable, from a release by estimating the changes in volume distribution of plume mass as a function of wind speed and atmospheric stability.

AlphaACT HAZMAT applies dispersion modeling methods recommended by the EPA, the Federal Emergency Management Agency (FEMA), and the DOT for assessing the hazards associated with airborne releases of extremely hazardous substances. Specifically, AlphaACT HAZMAT uses the methods and algorithms specified in the agencies' *Technical Guidance for Hazards Analysis—Emergency Planning for Extremely Hazardous Substances* (EPA/FEMA/DOT 1987) as amended and extended in EPA's *Risk Management Program Guidance for Offsite Consequence Analysis* (EPA 1999). These methods and algorithms also form the technical basis for the EPIcode® dispersion model widely used for emergency management across the DOE complex.

AlphaACT HAZMAT models five event types:

- *Spill*: A spill is a release involving a breach of primary containment that does not involve energy or fire, factors that typically affect the atmospheric dispersion of hazardous material.
- *Fire*: The heat emission of a fire causes the plume of hazardous material to become lofted, unlike in a spill. This usually results in lower concentrations of hazardous material close to the source, but may produce higher concentrations further downwind as the lofting effect of the fire diminishes and the plume settles to the ground.
- *Explosion*: In an explosion, the explosive energy contributes to the release of the hazardous material but not to the dispersion of the material. This usually causes more hazardous material to become airborne and respirable than spills.
- *Crash*: In a vehicle crash, the kinetic energy of the crash contributes to the release of the hazardous material, causing more hazardous material to become airborne and respirable than spills.
- *Liquid aerosolization*: Liquid aerosolization involves the conversion of a hazardous liquid or solution to dispersible droplets and the release of the material into the atmosphere. This usually causes more hazardous material to become airborne and respirable than spills.

6.4 Event Classification

The event classification process is used by DOE-Headquarters to characterize the severity of a site hazardous materials emergency for offsite agencies.

Event classification is determined by comparing projected consequences (based on PACs) to two key receptors—the facility boundary and the nearest site boundary—according to the following criteria:

➤ The event is classified as an *Alert* when the event consequences exceed the PAC at or beyond 30 meters (m) (100 feet [ft]) but not at or beyond the facility boundary (100 m [330 ft]).

➤ The event is classified as a *Site Area Emergency* (SAE) when the event consequences exceed the PAC at or beyond the facility boundary (100 m [330 ft]) but not at or beyond the site boundary.

➤ The event is classified as a *General Emergency* (GE) when the event consequences exceed the PAC at or beyond the site boundary.

The projected consequences are compared to the PAC and TEL to determine the appropriate consequence-based decisions for each scenario.

6.5 Protective Actions

Immediate evacuation, sheltering, or sheltering followed by evacuation are protective actions of choice for hazardous material events.

AlphaACT HAZMAT presents recommendations for protective actions based on the specific conditions of the event, the release, the plume, and your assessment of the stability of event conditions.

6.6 What-If Assessment

One of the most important activities that can help a decision maker stay ahead of an evolving crisis is the ability to conduct contingency or "what if" analyses. This might include questions like:

➤ What if the building catches fire?
➤ What if the delivery truck explodes?
➤ What if there are really two ruptured cylinders instead of one?
➤ What if the wind changes direction?

Considering such questions allows a decision maker to anticipate changing event conditions and adapt courses of action to avoid or address potential high risk situations. In this way, a crisis manager can continuously adapt planning for the event, leading to eventual resolution of the crisis.

Traditional consequence assessment methods often require 30 minutes or more to analyze a "what if" contingency, making the process unwieldy and impractical for rapidly evolving events.

In the Customize step, AlphaACT HAZMAT lets you quickly assess such scenarios by changing event characteristics individually or in combination. This includes:

➤ Event type
➤ Weather (wind speed, stability)
➤ Wind direction
➤ Terrain type
➤ Substance and physical state
➤ Container type
➤ Number of containers

When a parameter is changed, AlphaACT HAZMAT's atmospheric dispersion model automatically reanalyzes the event, projects consequences, and presents a revised consequence map showing the resulting Isolation Zone and Protective Action Zone. The new event and consequence map are shown beside the original event, allowing the decision maker to compare the consequences numerically and visually.

The process typically requires only 10 to 15 seconds to complete, making multiple evaluations practical, even during a fast-moving event.

6.7 Key Response Locations

First responders determine the appropriate locations for emergency response assets needed to handle an event:

➤ The Incident Command Post (ICP) is the location from which the Incident Commander oversees all field operations for an incident.
➤ Traffic control points (TCPs) are staffed or barricaded (unstaffed) locations along major roads around the perimeter of the incident used to prevent unauthorized personnel from entering the Protective Action Zone. They are also used at key points along evacuation routes.
➤ Staging areas are temporary locations where personnel, supplies, and equipment are kept while awaiting tactical assignment. Staging areas may include feeding, fueling, and sanitation services.
➤ Assembly points are (typically pre-designated) locations where personnel evacuated from a high hazard area initially gather prior to further evacuation. Accountability checks conducted at assembly points help determine if anyone remains in the high hazard area and may lead to search and rescue operations.
➤ Decontamination sites are locations where personnel who may have been exposed to hazardous materials during an incident are taken to be checked and/or decontaminated.
➤ Evacuation centers are locations where personnel are taken after evacuation from the Protective Action Zone.

AlphaACT HAZMAT lets you set these key response locations on the incident map for the event.

7 TECHNICAL SPECIFICATIONS

AlphaACT HAZMAT is a scalable, web-based system hosted on secure, central servers. It can be accessed through hardware devices typically available to emergency responders. The system supports Internet Explorer 8 and Google Chrome.

The product comprises a web application integrated with a web portal.

7.1 Web Portal

DotNetNuke is the content management system used as the platform for the web portal. Application programming interfaces (APIs) from third-party DotNetNuke developers are used for user management, while APIs from PayPal handle commerce transactions.

7.2 Web Application

AlphaACT HAZMAT was built using .NET Framework 4. The system's primary elements are written in ASP.NET (the web element) with a C# back end (the data element).

JavaScript is used for elements (such as transitions, pop outs, and Google Maps interactions) that make the system feel like an application. jQuery and Ajax Control Toolkit are used to speed up the coding of JavaScript.

Microsoft SQL Server is used to manage AlphaACT HAZMAT's extensive database and the pattern recognition engine.

8 INFORMATION SECURITY

AlphaACT HAZMAT meets Department of Homeland Security (DHS), Department of Defense (DoD), and DOE requirements for security at a For Official Use Only (FOUO) level.

The system has been designed with safeguards that minimize security and vulnerability concerns. It authenticates and certifies users for security purposes through:

- ➤ User account authorization and management
- ➤ Password-protected system access
- ➤ User login-in verification

Critical components of the AlphaACT HAZMAT host system are redundant to help ensure system availability. Reliability concerns are limited to the availability and bandwidth of Internet connections on the user end, as well as the reliability of users' computer equipment.

9 STANDARDS COMPLIANCE

AlphaACT HAZMAT is fully compliant with DOE O 151.1C and its implementing guidance. This compliance level is maintained as changes to guidance occur (e.g., through DOE Frequently Asked Questions) and standardized data (e.g., the DOE PAC database) are updated.

AlphaACT HAZMAT is also fully compliant with the NIMS ICS standards. FEMA certified AlphaACT HAZMAT under the NIMS Supporting Technology Evaluation Program (STEP).

10 QUALITY ASSURANCE

AlphaACT HAZMAT is being developed under a phased implementation of Institute of Electrical and Electronics Engineers (IEEE) software standards.

To date, the system has been developed to meet IEEE Level 1 standards, which involve the adoption of requirements specifications and test documentation.

11 ABBREVIATIONS AND ACRONYMS

AAR — After action review

AEGL — Acute Exposure Guideline Level

API — Application programming interface

DHS — Department of Homeland Security

DoD — Department of Defense

DOE — Department of Energy

DOT — Department of Transportation

EOC — Emergency Operations Center

EPA — Environmental Protection Agency

EPZ	Emergency planning zone
ERPG	Emergency Response Planning Guideline
FEMA	Federal Emergency Management Agency
FOUO	For Official Use Only
GE	General Emergency
GIS	Geographical information system
ICP	Incident Command Post
ICS	Incident Command Structure
IEEE	Institute of Electrical and Electronics Engineers
NIMS	National Incident Management System
PAC	Protective action criteria
RPD	Recognition-primed decision
SAE	Site Area Emergency
STEP	Supporting Technology Evaluation Program
TEEL	Temporary Emergency Exposure Limit
TEL	Threshold of Early Lethality
TCP	Traffic control point

12 REFERENCES

DOE 2007. *Technical Planning Basis, Emergency Management Guide*, DOE G 151.1-2. U.S. Department of Energy Office of Emergency Management, Washington, D.C. July 11, 2007.

EPA/FEMA/DOT 1987. *Technical Guidance for Hazards Analysis—Emergency Planning for Extremely Hazardous Substances*, U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, PB-93-206910/XAB; OSWER-88-0001, December 1987.

EPA 1999. *Risk Management Program Guidance for Offsite Consequence Analysis*, U.S. Environmental Protection Agency, EPA 550-B-99-009, April 1999.

Klein 1993. A recognition-primed decision model of rapid decision making. G. Klein. In G.A. Klein, J. Orasanu, R. Calderwood, and C.E. Zsambok (Eds). *Decision Making in Action: Models and Methods*. Ablex Publishing, Norwood, Connecticut 1993.

Klein 1998. *Sources of Power: How People Make Decisions*. Cambridge, G. Klein. MIT Press, Cambridge, Massachusetts. 1998.

Lipshitz et al. 2001. Taking stock of naturalistic decision making, R. Lipshitz, G. Klein, J. Orasanu, and E. Salas. *Journal of Behavioral Decision Making*, 14, 331-352. 2001.

APPENDIX A.   SUBSTANCES

The AlphaACT HAZMAT knowledge base contains the chemicals shown in the following list.

(E)-crotonaldehyde
2,4,5-T
2,4-D
2,4-dinitrophenol
3-bromo-1-propene
Acetaldehyde
Acetamide
Acetic acid
Acetone cyanohydrin
Acetyl bromide
Acetyl chloride
Acrolein
Acrylic acid
Acrylonitrile
Adamsite
Aluminon
Aluminum(III) isopropylate
Amberlite
Ammonium bromide
Ammonium fluoride
Ammonium hydroxide
Ammonium iodide
Ammonium pentaborate
Ammonium sulfide
Ammonium tartrate
Anhydrous ammonia
Anisidine, p-
Aqueous ammonia
Arsenic
Arsenic pentoxide
Arsenic trioxide
Arsine
Barbituric acid

Barium
Barium metaborate
Benzene
Benzoic acid
Benzotrichloride
Benzyl benzoate
Benzyl bromide
Beryllium
Bismuth acetate
Bismuth hydroxide
Bismuth iodide
Bismuth oxychloride
Boron carbide
Boron nitride
Boron trichloride
Bromine
Bromine chloride
Bromoacetone
Bromopyrene, 3-
Bromotrifluoromethane
Butanediol, 1,3-
Butene, 2-
Butoxypolypropylene glycol
Butyl acetate, tert-
Butylcyclohexane
Cadmium
Cadmium tungstate
Calcium chloride
Calcium hydroxide
Calcium metasilicate
Calcium nitrite
Calcium salt
Caprylic acid

Carbon disulfide
Cerium sulfate
Cerium trioxide
Cesium
Cesium hydroxide
Chlorine
Chlorobenzylidene malononitrile, o-
Chlorodecane, 1-
Chlorodiphenylarsine
Chloroform
Chloroform-D
Chloropicrin
Chlorthiophos
Chromic trioxide
Cobalt oxide
Colchicine
Copper oxide
Copper(I) sulfide
Cyanide
Cyanogen chloride
Cyclohexylamine
Cyclopropane
Decahydronaphthalene
Decanal
Decane
Dibenzofuran
Diborane(6)
Dichloroacetic acid
Dichloroacetyl chloride
Dichloropropane
Dichloropropane, 1,3-
Dichlorosilane
Dichlorvos
Diethylene glycol
Diisopropylbenzene
Dimethyl oxalate
Dimethylformamide, N,N-
Dimethylmercury
Dimethylphthalate
Dioxolane, 1,3-
DMSO
Dodecamethylcyclohexasiloxane
Epichlorohydrin
Ethyl acetoacetate
Ethyl furoate

Ethyl-1-hexanol, 2-
Ethylbenzaldehyde
Ethylene dimethacrylate
Ethylene glycol
Ethylmercury chloride
Europium oxide
Ferric nitrate
Ferric sulfate
Ferrous ammonium sulfate
Fluorine
Formaldehyde
Formic acid
Gallic acid monohydrate
Germane
Germanium tetrafluoride
Glycolic acid
Glycoluril
Goethite
Hafnium oxide
Hematoxylin
Heptanoic acid
Hexadecane
Hexadecene, 1-
Hexamethylene glycol
Hexanoic acid
Hexanol, 2-
Hexaphenylcyclotrisiloxane
Hexylene glycol
Holmium trioxide
Hydrazine
Hydrazine, dihydrochloride
Hydrobromic acid
Hydrochloric acid
Hydrofluoric acid
Hydrogen bromide
Hydrogen fluoride
Hydrogen iodide
Hydrogen peroxide
Indene
Isobutyronitrile
Isopropyl alcohol
Lanthanum boride
Lead bromide
Lead carbonate
Lead chloride

Lewisite 1
Lithium bromide
Lithium iodide
Lithium molybdate
Lithium nitrate
Lithium tetraborate
Magnesium
Magnesium acetate tetrahydrate
Magnesium carbonate hydroxide
Magnesium fluoride
Magnesium formate
Magnesium hydroxide
Magnesium nitrate hexahydrate
Magnesium oxide
Maleic acid
Manganese carbonate
Manganese(II) nitrate hydrate
Melamine
Mercaptoethanol, 2-
Mercuric chloride
Mercuric oxide
Mercury(II) nitrate monohydrate
Metaphosphoric acid
Methacrylaldehyde
Methacrylic acid
Methanesulfonyl chloride
Methoxytrimethylsilane
Methyl acrylate
Methyl alcohol
Methyl bromide
Methyl formate
Methyl iodide
Methyl isocyanate
Methyl isopropyl ketone
Methyl mercaptan
Methyl methacrylate
Methyl sulfoxide-D6
Methyl-2-chloroacrylate
Methylamine
Methylcyclohexane
Methyldichloroarsine
Methylene chloride
Methylmorpholine, 4-
Methylphosphonate
Methylpyrrolidine

Mineral spirits
Molybdophosphoric acid
Monoammonium phosphate
Morpholine
Neodymium fluoride
Neodymium hydroxide
Nickel aluminide
Nickel fluoride
Nickel perchlorate
Nickel(II) bromide
Niobium pentoxide
Niobium(IV) carbide
Nitric acid
Nitric oxide
Nitrogen dioxide
Nitrogen mustard-3
Nitrogen trifluoride
Nitropropane, 1-
Nitrous oxide
Nonanone, 2-
Nonyl alcohol
Octacosane
Octadecane, N-
Octadecyl methacrylate
Octafluoro-sec-butene
Octane, n-
Octanenitrile
Octaphenylcyclotetrasiloxane
Octene, 1-
Osmium tetroxide
Oxirane
Pentachlorobenzene
Pentadecane
Pentafluoropropane, 1,1,1,3,3-
Pentanediol, 1,5-
Pentene, 1-
Peracetic acid
Phenolphthalein
Phenylcyclohexane
Phenylhydrazine
Phenylphosphine
Phenylpropanol, 2-
Phosgene
Phosphoric acid
Phosphorus oxychloride

Phosphorus pentafluoride
Phosphorus trichloride
Phosphorus trifluoride
Phthalic acid
Piperazine
Piperidine
Platinum cyanide
Polybutyl acrylate
Polypropylene
Potassium bi-iodate
Potassium cyanide
Potassium hydroxide
Potassium silicate
Potassium stannate
Potassium sulfite
Propanethiol
Propionaldehyde
Propionic acid
Propionic anhydride
Propionitrile
Propylene glycol
Propyleneimine, 1,2-
Pyridine
QNB
Rhenium fluoride
Rhenium oxide
Ricin
Rubidium bromide
Sarin
Scandium
Scandium oxide
Selenious acid
Selenium
Silica gel
Silicon chloride
Silicon tetrafluoride
Silver chloride
Silver nitrate
Sodium (metal)
Sodium azide
Sodium bismuthate
Sodium bisulfate monohydrate
Sodium bisulfite
Sodium bromide
Sodium cyanide

Sodium ferrocyanide
Sodium formate
Sodium hydride
Sodium hydroxide
Sodium metasilicate nonahydrate
Sodium polyphosphate
Sodium potassium tartrate tetrahydrate
Sodium succinate, hexahydrate
Sodium sulfate, anhydrous
Sodium sulfide nonahydrate
Sodium tungstate dihydrate
Soman
Stibine
Strontium carbonate
Strontium hydroxide
Strontium nitrate
Strontium oxalate
Strychnine
Styrene
Succinic acid
Succinic anhydride
Sulfonylbis-ethanol, 2,2-
Sulfosalicylic acid, dihydrate, crystal
Sulfur
Sulfur dioxide
Sulfur mustard
Sulfuric acid
Sulfuryl fluoride
Tabun
Tantalum(V) ethoxide
Tartaric acid
TDI
Terbium oxide
Terbufos
Tetradecafluorohexane; (Perfluoro-n-hexane)
Tetradecane
Tetraethylene glycol
Tetrahydrofuran
Tetraline
Tetramethylammonium hydroxide pentahydrate
Tetranitromethane
Thallic oxide
Thallium

Thenoyltrifluoroacetone
Thiodiglycol
Tin(IV) oxide
Titanium boride
Titanium hydride
Toluene
Tribenzylamine
Trichloroacetyl chloride
Triethanolamine
Triethyl phosphate
Triethylamine
Trifluoroacetyl chloride
Triphenylethoxysilane
Tungsten hexafluoride

Tungstic acid
Vanadium pentoxide
Vanillin
Veratraldehyde
VX nerve agent
White phosphorus
Ytterbium oxide
Yttrium chloride, hexahydrate
Zinc acetate dihydrate
Zinc bromide
Zinc nitrate hexahydrate
Zirconium fluoride
Zirconium nitride
Zirconium oxide

AlphaACT HAZMAT

At Urban Shield 2010

"…essential … for anyone … involved in disaster preparedness"

INTRODUCTION

From October 15 through 18, 2010, the San Francisco Bay Area Urban Area Security Initiative (UASI) hosted a Department of Homeland Security (DHS)-sponsored regional emergency response and anti-terrorism exercise called Urban Shield 2010. In the largest tactical exercise in the United States, over 40 eight-person response teams competed in more than 30 exercises. The exercises were completed during a continuous 48-hour period at venues scattered across a 750 square mile area. The purpose: to test preparedness for response to disasters and emergencies throughout the San Francisco Bay region.

One of the exercises at Urban Shield exposed response teams to AlphaACT™ HAZMAT, a web-based solution developed by AlphaTRAC, Inc. that teaches first responders how to deal with releases of hazardous chemicals. Deploying AlphaACT HAZMAT at Urban Shield allowed AlphaTRAC to train and test the ability of first responders to make critical decisions during a realistic terrorist event. It also allowed AlphaTRAC to obtain first responder evaluations of AlphaACT HAZMAT as a training and response capability.

AlphaACT HAZMAT

AlphaACT HAZMAT teaches first responders how to deal with releases of hazardous chemicals through training scenarios based on the experiences of emergency response subject matter experts. While developed primarily for training, the system can also be used during real-time emergency response. The system uses observed characteristics of a release to help users identify similar cases from a knowledge base of information, which includes combinations of events, observable indicators, and recommendations for how to handle the event.

In training mode, AlphaACT HAZMAT operates in a game-like environment to teach rapid, effective decision-making. In response mode, it helps a responder make decisions quickly with limited information. The system is designed for first responders, Incident Commanders, and Emergency Operations Center decision makers.

A software application hosted on secure, central servers, the browser-based system combines knowledge databases, pattern recognition search functions, scenario modification tools, and an interface that operates on hardware platforms readily available to first responders.

THE AlphaACT HAZMAT EXERCISE

Unlike most other exercises at Urban Shield, the AlphaACT HAZMAT exercise required teams to demonstrate thinking skills, rather than physical skills.

In the exercise's hypothetical scenario, an improvised chemical weapon exploded in Oakland, California, at an outdoor food festival attended by more than 30,000 visitors. The release injured or contaminated large numbers of victims and produced a plume that drifted away from the scene. Each team was told that it was the first organized response team to reach the scene. Other response organizations (e.g., fire, HAZMAT, incident command) had been requested but were unable to reach the scene during the exercise. The team was on its own!

The AlphaACT HAZMAT exercise ran 65 minutes and included a pre-exercise briefing, the exercise play, and a post-exercise evaluation. Exercise play lasted about 30 minutes and was organized around two indoor locations.

At the simulated ICP, teams gathered information, established team member roles, organized the ICP, established a reconnaissance team, made external notifications, requested support from outside agencies, and used AlphaACT HAZMAT for decision support. Limited technical assistance operating AlphaACT HAZMAT was provided, since teams received no training prior to the exercise other than a demonstration and overview of the system.

Figure 1   Using AlphaACT HAZMAT at the simulated Incident Command Post

At the simulated event scene, the reconnaissance team gathered event information, interviewed witnesses and victims, and reported back to the ICP by radio.

Figure 2   A reconnaissance team examines the scene from a safe distance

Cues needed to understand the event and make effective decisions were placed realistically throughout the event scene. Many of the cues were hidden, ambiguous, conflicting, or misleading, just as they would be in a real response.

Figure 3   The simulated event scene

Limited information about the evolving scenario was provided to the teams through:

- An initial scenario briefing
- A staged event scene
- Radio communications with Dispatch
- Interactions with role players (both witnesses and victims)

Using AlphaACT HAZMAT, the team was asked to:

- Determine the nature of the event based on limited information
- Determine the protective equipment needed by responders
- Establish an appropriate Isolation Zone and Protective Action Zone
- Designate appropriate locations for the Incident Command Post (ICP) and traffic control points
- Determine protective actions to safeguard responders and the public

These decisions were outside the normal comfort zone for the participating special weapons and tactics (SWAT) teams, but it was a role the teams acknowledged they could be expected to fill.

EXERCISE RESULTS

Twenty-six local responder SWAT teams from the San Francisco Bay Area UASI completed the AlphaACT HAZMAT exercise within the target time of 30 minutes.

Three international teams — from the State of Israel, the Kingdom of Bahrain, and the Kingdom of Jordan — also participated in the AlphaACT HAZMAT exercise. Extensive controller support was required to bridge the significant language and cultural barriers that were encountered. Results from these exercises were not included in the AlphaACT HAZMAT evaluations.

EXERCISE EVALUATIONS

At the end of the exercise, each team was asked to evaluate AlphaACT HAZMAT from a first responder's perspective. The evaluation included 18 questions in categories such as value to first responders, ease of use, and the embedded decision process.

The evaluations were conducted in part to support a certification review of AlphaACT HAZMAT by DHS under its System Efficacy through Commercialization, Utilization, Relevance and Evaluation (SECURE) Program.

Representative responses included the following:

- Willingness to use AlphaACT HAZMAT: 92% of the teams willing or very willing
- Overall satisfaction with AlphaACT HAZMAT as a first responder tool: 92% satisfied or very satisfied (72% were very satisfied)
- Satisfaction with the AlphaACT decision process: 93% satisfied or very satisfied
- AlphaACT decision process is similar to that used by the response team: 88% said yes
- Satisfaction with the time it takes to operate AlphaACT HAZMAT: 92% satisfied or very satisfied
- Usefulness of AlphaACT HAZMAT as a training tool (a synthesis of multiple questions): 98% useful or very useful (83% said very useful)

When asked if they would recommend DHS provide AlphaACT HAZMAT to the field as a training and/or response tool, 96% of the teams indicated that they would recommend or strongly recommend this to DHS (69% would strongly recommend).

The Urban Shield site commander, who independently observed the exercises and privately debriefed competing teams, said this: "This training is an essential element for anyone who is involved in disaster preparedness, including law enforcement. I was able to witness the teams during this exercise and was amazed to see the problem solving, time management, and team building that occurred."

ACKNOWLEDGEMENTS

AlphaTRAC would like to thank the following organizations for their superb support in making the exercise and evaluation a success:

- The Urban Shield site commanders and management team for the AlphaACT site
- The "Red Command" team
- The Urban Shield management and administrative staff
- The Alameda County Sheriff's Department
- The San Francisco Bay UASI
- The Lawrence Berkeley National Laboratory

We also express our appreciation to the Defense Advanced Research Projects Agency (DARPA) and the Department of Energy (DOE) for their support in the development of AlphaACT HAZMAT.

STEP Evaluation Report

AlphaACT HAZMAT version 2011.03.09.09.41

September 2011

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Executive Summary

The Federal Emergency Management Agency (FEMA), National Preparedness Directorate (NPD) offers a project to assist the response community with interoperability Test and Evaluation (T&E). The Preparedness-Technology, Analysis, and Coordination (P-TAC) Center manages the Supporting Technology Evaluation Project (STEP), which conducts T&E of technologies relating to incident management and response. This report presents the results from an interoperability evaluation of AlphaTRAC's product[1], AlphaACT HAZMAT version number 2011.03.09.09.41. The AlphaACT HAZMAT evaluation was conducted from 16 through 18 August, 2011. STEP uses an accredited testing laboratory (Incident Management Test and Evaluation Laboratory [IMTEL[2]]) for conducting evaluations.

The type of evaluation performed for a system is dependent on the system's incorporation of National Incident Management System (NIMS) concepts and principles and/or NIMS recommended technical standards. This was a Comprehensive NIMS Evaluation; therefore, it specifically addresses adherence to NIMS concepts and principles. This evaluation had two objectives:

- **Objective 1** was to evaluate the product's incorporation of NIMS concepts and principles.

- **Objective 2** was to identify the applicability of core capabilities recognized by the Target Capabilities List (TCL).

According to the vendor, AlphaACT HAZMAT trains users how to think like an expert in crisis situations. AlphaACT HAZMAT is a crisis decision training solution designed to help first responders meet HAZMAT training requirements. Users can choose a scenario from the knowledge base library, and complete it in 15 minutes or less. The system includes a growing database of scenarios developed by subject matter experts and inspired by real response experiences.

The STEP team used web browsers installed on P-TAC Center computer workstations to access AlphaACT HAZMAT. The vendor provided user guides and quick reference guides to participants and conducted five hours of presentation, demonstration, and hands-on training. Evaluation activities were conducted on site at the IMTEL. Assessors with experience as an emergency manager, emergency responder, and/or first receiver[3] conducted an evaluation of system and provided qualitative analysis and feedback on AlphaACT HAZMAT based on concepts and principles from the NIMS document (December 2008). Assessors also identified which of the core capabilities from the TCL (September 2007) apply to the product.

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[1] The terms product, system, and technology are used interchangeably throughout this report.

[2] The laboratory is located within Science Applications International Corporation's (SAIC) Somerset, Kentucky facility.

[3] First receivers typically include personnel in the following roles: clinicians and other hospital staff who have a role in receiving and treating injured or contaminated victims (e.g., triage, decontamination, medical treatment, and security) and those whose roles support these functions (e.g., set up and patient tracking). References to emergency response personnel throughout this document are intended to include first receivers.

NIMS Concepts and Principles

Table 1: NIMS Criteria Rating Summary provides a summary of findings for NIMS criteria. Key elements identified within each NIMS criterion are cited as Minimum Product Requirements. These requirements were derived from the NIMS document and impact the overall rating of the product's adherence to NIMS concepts and principles. The numbers provided below summarize ratings (Agree, Disagree, Not Applicable) for Minimum Product Requirements within each NIMS criterion.

Table 1: NIMS Criteria Rating Summary

NIMS Criteria (Number of Minimum Product Requirements)	# Agree	# Disagree	# Not Applicable
Emergency Support (1)	1	0	0
Hazards (1)	1	0	0
Preparedness (1)	1	0	0
Communications and Information Management (9)	7	0	2
Resource Management (10)	0	0	10
Command and Management (2)	2	0	0

Note: NIMS criteria and Minimum Product Requirements are described in the STEP Guide.

AlphaACT HAZMAT is consistent with 5 of 6 NIMS criteria (Emergency Support, Hazards, Preparedness, Communications and Information Management, Command and Management). The system is not applicable to Resource Management. Overall, AlphaACT HAZMAT applies to 12 of 24 Minimum Product Requirements; of which all are consistent with NIMS concepts and principles. An overview for each NIMS criterion is provided below; explanations of all findings are provided in section 3.0 Results.

Target Capabilities List

AlphaACT HAZMAT applies to core capabilities that address prevention, response, and common capabilities. See the STEP Guide for a list of the core capabilities recognized by the TCL and section 3.0 Results for those capabilities that apply to the system.

1.0   Introduction

This report presents the results from an evaluation of AlphaACT HAZMAT version 2011.03.09.09.41, a product marketed by AlphaTRAC. Evaluation activities are managed by FEMA's NPD. The FEMA NPD provides strategy, policy, and planning guidance to build prevention, protection, response, and recovery capabilities among all levels of government throughout the nation. In support of this effort, the P-TAC Center assists the responder stakeholder community with standards and technology integration, evaluations, exercises, and training activities relating to NIMS and preparedness. The P-TAC Center is funded through the NIMS General Support Contract (NGSC) and managed by the NPD within FEMA. The project includes operation of a simulated Emergency Operations Center (EOC) with supporting technologies located at SAIC's facility in Somerset, KY.

As part of the P-TAC Center, STEP provides evaluations of supporting technologies relating to incident management and response. Evaluation activities are designed to verify interoperability and provide the response community with reports to support purchasing decisions. Products evaluated by STEP vary in system capabilities; therefore, STEP scales their evaluations as needed. For more information on the evaluation project and types of evaluations performed, visit the STEP website or contact the STEP team.

A Tier III –Comprehensive NIMS Evaluation was conducted for AlphaACT HAZMAT. The intent of this evaluation was to determine the system's ability to incorporate NIMS concepts and principles.

Vendor participation in STEP is voluntary and the use of trade names and evaluation results in this document do not constitute a Department of Homeland Security (DHS) or FEMA endorsement or certification of the use of such commercial hardware or software. Evaluations do not constitute a determination of NIMS compliance.

1.1   Project Summary

NIMS provides a framework and sets forth, among others, the requirement for interoperability and compatibility to enable a diverse set of public and private organizations to conduct well-integrated and effective incident management operations. Systems operating in an incident management environment must be able to interact smoothly across disciplines and jurisdictions. Interoperability and compatibility are achieved through the use of tools such as common communications and data standards. Establishing and maintaining a common operating picture and ensuring accessibility and interoperability are the principal goals of the Communications and Information Management criterion of NIMS.

STEP evaluations primarily take place in a controlled, simulated EOC-based environment. However, some systems may require an additional or alternate environment, such as a limited field setting. In these cases, the field setting is considered an extension of the laboratory environment. Evaluations take place usually over the course of four days during which the evaluation team, known as the STEP team, gains hands-on experience with the systems. The STEP team typically consists of one test engineer, one test analyst, and assessors for each system under evaluation. The team is scaled appropriately based on the complexity and type of evaluation. Participants adhere to a non-disclosure agreement, which ensures objectivity and the protection of the vendor's sensitive information.

The evaluation took place at the IMTEL, which is accredited through the American Association for Laboratory Accreditation (A2LA). To achieve and maintain accreditation status, the laboratory was required to meet general requirements for the competencies of testing and calibration laboratories, as

provided in International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2005. The current scope of accreditation and associated certification is available on A2LA's website for ISO/IEC 17025:2005. Results presented in Section 3.1 NIMS Concepts and Principles are within IMTEL's ISO/IEC 17025:2005 scope of accreditation. In the event that any individual findings fall outside the scope of accreditation, they will be clearly annotated as such.

1.2   System Description[4]

According to the vendor AlphaACT HAZMAT trains users how to think like an expert in crisis situations. AlphaACT HAZMAT is a crisis decision training solution designed to help first responders meet HAZAMAT training requirements. Users can choose from a range of Hazardous Material (HAZMAT) scenarios based on user proficiency and skill sets (beginner, advanced and expert) from the knowledge base library.

1.2.1 Process

AlphaACT HAZMAT helps users identify the observable characteristics of a hazardous chemical release to identify similar cases from a knowledge base of information and then use that information to determine the appropriate protective actions to take. This Recognition Primed Decision (RPD) structured approach to emergency response decision-making is based on a six-step process shown in **Figure 1: AlphaACT HAZMAT Decision Process**. The following sections describe each step in more detail.
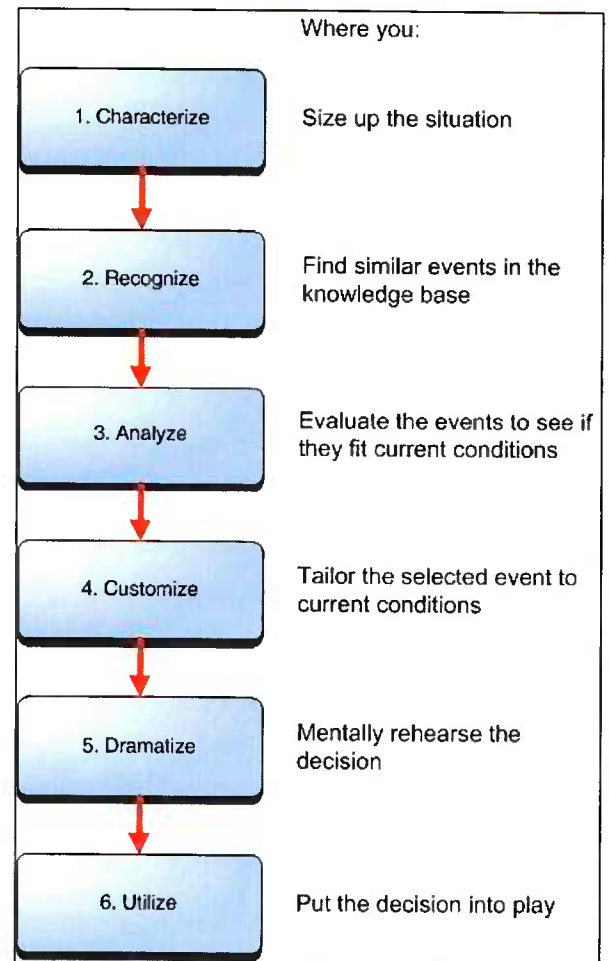
Figure 1: AlphaACT HAZMAT Decision Process

1.2.1.1   Characterize

Once the user has selected a scenario, they are provided basic information about the dispatch call, information en route, and initial size-up information. The user enters known information about the incident on the Characterize page as shown in **Figure 2: Characterize.**

[4] The vendor provided the majority of information within this section. Participants did not verify all of the system's capabilities during the evaluation, only those associated with the standards and criteria under test.
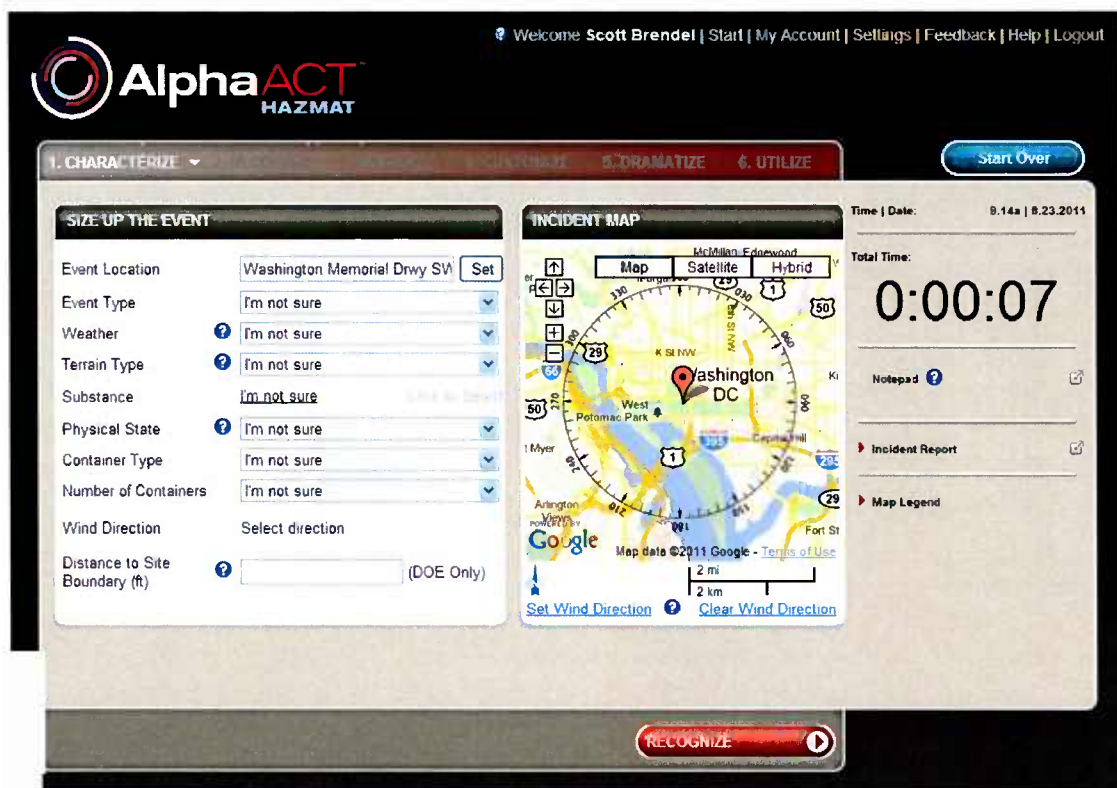
Figure 2: Characterize

1.2.1.2   Recognize

On the Recognize screen, the Artificial Intelligence (AI) interface asks the user a series of questions, to reach a convergence for possible events. While the user is answering questions, they are permitted to answer questions they have answers to or leave an answer of unknown. As more information about the incident is received, the user is notified by a flashing 'Incident Report' or 'Incident Update' label. **Figure 3: Recognize** depicts the Recognize screen.
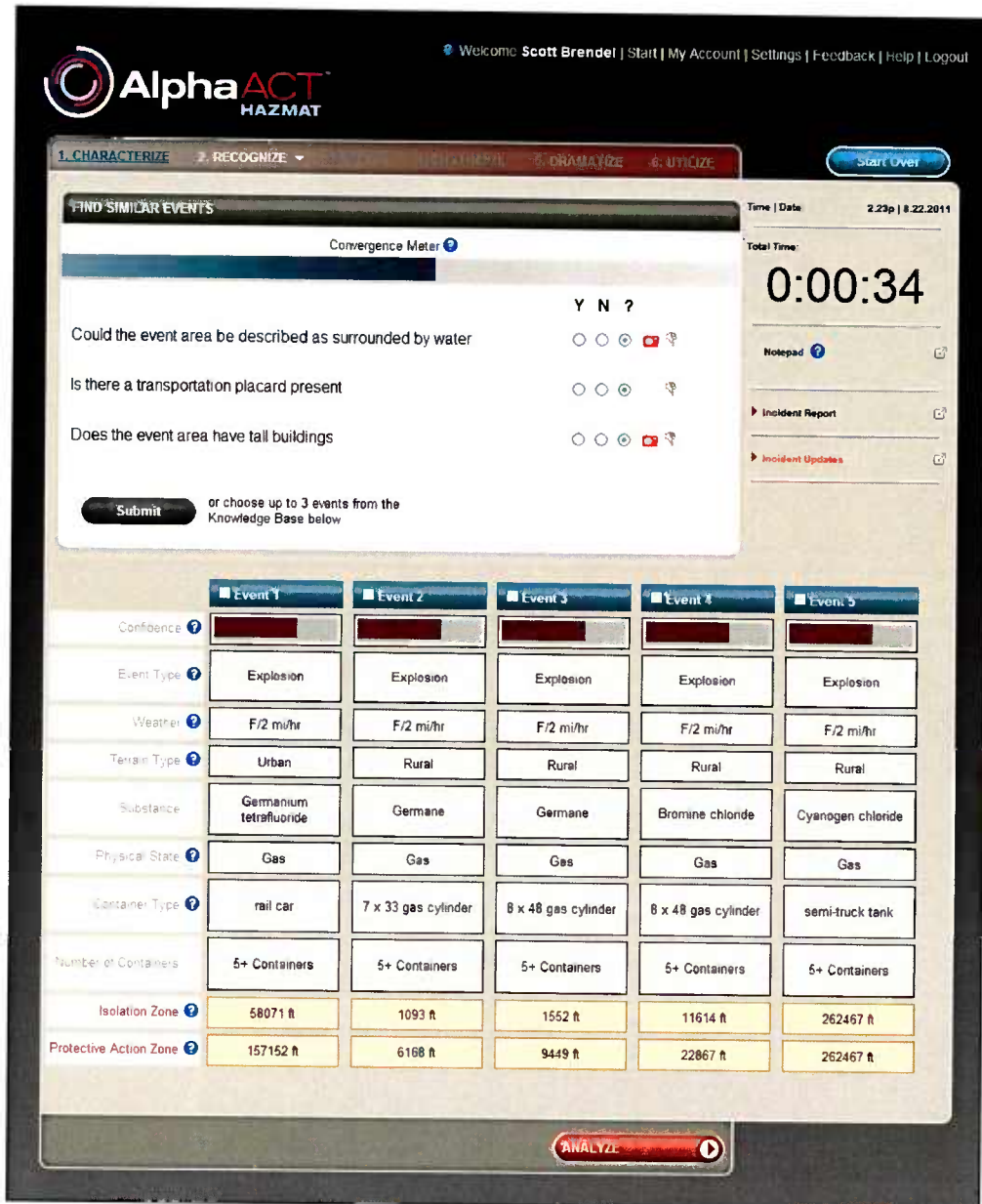
Figure 3: Recognize

1.2.1.3 Analyze

Once the AI has identified a set of possible scenarios, the user selects up to three events as the possible event. On the Analyze screen the user compares the possible events and selects the one they feel is the correct answer. Analyze also allows the user to review Material Safety Data Sheets (MSDS) information sheets to obtain additional information about the chemical.

1.2.1.4 Customize

On the Customize screen the user can update any previously reported information to reflect changing conditions. The user can set the wind direction or change event parameters to reflect new or changing event conditions and the system will automatically update the Isolation and Protective Action Zones..

1.2.1.5 Dramatize

On the Dramatize page, the user can rehearse the actions they intend to take. The user can establish the locations for the Command Post; Staging Area; Decontamination site; Hot, Warm and Cold Zones; etc.

1.2.1.6 Utilize

On the Utilize screen the user sees a summary of the event conditions and the user needs to provided updated meteorological and plume release conditions and evacuation information. The user has access to checklists to put their plan into action.

1.2.1.7 Feedback

On the Feedback screen the user receives their score for the scenario. The user is shown the actual event details compared to the event they selected. The user is provided feedback on how to improve their performance during the scenario. The user then has an opportunity to complete a Self-assessment After Action Review (AAR). **Figure 4: Session Feedback** depicts the Feedback screen.
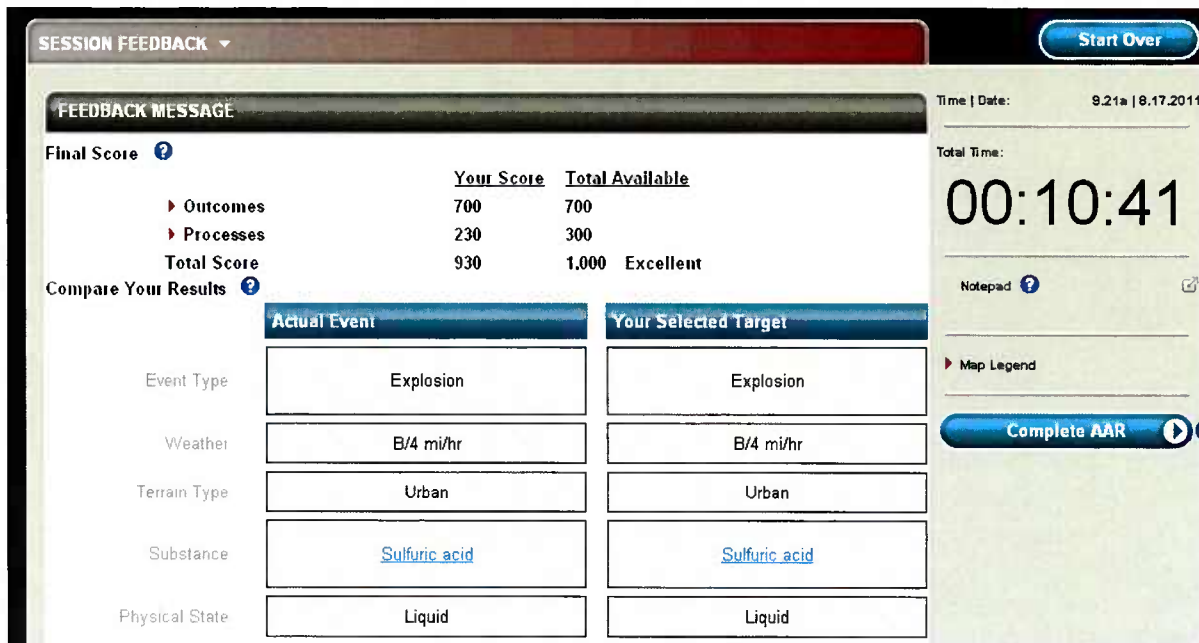
Figure 4: Session Feedback

1.2.2 Scenario Database

The system includes a growing database of scenarios developed by subject matter experts and inspired by real response experiences. The database includes more than 50 HAZMAT event scenarios inspired by interview with first responders, input from users, and FirefighterCloseCalls.com.

1.2.3 Knowledge Base

AlphaACT HAZMAT organizes, filters, and manages numerous HAZMAT situational event characteristics combinations. The pattern recognition engine can discover the key patterns in the information, store the patterns in a knowledge base, and then present them to users.

1.2.4 Community Scoreboard

AlphaACT HAZMAT lets users privately compete with others in the responder community through a leaderboard that shows the top performers and their scores.

1.2.5 Structured After Action Reviews

AlphaACT HAZMAT walks users through a structured, standardized process that helps focus on critical areas of decision-making and automatically produces a summary report, simplifying the paperwork normally required.

1.3 Objectives

The STEP team developed a set of objectives to provide the foundation for this evaluation.

Objective 1 addresses the incorporation of NIMS concepts and principles.[5] This includes a determination of how the system applies to the criteria for Emergency Support, Hazards, Preparedness, Communications and Information Management, Resource Management, and Command and Management. General questions on the system, including implementation considerations of the product, were also addressed.

Objective 2 addresses the applicability of core capabilities recognized by the TCL. This includes identification of capabilities that address prevention, protection, response, and recovery, as well as common capabilities such as planning and communications that support all missions.

1.4 Evaluation Setup

The evaluation was conducted on site at IMTEL. The vendor provided User Guides, scenarios, and usernames/passwords for their web-based system. A test engineer managed and documented the test environment, and an analyst was available to assist the vendor in resolving any technical issues.

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[5] All products are evaluated for NIMS concepts and principles. The depth at which products are evaluated for NIMS criteria depends on the type of evaluation conducted (e.g. a Comprehensive NIMS Evaluation [Tier III] or a Comprehensive NIMS Evaluation with a Technical Component [Tier I] is evaluated in more detail for applicability to NIMS concepts and principles than is a Technically Focused Evaluation [Tier II]).

1.5   Evaluation Schedule

The STEP team conducted the AlphaACT HAZMAT evaluation from 16 through 18 August 2011. On 10 August, the STEP team conducted an Evaluation Readiness Review to ensure logistic and technical preparations were complete. The vendor provided participants on-site training (presentation, demonstration, and hands on).

1.6   Scope and Limitations

Table 2: Scope and Limitations identifies issues that impacted the evaluation of AlphaACT HAZMAT and the team's approach to mitigating them.

Table 2: Scope and Limitations

Limitation	Impact	Mitigation Strategy
None identified.		

Document ID: 13032

2.0 Execution

2.1 Participant Credentials

Table 3: Participant Credentials summarizes the STEP team's areas of expertise, role during the evaluation, and years of experience. In addition to personnel identified below, Information Technology (IT) personnel provide technical support as necessary during evaluations and maintain IMTEL computer hardware and software.

Table 3: Participant Credentials

Title	Role
Senior Analyst Critical Infrastructure Protection	Lead Emergency Response Assessor, NIMS Evaluation (Experience: Law Enforcement, Emergency Management, Security Management)
Senior Emergency Management Analyst	Emergency Response Assessor, NIMS Evaluation (Experience: Fire, Emergency Management, HAZMAT)
Senior Systems Analyst	Test Engineer
Systems Engineer	Test Analyst

2.2 Methodology Overview

Assessors with knowledge in the areas of emergency response and management performed an evaluation for NIMS concepts and principles in a simulated operational environment. They also identified which of the core capabilities within the TCL apply to the product.

For further information about the procedures used by assessors when reviewing this product, see the STEP Guide available at https://www.nimsstep.org/. The STEP Guide contains complete information about NIMS Criteria and the TCL.

2.3 Post-Assessment Activities

A test analyst was present during the evaluation, collected required data from all participants, and ensured data integrity and Quality Control (QC). The data collected during this evaluation included a collective STEP Worksheet, a collective TCL – Core Capabilities Form, electronically submitted observation logs, and screenshots. Data analysis began during the evaluation and resulted in the development of this evaluation report. After the evaluation was concluded, the P-TAC Center staff conducted internal reviews of the report to ensure accuracy and completeness.

3.0 Results

Results presented in section 3.1 NIMS Concepts and Principles are within IMTEL's ISO/IEC 17025:2005 scope of accreditation. In the event that any individual findings fall outside the scope of accreditation, they will be clearly annotated as such.

3.1 NIMS Concepts and Principles

3.1.1 Objective 1: Evaluate Incorporation of NIMS Concepts and Principles

Assessors evaluated AlphaACT HAZMAT to determine if the system incorporates NIMS concepts and principles and documented results as identified in the following sections for Objective 1. The sections below summarize evaluation results for NIMS concepts and principles. Refer to Appendix A: Detailed Results for NIMS Concepts and Principles for additional details.

AlphaACT HAZMAT is consistent with 5 of 6 NIMS criteria; it is consistent with Emergency Support, Hazards, Preparedness, Communications and Information Management, and Command and Management. The system is not applicable to Resource Management. The sections below summarize evaluation results for NIMS concepts and principles.

3.1.1.1 *Emergency Support*

AlphaACT HAZMAT applies to 7 of 15 Emergency Support Functions (ESFs) (Transportation; Firefighting; Emergency Management; Mass Care, Emergency Assistance, Housing, and Human Services; Public Health and Medical Services; Oil and HAZMATs Response; Agriculture and Natural Resources). AlphaACT HAZMAT applies to 4 of 9 Incident Command functions (Incident Command, Operations, Planning, and Safety).

3.1.1.2 *Hazards*

The system applies to natural, human-caused, and technological-caused events.

3.1.1.3 *Preparedness*

AlphaACT HAZMAT can be used to effectively support the preparedness activities for planning; procedures and protocols; and training and exercises.

3.1.1.4 *Communications and Information Management*

Common Operating Picture:

AlphaACT HAZMAT provides access to critical information. The software provides a mechanism for users to enhance their skill sets in a standardized approach at all levels of proficiency. Mapping symbology uses Google Maps icons instead of the ICS symbols for ICS facilities.

Interoperability:

AlphaACT HAZMAT meets the SAFECOM Interoperability Continuum for data sharing via common applications and custom-interfaces. Incident Command System (ICS) forms are not included in the system.

Scalability:

AlphaACT HAZMAT can be used for a range of small- through large-scale incidents and events. It is also flexible and scalable to support the full spectrum of multi-agency and multi-discipline incidents and events. The system applies to multiple levels of the government and to the public and private sector. The system does not allow for scenario interaction between users.

Plain Language:

The system adheres to the principle of plain language (clear text).

Information Security:

Usernames and passwords are required to log into the system. As a web-based system, security and vulnerability concerns are primarily tied to the Internet and not the product itself (e.g., loss of connectivity, hacking, viruses). According to the vendor, all information on servers is encrypted, and servers are located in disparate locations. Users can see forums and message boards containing information from other users. Multiple users can log into the system using the same user name and password at the same time.

3.1.1.5   Resource Management

AlphaACT HAZMAT was not designed to be a resource management tool and it not applicable to this criterion.

3.1.1.6   Command and Management

AlphaACT HAZMAT is consistent with 8 of 14 management characteristics of ICS: Common Terminology; Modular Organization; Management by Objectives; Incident Action Planning; Manageable Span of Control; Incident Facilities and Locations; Dispatch/Deployment; and Information and Intelligence Management. The system is not applicable with the management characteristics: Comprehensive Resource Management; Integrated Communications; Establishment and Transfer of Command; Chain of Command and Unity of Command; Unified Command; and Accountability.

3.1.1.7   Implementation and Product Overview

It should take less than two weeks for a department/agency to implement this system (from acquiring and installation to user proficiency). The system's user guide is comprehensive and AlphaACT HAZMAT's integrated help tool is intuitive. The vendor offers online, train-the-trainer, on-site presentation and hands-on training. Training provided by the vendor is comprehensive and it allows recipients to proficiently use the system. Customer support is available Monday through Friday from 8 am through 5 pm Mountain Standard Time by telephone. Overall, AlphaACT HAZMAT is intuitive, easy to use, and was reliable during the evaluation.

3.2 TCL

3.2.1 Objective 2: Identify Applicable TCL Core Capabilities[6]

Assessors identified the following core capabilities as being applicable to AlphaACT HAZMAT:

Table 4: TCL Core Capabilities

Common Capabilities	Prevent Mission Capabilities
• Planning • Community Preparedness and Participation • Risk Management • Intelligence and Information Sharing and Dissemination	• Information Gathering and Recognition of Indicators and Warning • Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Detection
Protect Mission Capabilities	**Recover Mission Capabilities**
• Not Applicable	• Not Applicable
Respond Mission Capabilities	
• On-Site Incident Management • EOC Management • Responder Safety and Health • Emergency Public Safety and Security • Animal Disease Emergency Support • Environmental Health • Explosive Device Response Operations	• Fire Incident Response Support • Weapons of Mass Destruction (WMD) and Hazardous Materials Response and Decontamination Citizen Evacuation and Shelter-in-Place • Isolation and Quarantine • Emergency Public Information and Warning

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[6] Objective 2 is not covered under the requirements outlined in ISO/IEC 17025:2005.

Appendix A: Detailed Results for NIMS Concepts and Principles

Table 5: STEP Worksheet Results provides specific details of the evaluation results.

Table 5: STEP Worksheet Results

EMERGENCY SUPPORT	
Criteria and Question	**Result**
EMERGENCY SUPPORT FUNCTIONS	
1. This product supports the following Emergency Support Functions (ESFs):	Agree/Disagree/Not Applicable
a. ESF #1 - Transportation	Agree
b. ESF #2 - Communications	Not Applicable
c. ESF #3 - Public Works and Engineering	Not Applicable
d. ESF #4 - Firefighting	Agree
e. ESF #5 - Emergency Management	Agree
f. ESF #6 - Mass Care, Emergency Assistance, Housing, and Human Services	Agree
g. ESF #7 - Logistics Management and Resource Support	Not Applicable
h. ESF #8 - Public Health and Medical Services	Agree
i. ESF #9 - Search and Rescue	Not Applicable
j. ESF #10 - Oil and Hazardous Materials Response	Agree
k. ESF #11 - Agriculture and Natural Resources	Agree
l. ESF #12 - Energy	Not Applicable
m. ESF #13 - Public Safety and Security	Not Applicable
n. ESF #14 - Long-Term Community Recovery	Not Applicable
o. ESF #15 - External Affairs	Not Applicable
2. There are no obstacles to ESF(s) implementing this product (i.e., from acquiring and installation to user proficiency).	Agree
3. Provide comments on ESF(s) implementing this product, including direct and indirect support.	None identified.
INCIDENT COMMAND	
4. This product supports the following Incident Command functions:	Agree/Disagree/Not Applicable
a. Incident Command	Agree
b. Operations	Agree
c. Planning	Agree

d. Logistics	Not Applicable
e. Finance/Administration	Not Applicable
f. Intelligence/Investigations	Not Applicable
g. Public Information	Not Applicable
h. Safety	Agree
i. Liaison	Not Applicable
5. There are no obstacles to Incident Command functions implementing this product (i.e., from acquiring and installation to user proficiency).	Agree
6. Provide comments on Incident Command functions implementing this product, including direct and indirect support.	The software has a self-check feature when placing Incident Command System (ICS) facilities against the danger zones.
7. This product is consistent with the applicable ESFs and core functions of ICS. (Minimum Product Requirement 1)	Agree

HAZARDS	
Criteria and Question	Result
8. This product can be used to plan for or respond to the following hazard types:	Agree/Disagree/Not Applicable
a. Natural hazards	Agree
b. Human-caused events	Agree
c. Technological-caused events	Agree
9. Provide comments on hazards applicability.	None identified.
10. This product can be used to plan for or respond to at least one hazard. (Minimum Product Requirement 2)	Agree

PREPAREDNESS	
Criteria and Question	Result
11. This product can be used to effectively support the following preparedness activities:	Agree/Disagree/Not Applicable
a. Planning	Agree
b. Procedures and Protocols	Agree
c. Training and Exercises	Agree
d. Personnel Qualifications, Licensure, and Certification	Not Applicable
e. Equipment Certification	Not Applicable
f. Evaluation and Revision	Agree

Criteria and Question	Result
12. Provide comments on the product's support to preparedness activities.	Product use will enhance trainee skill sets to support the decision making process utilizing Recognition Primed Decisions (RPD).
13. This product can be used to support one or more core preparedness activities: a, b, or c above. **(Minimum Product Requirement 3)**	Agree

COMMUNICATIONS AND INFORMATION MANAGEMENT

Criteria and Question	Result
COMMON OPERATING PICTURE	
	Agree/Disagree/Not Applicable
14. This product supports user access to critical information.	Agree
15. This product allows on-scene and off-scene personnel to have the same information about the incident (e.g., situational awareness).	Not Applicable
16. This product offers an incident overview by collating and gathering information that enables the Incident Commander (IC), Unified Command (UC), and supporting agencies and organizations to make effective, consistent, and timely decisions.	Agree
17. This product has the capability to be updated continually in order to maintain situational awareness.	Not Applicable
18. This product uses or interacts with geospatial information to portray the incident.	Agree
19. Provide comments on the common operating picture.	The software provides a mechanism for users to enhance their skill sets in a standardized approach at all levels of proficiency. Mapping symbology uses Google Maps icons instead of the ICS symbols for ICS facilities.
INTEROPERABILITY	
	Agree/Disagree/Not Applicable
20. Incident reporting and documentation procedures are standardized to ensure situational awareness.	Not Applicable
21. Comment on incident reporting and documentation procedures.	Users have the ability to generate a self-assessment After Action Review (AAR) after each scenario.

22. This product allows National Incident Management System (NIMS) ICS forms to be completed.	Not Applicable
23. If the product uses ICS forms, they remain consistent with the ICS form numbers and purpose of the specific type of form as identified by NIMS. **(Minimum Product Requirement 4)**	Not Applicable
24. Provide comments on ICS forms.	ICS forms are not included in the product.
25. This product provides a method for data sharing or is interoperable with other incident management systems via voice, data, or video, etc. Identify the applicable level(s) of Data Elements interoperability on the SAFECOM Interoperability Continuum:	Agree/Disagree/Not Applicable
a. Swap Files	Not Applicable
b. Common Applications	Agree
c. Custom-Interfaced Applications	Agree
d. One-Way Standards-Based Sharing	Not Applicable
e. Two-Way Standards-Based Sharing	Not Applicable
26. Provide comments on data sharing.	Product provides a mechanism to support common applications such as Google mapping. The vendor indicated custom-interfaces are developed on an as needed basis.
27. This product is interoperable with other systems at the level of c, d, or e above. **(Minimum Product Requirement 5)**	Agree
SCALABILITY	
	Agree/Disagree/Not Applicable
28. This product can be used to respond to small scale incidents and events. **(Minimum Product Requirement 6)**	Agree
29. This product can be used to respond to large scale incidents and events. **(Minimum Product Requirement 7)**	Agree
30. This product can be used by a single jurisdiction during incidents and events. **(Minimum Product Requirement 8)**	Agree
31. This product can be used across the full spectrum of multi-agency incidents and events. **(Minimum Product Requirement 9)**	Agree
32. This product can be used across the full spectrum of multi-discipline incidents and events. **(Minimum Product Requirement 10)**	Agree

33. This product allows responders to increase the number of users on a system.	Agree
34. Provide comments on scalability.	The system does not allow for scenario interaction between users. Users can see forums and message boards containing information from other users.
35. The product can be used at the following:	Agree/Disagree/Not Applicable
a. On scene as a portable or static device.	Agree
b. On scene at the Incident Command Post (ICP).	Agree
c. At a Staging Area, Base, or Camp.	Agree
d. At a local Emergency Operations Center (EOC).	Agree
e. At a state EOC.	Agree
f. At a Federal Joint Field Office (JFO) or EOC.	Agree
36. Provide comments on Command and Coordination levels.	The system is web-based and requires internet connectivity.
37. This product can be used by the following levels of government:	Agree/Disagree/Not Applicable
a. Municipality	Agree
b. County	Agree
c. Regional	Agree
d. Tribal	Agree
e. State	Agree
f. Federal	Agree
g. Special District	Agree
h. Agency	Agree
i. Other	Agree
38. This product can be used to support communications among multiple levels of government(s).	Not Applicable
39. Provide comments on levels of government.	The product may be used by all levels of government as a training tool to support the decision making process in the Hazardous Material (HAZMAT) arena.
40. This product is flexible enough to be used by the public and private sectors.	Agree
41. Provide comments on use by the public and private sectors.	The product may be used by public and private sectors as a training tool to support the decision making process in the HAZMAT arena.
PLAIN LANGUAGE	
	Agree/Disagree/Not Applicable

42. This product adheres to the principle of plain language (clear text). **(Minimum Product Requirement 11)**	Agree
43. Provide comments on the use of plain language.	None identified.

<table>
<tr><td colspan="2" style="text-align:center">INFORMATION SECURITY</td></tr>
<tr><td></td><td>Agree/Disagree/Not Applicable</td></tr>
<tr><td>44. This product has redundancy capabilities as a part of its functionality.</td><td>Agree</td></tr>
<tr><td>45. The product provides a means to properly authenticate and certify users for security purposes.</td><td>Agree</td></tr>
<tr><td>46. This product provides controls to restrict access to sensitive information. (Minimum Product Requirement 12)</td><td>Not Applicable</td></tr>
<tr><td>47. This product does not introduce any unique security or vulnerability concerns.</td><td>Agree</td></tr>
<tr><td>48. Describe any safeguards integrated to minimize security and/or vulnerability concerns.</td><td>The system requires user names and passwords for authentication and system use.</td></tr>
<tr><td>49. Provide comments on Information Security.</td><td>No sensitive information is stored in the system. The vendor warns all users that information posted to forums can be seen by all users who have access to the web-based system from multiple locations. Multiple users can log into the system using the same user name and password at the same time.</td></tr>
<tr><td>Minimum Product Requirement Summary: Rating for the Communications and Information Management category.</td><td>Agree: 7 of 9
Disagree: 0 of 9
Not Applicable: 2 of 9</td></tr>
</table>

RESOURCE MANAGEMENT

Criteria and Question	Result
	Agree/Disagree/Not Applicable
50. This product addresses the need to manage resources.	Not Applicable
51. This product provides for requirements identification.	Not Applicable
52. This product provides for mobilizing resources.	Not Applicable
53. This product addresses the use of Mutual Aid Agreements and resources. **(Minimum Product Requirement 13)**	Not Applicable
54. This product provides an integrated means for resource typing definitions. **(Minimum Product Requirement 14)**	Not Applicable

Criteria and Question	Result
55. This product provides a means for inventorying Federal Emergency Management Agency (FEMA) typed resources. **(Minimum Product Requirement 15)**	Not Applicable
56. This product provides a means for inventorying non-FEMA typed resources. **(Minimum Product Requirement 16)**	Not Applicable
57. This product provides a record of credentialed and other personnel. **(Minimum Product Requirement 17)**	Not Applicable
58. This product provides a means for performing personnel and equipment accountability. **(Minimum Product Requirement 18)**	Not Applicable
59. This product provides a means for resource requesting/ordering. **(Minimum Product Requirement 19)**	Not Applicable
60. This product provides a means for resource tracking/reporting. **(Minimum Product Requirement 20)**	Not Applicable
61. This product provides a means for resource recovery and demobilization. **(Minimum Product Requirement 21)**	Not Applicable
62. This product assists in the reimbursement process. **(Minimum Product Requirement 22)**	Not Applicable
63. Provide comments on resource management.	The product is not designed for resource management.
Minimum Product Requirement Summary: Ratings for the Resource Management category.	**Agree:** 0 of 10 **Disagree:** 0 of 10 **Not Applicable:** 10 of 10

COMMAND AND MANAGEMENT

Criteria and Question	Result
	Agree/Disagree/Not Applicable
64. This product assists users in the management of an incident.	Agree
65. This product supports (or is consistent with) the following management characteristics of ICS:	Agree/Disagree/Not Applicable
a. Common Terminology	Agree
b. Modular Organization	Agree
c. Management by Objectives	Agree
d. Incident Action Planning	Agree
e. Manageable Span of Control	Agree
f. Incident Facilities and Locations	Agree
g. Comprehensive Resource Management	Not Applicable
h. Integrated Communications	Not Applicable
i. Establishment and Transfer of Command	Not Applicable
j. Chain of Command and Unity of Command	Not Applicable

k. *Unified Command*	Not Applicable
l. *Accountability*	Not Applicable
m. *Dispatch/Deployment*	Agree
n. *Information and Intelligence Management*	Agree
66. Overall, this product is consistent with the applicable 14 ICS management characteristics. **(Minimum Product Requirement 23)**	Agree
67. If the product references ICS, the organization charts and/or terminology are consistent with it. **(Minimum Product Requirement 24)**	Agree
68. Comment on the product's integration of management characteristics of ICS.	The software's use of Artificial Intelligence to focus the trainee on the RPD process supports the management by objectives ICS function to quickly identify public protection exclusionary zones. This functionality also supports development of an Incident Action Plan for the event.
Minimum Product Requirement Summary: Ratings for the Command and Management category.	**Agree:** 2 of 2 **Disagree:** 0 of 2 **Not Applicable:** 0 of 2

IMPLEMENTATION AND PRODUCT OVERVIEW

Criteria and Question	Result
IMPLEMENTATION	
	Agree/Disagree/Not Applicable
69. This product can be easily implemented.	Agree
70. Comment on implementation.	The system is web-based, no additional hardware or software is required.
71. System documentation (including training materials and user's guides) is comprehensive.	Agree
72. The vendor provides the following types of practitioner training:	Agree/Disagree/Not Applicable
a. *Online*	Agree
b. *Train the trainer*	Agree
c. *On-site presentation*	Agree
d. *Hands-on training*	Agree
73. Comment on practitioner training.	Vendor training was comprehensive and informative.

74. Training provided allows recipients to proficiently use this product.	Agree
75. There are no unique obstacles introduced by this product that would prohibit a department or agency from providing product training.	Agree
76. Describe any unique obstacles to training.	None identified.
77. This product has an integrated help tool that is comprehensive.	Agree
78. Comment on the help tool.	The help tool was user friendly; easy to use; and informative. The vendor also provides a method for users to submit feedback for improvements.
79. Is customer support available? If so, what is its availability and what medium is used (e.g., e-mail, phone, live-chat)?	AlphaACT HAZMAT user telephone support is available Monday – Friday from 8 am through 5 pm, Mountain Standard Time. Users can also send feedback or emails for user support.
80. How long would it take a department, agency, or jurisdiction to implement this product?	Less than two weeks.
81. Comment on how the size or make up of a department, agency, or jurisdiction can impact the implementation of this product.	Internet access is required to implement this product. Agency size is not a factor for implementation.
82. Comment on any identified impacts.	None identified.
83. Federal, state, or local laws or regulations will not hinder the implementation of this product.	Agree
84. Comment on any laws that may hinder this implementation.	None identified.
85. Identify any issues with urban or rural implementation.	Internet access is required to implement this product.
86. Identify any issues with paid, combination, or volunteer departments.	None identified.
87. Identify associated expenditures that may be incurred in addition to the initial procurement of this product.	None identified.
PRODUCT OVERVIEW	
88. Overall, this product is consistent with the concepts and principles of NIMS. To receive an agree in this category, this product must be consistent with all of the applicable supporting Minimum Product Requirements.	Agree

89. Identify any issues with NIMS consistency.	None identified.
90. This product will enhance the user's ability to do his/her job.	Agree
91. Comment on how this product will impact the job performance for the user.	Use of this product will enhance user capabilities to respond to and recover from HAZMAT based events.
92. This product was easy to use and intuitive.	Agree
93. Comment on the products ease of use.	Vendor's on-line training demos provide users with the necessary tools to successfully utilize the software affectively.
94. This product was reliable during the evaluation.	Agree
95. Describe any issues with reliability.	None identified.
96. Comment on the primary capability/features provided by this product.	The product provides a structured approach to HAZMAT incidents/response utilizing RPD. Users at all levels of proficiency can enhance their skills by using this software.
97. Provide any other observations.	The tool offers scenario-based learning sessions in three levels of proficiency (beginner, advanced, and expert) to assist in training development. All scenarios are based on actual HAZMAT events.

Appendix B: References

1. American Association for Laboratory Accreditation (A2LA), http://www.a2la.org/.

2. National Incident Management System (NIMS), December 2008, http://www.fema.gov/emergency/nims/.

3. National Response Framework, January 2008, http://www.fema.gov/emergency/nrf/.

4. National Incident Management System (NIMS) Recommended Standard List, January 2009 http://www.fema.gov/pdf/emergency/nims/FY09_Recommend_Standards_List_121708.pdf.

5. Supporting Technology Evaluation Project (STEP) Guide, September 2010, https://www.nimsstep.org/files/NIMS_STEP-Guide.pdf.

6. Target Capabilities List (TCL), September 2007, http://www.fema.gov/pdf/government/training/tcl.pdf.

7. www.alphact.com, accessed August 2011.

Appendix C: Acronyms and Abbreviations

A2LA   American Association for Laboratory Accreditation

AAR   After Action Review

AI   Artificial Intelligence

CBRNE   Chemical, Biological, Radiological, Nuclear, and Explosive

DHS   Department of Homeland Security

EOC   Emergency Operations Center

ESF   Emergency Support Function

FEMA   Federal Emergency Management Agency

HAZMAT   Hazardous Material

IC   Incident Commander

ICP   Incident Command Post

ICS   Incident Command System

IEC   International Electrotechnical Commission

IMTEL   Incident Management Test and Evaluation Laboratory

ISO   International Organization for Standardization

IT   Information Technology

JFO   Joint Field Office

MSDS   Material Safety Data Sheets

NGSC   NIMS General Support Contract

NIMS   National Incident Management System

NPD   National Preparedness Directorate

P-TAC   Preparedness-Technology, Analysis, and Coordination

QC   Quality Control

RPD   Recognition Primed Decision

SAIC	Science Applications International Corporation
STEP	Supporting Technology Evaluation Project
T&E	Test and Evaluation
TCL	Target Capabilities List
UC	Unified Command
WMD	Weapons of Mass Destruction

Appendix D: Vendor Response

September 13, 2011

P-TAC Center
Attention: STEP
75 Valley Oak Drive
Somerset, KY 42503

STEP Team,

Our team at AlphaTRAC was thrilled to participate in the productive and well organized evaluation of AlphaACT®. We are grateful for the time your evaluation team spent with us and fully support the results.

We strongly believe that AlphaACT HAZMAT will not only improve decision performance, but be an enjoyable and motivating training tool for the first responder community. We were excited to see how engaged and competitive your evaluation team became with the AlphaACT HAZMAT training scenarios. This validates our intent.

We would like to take this opportunity to make the Supporting Technology Evaluation Project (STEP) aware of some of the next steps in the evolution of AlphaACT HAZMAT, as well as future applications of the AlphaACT capability.

In response to strong feedback from the first responder community, we plan to add three major features to the system within the next year (that may warrant an additional review by the STEP program).

- **Team Mode:** Emergency response – and emergency decision-making – is a team effort. As the Incident Command System becomes standardized under NIMS, responders need to train as a team. AlphaACT HAZMAT will support team training within the NIMS Incident Command System by establishing roles and providing mini-scenario injects to each player. In team mode, users work together to filter and input information to a central decision maker, then develop and implement action plans in a simulated environment.
- **Response Mode:** End users have asked if they can get decision support during an actual event. AlphaACT HAZMAT's real-time response mode will help responders assess the situation and provide clear options for action. The user interface — a simplified version for rapid use under emergency conditions — will have the look and feel users are used to from their training sessions.

- **Rich Media:** Currently available in a handful of scenarios, our rich media system allows end users to interact with and develop an understanding of the situation before them through visual and audio cues. Event scene images show victims, settings, and symptoms, all within a single image. Users can zoom in and examine areas of interest and click on audio cues to hear interviews or sound-based symptoms (like coughing). Additional scenarios with audio/visual cues will be developed in the coming year.

As pointed out in the STEP evaluation, there is a strong need to capture the experiences of a generation of retiring first responders and transfer them to the new generation. We plan to expand the AlphaACT product portfolio to address other first responder needs. Our next application will be AlphaACT FIRE, a training and response system designed to support effective decision-making in firefighting situations.

We believe the additional features in AlphaACT HAZMAT and the introduction of AlphaACT FIRE will significantly improve the overall training and decision-making ability of first responders across the country. We will continue to look to the STEP program to evaluate future applications and features as we seek to help save lives and improve response success.

Thank you for your favorable review of AlphaACT HAZMAT. We move forward with greater confidence that we will truly make a difference.

Sincerely,

C. Reed Hodgin
CEO/President
AlphaTRAC, Inc.

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New Training Program Strives to Capture and Recreate User Experiences

AlphaACT uses simulation to teach recognition-primed decision-making

FEATURED ARTICLE
Planning & Preparation for Swiftwater Operations

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By Shannon Pieper
Published Monday, February 20, 2012

For years now, fire service publications and leaders have warned about a knowledge gap, as a generation of experienced fire service leaders retire, causing the officer ranks to be filled with firefighters who've seen far fewer structure fires and spent more time training for all-hazards response.

But as much as we've talked about this problem, we haven't really begun to solve it. One area that's shown promise: simulation training, which immerses the trainee in lifelike situations, building muscle memory that can be recalled when faced with a real-life situation.

Now, a new entry to the field is combining that approach with a unique way of capturing the experiences of outgoing officers. AlphaTRAC, an emeregency management and solutions company, recently released AlphaACT HAZMAT a web-based training tool that uses scenario-based simulation training while also capturing the experiences of its users (view a video about the training tool here). Although this first product focuses on hazmat, the company is building a tactical fire training program and has plans to enter the law enforcement training market as well.

Target: Better Decision-Making

"Our job has historically been to gather data and information and put it in a form that decision-makers in a crisis can use effectively," says Reed Hodgin, AlphaTRAC's founder and CEO. "About five years ago,
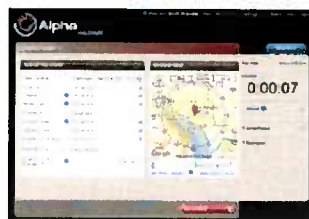
AlphaACT HAZMAT takes users through a six-step process that mimics recognition-primed decision-making, guiding them to make the right decisions to respond to the scenarios on screen. Image courtesy AlphaTRAC

Previous   1   2   Next

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TERMS OF SERVICE
PRIVACY POLICY

we discovered that although we were delivering more and more information into the hands of emergency managers, we weren't seeing a corresponding improvement in their ability to control emergencies. So we had to ask, if we're giving them more information, why aren't they making better decisions?"

What they discovered is that information is only one part of the equation. An equal, perhaps bigger, component is the natural decision-making ability of the incident commander.

"Some chiefs, battalion chiefs, etc., do a really great job of making the key decisions quickly when faced with a complex incident and little information, and others freeze up and do a terrible job even with a simple situation and a lot of information," Hodgin says.

Studying research about the cognitive processes involved in decision-making and crisis reaction, AlphaATRAC's researchers discovered the missing ingredient: experience. "Excellent crisis managers think differently than the rest of us do," Hodgin says. "Over a period of 15 or 20 years, they come to use a different process of thinking."

That process: recognition-primed decision-making (RPDM). Experienced decision-makers show up at a scene, do a quick size-up, and use the information they can see to trigger recognition, or the memory of an event that they have been to or been trained on or heard about. They use that event from history to help them deal with the crisis. Hodgin notes that this is extremely effective because, "while all emergencies are unique, they're also in some ways similar to other things that have happened. ICs with a wealth of knowledge in their heads and the ability to recall that knowledge quickly make decisions in a blur, and good ones."

Capturing Experience
AlphaTRAC was soon on a quest to determine how it could capture the experiences of skilled fire officers and share them with less-experienced colleagues.

At the same time, the Department of Defense noticed a similar need in military training, specifically training soldiers to prepare for asymmetrical warfare. So over the next several years, AlphaTRAC worked in conjunction with the DOD to develop a training platform.

"We went to the various disciplines that represent the end users and held workshops with law enforcement officers and firefighters, asking them, how do you share information, how do you like to train and how often?" Hodgin says. "We took that information and designed a technology that would 1) automatically gather experiences in a story format, because firefighters like to tell stories and 2) provide an innovative approach to training by turning the experiences people have had into scenarios that can be used to teach how to think fast and what are the important things to look for, to trigger the process of recognition."

The beta version of the program was pilot tested with the San Diego Fire-Rescue Department (SDFRD) and Westminster (Colo.) Fire Department. SDFRD Battalion Chief Dave Williams, the department's Special Operations-HAZMAT Program Manager, tested the program several times. "The first time was during a small work group meeting/presentation on the product, using laptop PCs that were provided," he says. "Other times have been in our fire stations using the fire station PCs." He immediately noticed the product's potential. "It continues to improve each time I use it," he says. "The information

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contained in the product is very good and applies directly to the hazmat incident response community. The scenarios are well thought out and consistently portray 'real-life' hazards."

The SDFRD testing process also provided the opportunity to refine the product. Williams says the department suggested "clarification and revision on some of the technical aspects of the scenarios from a first responder's perspective and some insights on how a first responder [student] would use the product."

Perhaps most importantly, he also stressed to AlphaTRAC researchers that it would be important to "make the net result more clear to the first responder from the start, i.e., that the application is designed to teach a decision-making skill set and methodology and not just provide answers on how to handle a hazmat incident."

The end product: a Web-based training tool that can be used by a responder or team of responders, in as little as 15 minutes. "It uses artificial intelligence engines in the background to look for patterns and bring the right experience to the fore for teaching," Hodgin says. "The user logs in online and goes through one scenario or a variety of scenarios. The artificial intelligence agent scores it, and then coaches them on what they can do to improve."

Williams says that the program is comparable to other simulation programs he's used. "Once you learn the flow of the system, it becomes fairly intuitive and easy to use," he says. "Initially, there is a short learning curve to navigate the interface to be successful."

In addition to the computerized coaching, the platform includes a social networking aspect. Users can discuss their experiences in forums and critique one another, further enhancing learning. "We know that responders listen to each other better than they do some outsider," Hodgin says.

Because the technology is built as a platform, it can easily be adapted to different disciplines. Thus, while AlphaTRAC began with a hazmat training product, it is currently at work on a much broader based tactical fire training program, which it expects to be available in late 2012. "Ultimately, what we've created is a thinking tool, not a hazmat tool," Hodgin says.

Positioning the training platform in this way evolved in part from the feedback of the SDFRD. Williams says he advised AlphaTRAC that to reach a broader student base, the product would need offer standard fireground scenarios. "Hazmat is not really all that interesting to the rank-and-file firefighter and/or incident commander," he says. One caveat: Williams sees the product's true potential as less of a tactical tool and more of a decision-making tool. "It strives to teach a decision-making methodology that can be applied to tactical fireground or all hazard incident scenarios," he says.

Next Steps
The IAFC is currently evaluating the AlphaACT HAZMAT training program; its Technology Council expects to release a white paper about this approach to training within a few months. The program is certified NIMS-compliant by FEMA and is available as a subscription for fire departments or individual users.

In the meantime, AlphaTRAC's researchers are scouring fire service publications and training programs to help them develop appropriate tactical simulations for its fireground training program, all the time

visualizing a new way to teach up-and-coming officers to be able to react with the experience of a 20-year veteran. "Our purpose is to improve all of our abilities to manage crisis situations," Hodgin says. "That's what we're focused on. We're doing this to improve emergency management."

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SHANNON PIEPER
Shannon Pieper is the editorial director for Elsevier Public Safety, which publishes FireRescue magazine and FirefighterNation.com. Read Full Bio

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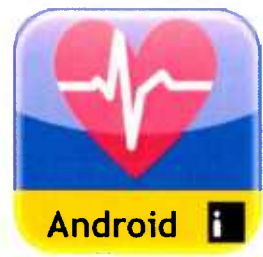
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360Recall

User Guide

May 2013

Prepared by

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www.alphatrac.com
www.360Recall.com

AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success. We specialize in training solutions for crisis decision-making for asymmetric combat and hazardous material incidents.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

Contents

Figures

1 INTRODUCTION

360Recall is a web-based scenario authoring tool developed for the U.S. Marine Corps that can help a Marine, training developer, or instructional designer quickly and easily create useful training scenarios from actual mission experiences or subject matter expertise. Its purpose is to allow users to develop rich scenarios with minimal effort.

Figure 1   The Home page

With 360Recall, you can:

➤ Write a training scenario
➤ Capture the details of a mission
➤ Review and edit your published and unpublished scenarios
➤ View scenarios published by other users

This guide explains how to use 360Recall.

2 HOW 360RECALL WORKS

360Recall helps you write training scenarios based on actual missions or events you may have heard recounted during story-swapping sessions with other Marines.

By presenting you with prompts and questions, the system captures information about a mission — things like:

- Operation orders
- Event details
- The cues or indicators that helped you recognize danger
- The decisions made
- The lessons learned

You can follow the guided interview of sequenced prompts or use the tabs to answer questions in an order that makes more sense to you. The system begins turning your input into a scenario that you can examine in the Scenario Viewer. It also automatically saves the scenario every five seconds to ensure nothing is lost.

The scenarios developed using 360Recall are structured and stored in a database that allows them to be searched, enabling you to sift through the information and making the content captured in the scenarios useful to future applications.

As you develop scenarios, you should identify cues or indicators of danger. Although 360Recall will identify some cues on its own (especially over time, as more and more scenarios are developed for it to analyze), you are encouraged to identify the cues you feel are important to track.

3 GETTING STARTED

3.1 What You Need

360Recall is a web application that requires Internet Explorer 7.

Use of 360Recall requires an account. Once your account has been activated, you can log in.

3.2 Logging In

To log in:

1. Go to http://www.360recall.com.
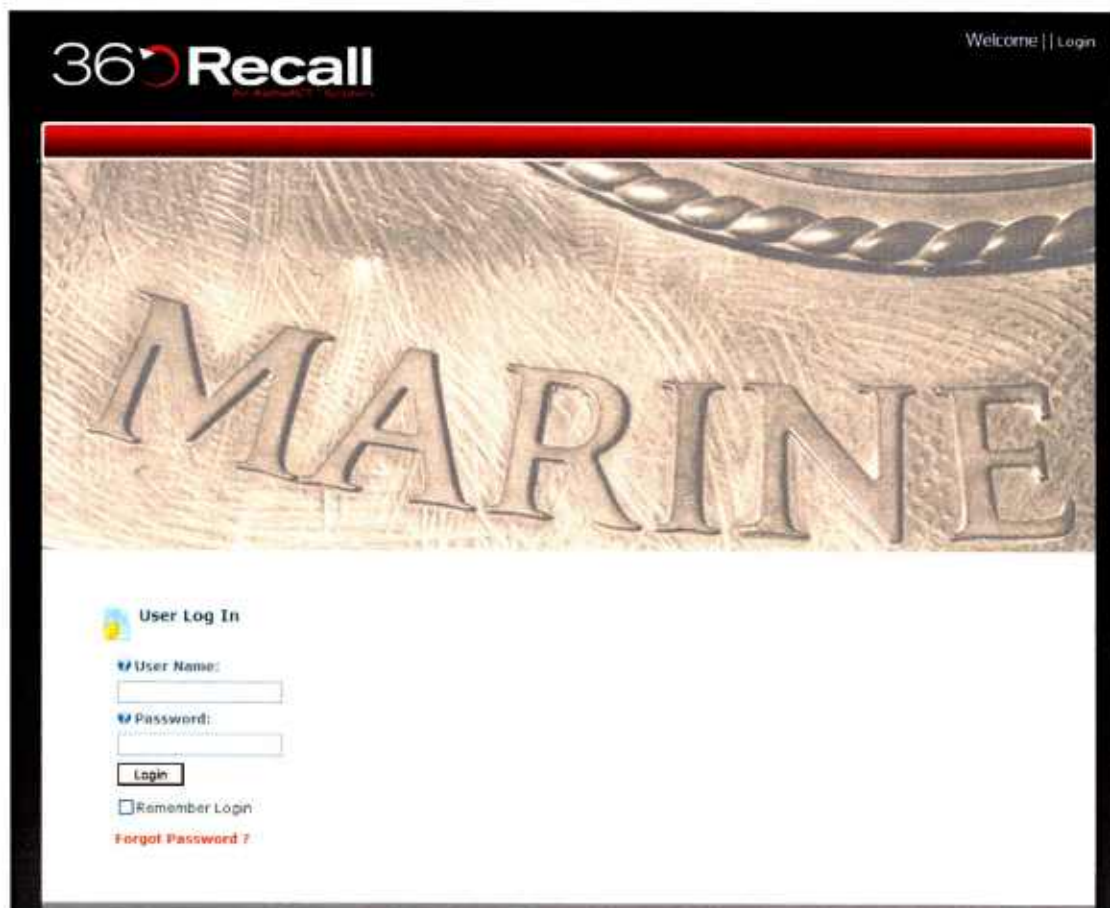
The system presents the Login page.

Figure 2   The Login page

2. Enter your user name and password.

3. Press Enter or click Login.

The system presents the Home page.

Figure 3   The Home page

3.3   Logging Out

To log out:

1. Click Logout.

    The Logout link is on the upper right corner of the page.

Figure 4   The Logout link

3.4 Getting Help

360Recall provides access to contextual help from many pages within the system. Just look for this symbol.

3.5 Saving Your Work

Even though 360Recall includes a Save button, the system automatically saves the changes you make every five seconds.

4 SEARCHING FOR A SCENARIO

360Recall lets you search scenarios for words or phrases you provide.

To search for a scenario:

1. Log in to the system.

2. From the View Scenarios panel, click Start.
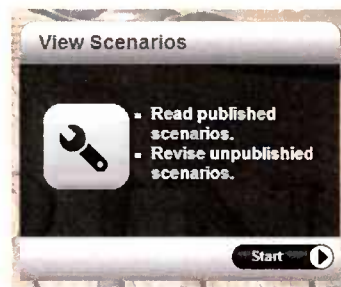
Figure 5   The View Scenarios panel

The system shows a list of the scenarios that have been published.

3. Enter the word or phrase in the box at the top of the page and click Search.

Figure 6   Searching for scenarios

The system presents the scenarios that contain the word or phrase.

5 READING A SCENARIO

Once a scenario is published, all users in the community can read it.

To read a scenario:

1. Log in to the system.

2. From the View Scenarios panel, click Start.

Figure 7   The View Scenarios panel

The system shows a list of the scenarios that have been published.

3. Click the scenario name.

The system opens the scenario.

6 CREATING A SCENARIO

Creating a scenario is a simple process. 360Recall lets you create scenarios from scratch or base a new scenario on one you've already written.

Reminder: Even though 360Recall includes a Save button, the system automatically saves the changes you make every five seconds.

6.1 Creating a Scenario from Scratch

To create a scenario from scratch:

1. Log in to the system.

2. From the Create a Scenario panel, click Start.

Figure 8   The Create a Scenario panel

The system takes you to the first page of a guided interview that prompts you for information about the incident.
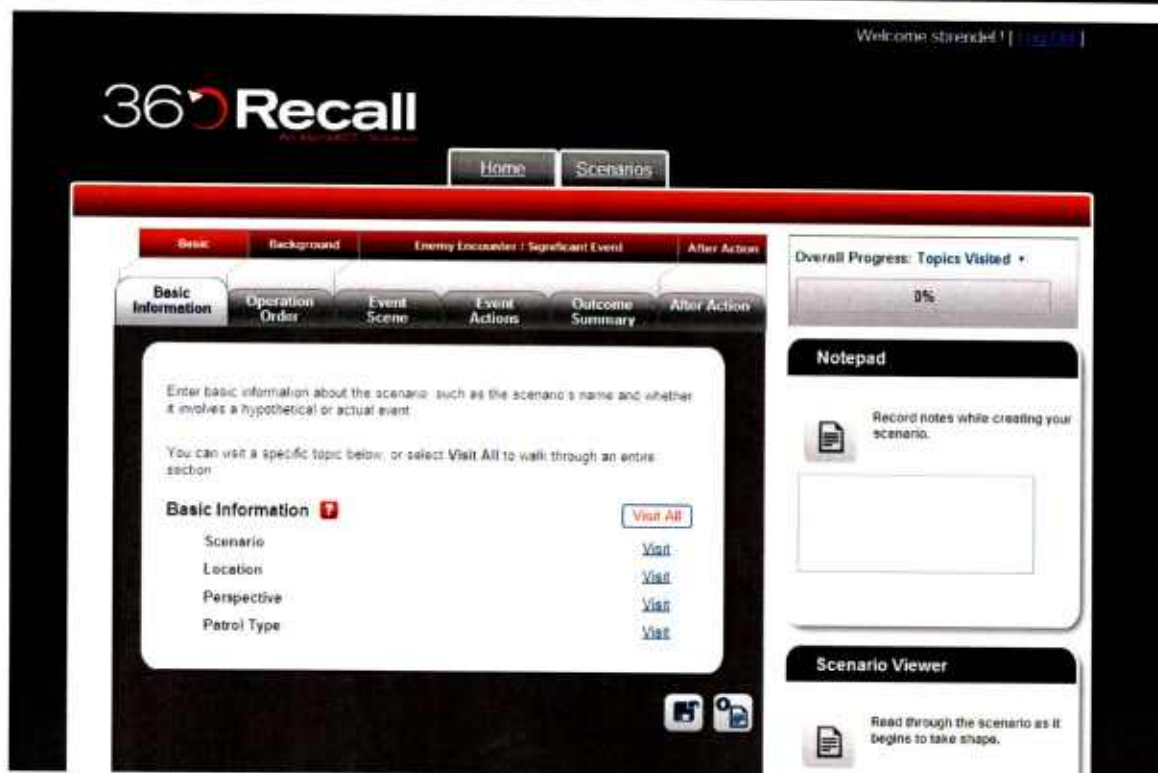
Figure 9   First page of the guided interview

You can follow the guided interview in sequence (the lowest row of tabs at the top of the page) or move around within the tabs as you wish.

The page has other panels:

- The Overall Progress panel shows your progress (by percentage of topics completed) through the guided interview
- The Notepad allows you to take notes as you develop the scenario (things you may want to add to the scenario later)
- The Scenario Viewer shows how 360Recall turns your inputs into a draft scenario

Although you can answer questions or provide information in response to the prompts in whatever order you prefer, it's best to first establish certain details about the scenario. This is done on the Scenario topic.

3. Click Visit beside the Scenario topic.

The system presents the Scenario page.

Figure 10   The Scenario topic page

4. Enter a name for the scenario.

    The system will use the name you provide as the scenario name.

    Tip: Give your scenario a descriptive name. Over time, you'll probably develop a large number of scenarios; naming them descriptively (and perhaps including the date in the name) will make them easier to find, remember, and track.

5. Using the check boxes, indicate whether your scenario is a hypothetical event or is based on an actual event.

    You can now navigate as you wish and either answer questions or enter cues in whatever order you prefer.

6. Navigate to another category by clicking its tab.

The system presents the main page of the category and shows you the topics within the category. The guided interview will lead you through the questions topic by topic or an entire section of topics at a time. You can skip the use of the guided interview and enter cues directly by topic.

7. To:

- Use the questions to guide you through a single topic, click Visit beside the topic.

  The page provides cue entry boxes in which to enter answers. Some questions may have check boxes.

Figure 11   Cue entry by topic

- Use the questions to guide you through an entire section of topics in sequence, click Visit All beside the topic section.

  The system presents an overview of the topics within the section.
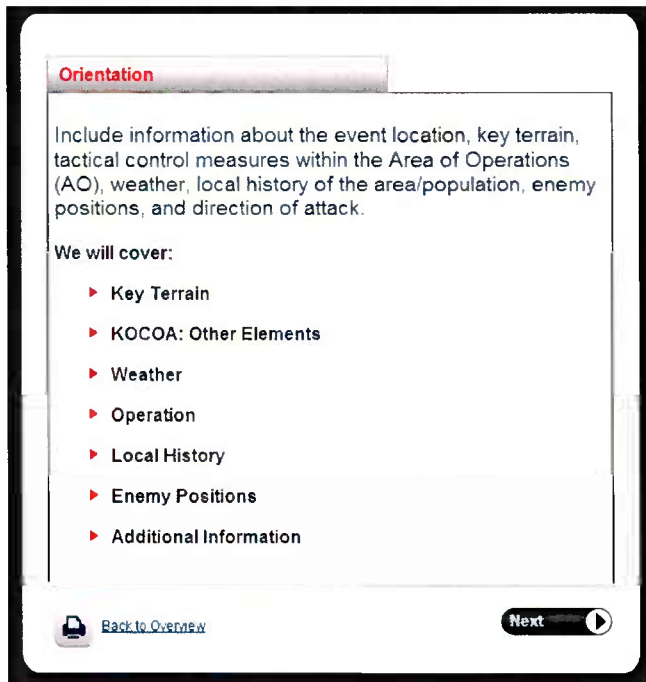
Figure 12   Cue entry by topic section

Click Next to go to the next page in the section (or click Back to return to an earlier page).

8. Furnish the information asked for on the page by clicking appropriate checkboxes and by entering responses to the questions in the style of a story.
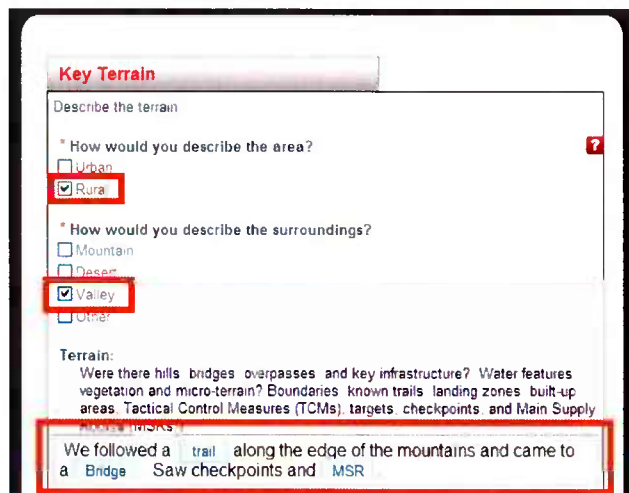
Figure 13   Entering information

You'll complete most tabs the same way, with the exception of the Event Actions tab, which is described in Section 6.2, Entering Event Actions.

As you enter information, the system highlights words or phrases that match cues it already knows about.

Tip: To add a new cue, highlight the word or phrase and then click Add Cue.

360Recall begins turning your input into a scenario which you can examine in the Scenario Viewer.
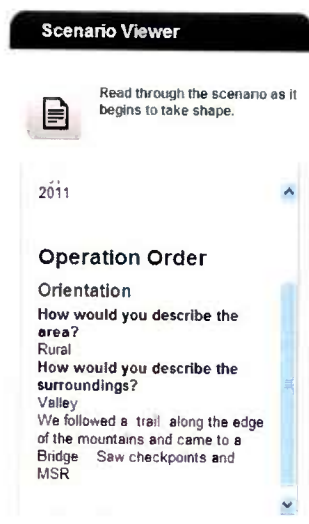
Figure 14   The Scenario Viewer

Tip: For an expanded view of the Scenario Viewer, click

Tip: To move the panel to a different part of the screen, click and drag it by the bar at the top of the panel.

Tip: To ensure a scenario is rich in detail, make sure you at least answer the questions marked with a red asterisk.

6.2   Entering Event Actions

Describing event actions can get confusing, because so many things can happen in a short period of time and because the sequence of events is important.   Event actions can include:

> Enemy actions
> Friendly actions
> Communications and their effect on the event
> Other actions

360Recall breaks this down so you can clearly capture the sequence of events. It also lets you re-sequence the actions, if necessary.

To describe event actions:

1. Click the Event Actions tab.

    The system presents the Event Actions page.
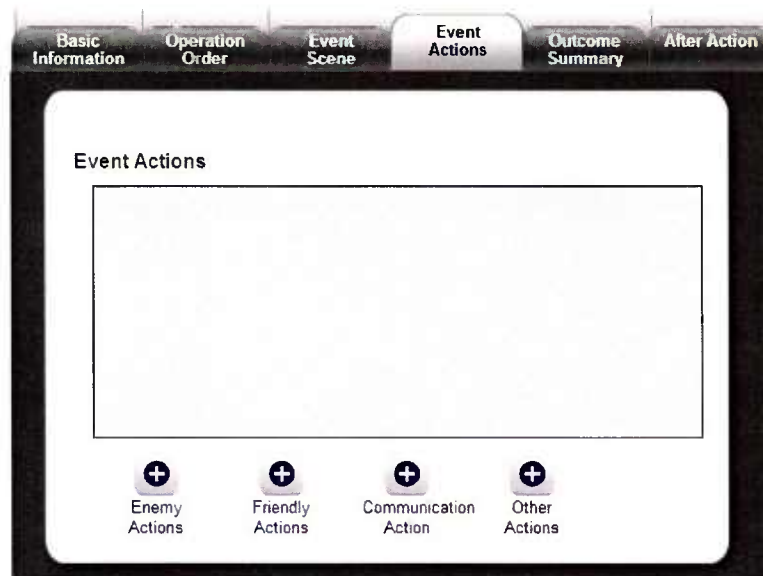
Figure 15   The Event Actions page

2. Click the appropriate button beneath the panel to show the action that occurred first.

If you click Enemy Actions, Friendly Actions, or Other Actions, the system presents a page of questions that prompt you for information similar to the one that follows.

What happened? What did you see and hear?

* At what time did the enemy action occur? [?]

* Give a brief title to the enemy action: [?]

Has the scene of the event changed since you last described it? If yes, explain: [?]

* Describe the enemy encountered (SALUTE). [?]
An acronym used to describe the enemy forces is SALUTE which stands for Size, Activity, Location, Unit/Uniform, Time, and Equipment

What do you think the enemy's objective was? [?]

What was the immediate result of the enemy force's actions? [?]

Anything else to add?

Back to Overview   Back

Figure 16   The Enemy Actions page

If you click Communication Actions, the system presents the following page.

At what time did the communication occur?

Give a brief title to the communication action

Record the conversation

Who said it?

Select a participant

...or enter a new one here

What did they say?

Submit

Back to Overview   ◀ Back

Figure 17   The Communications Action page

To enter a paraphrased conversation:

a. Identify the speaker (using the dropdown list or by entering the person's role or rank)
b. Enter what the person said
c. Click Submit

The system will post what you entered in the Record the conversation box.

3. Enter information about the action into the form and click Back to Overview.

The system returns you to the Event Actions page and adds a flowchart-like box to the page for the action you just entered, using the brief title you provided to identify the action. You can continue to add event actions to the scenario.

4. Add as many other actions as necessary to fully describe the event.

To re-sequence the order of event actions:

1. Click the up or down arrow beside the action you want to move until it appears in the right place in the order of actions.

To revise details for an event action:

1. Click Revisit beside the action you want to revise.

2. Make changes to the description.

To delete an event action:

1. Click the ⊠ beside the action you want to delete.

6.3   Reviewing Your Progress

The Overall Progress panel shows what percentage of topics in the guided interview you have already completed.
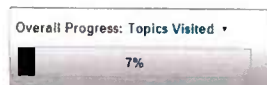
Figure 18   The Overall Progress panel

To determine which topics you have already visited or which topics and questions you have answered, use the dropdown beside the visual indicator.

7 EDITING AND FINALIZING A SCENARIO

Once you have written a scenario, you can edit it even if it has been published. You can also rename it if necessary.

7.1   Revising a Scenario

To add to or revise a scenario:

1. From the View Scenarios panel on the Home page, click Start.
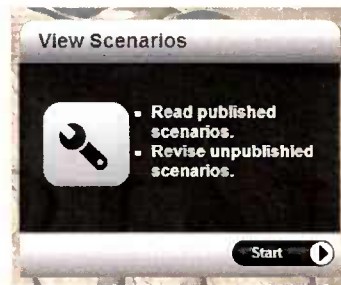
Figure 19   The View Scenarios panel

The system shows the current list of published scenarios.

Figure 20   The published scenarios list

2. Click the Unpublished Cases tab.

    The system lists the scenarios you have drafted but not published.

3. Click the title of the scenario you wish to edit.

    The system lists the scenario and provides buttons for several options.

4. Click

    The system displays the first page of the guided interview.

5. Navigate through the tabs and topics and make the additions, deletions, and changes you need.

7.2 Renaming a Scenario

Renaming a scenario is a matter of changing the name you gave it when you first created it.

To rename a scenario:

1. From the View Scenarios panel on the Home page, click Start.

   The system lists the scenarios you have drafted but not yet published.

2. Click the Unpublished Cases tab.

   The system lists the scenarios you have drafted but not published.

3. Click the title of the scenario you wish to rename.

   The system displays the scenario.

4. Click Visit beside the Scenario topic.

   The system presents the Scenario page.
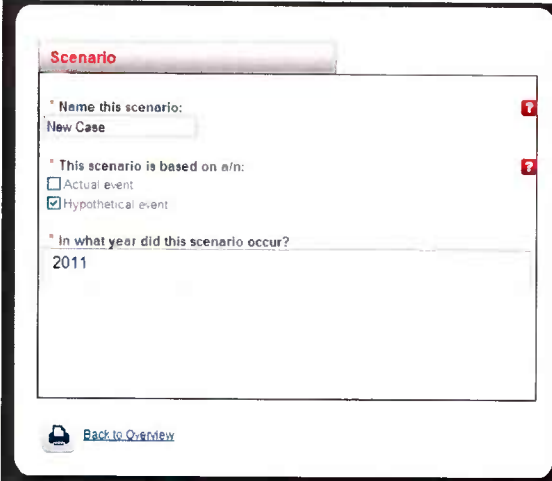
Figure 21   The Scenario page

5. Enter a new name for the scenario, then click Back to Overview.

The system will use the name you provide as the scenario filename and then return you to the topic page.

7.3   Publishing a Scenario

To publish a scenario:

1. Click

   The system opens the Scenario Viewer and suggests you review it one more time before publishing it.

2. Click again.

   The system moves the scenario to the library of published scenarios that you can read through the View Scenarios panel.

7.4   Exporting a Scenario to Word

Once a scenario has been published, you can export it to Microsoft Word.

Note: Once a scenario has been exported to Word and changed in any way, you cannot bring it back into 360Recall.

To export a scenario to Word:

1. Open the scenario.

2. Click

   The system opens the scenario in Microsoft Word.

   Reminder: Once a scenario has been exported to Word and changed in any way, you cannot bring it back into 360Recall.

7.5   *Printing a Scenario*

To print a scenario:

1. Open the scenario.

2. Click

8 TAKING NOTES

The Notepad lets you take notes while you are creating or editing a scenario. The notes are saved along with the scenario content and can be added to the published and unpublished scenarios you have developed.
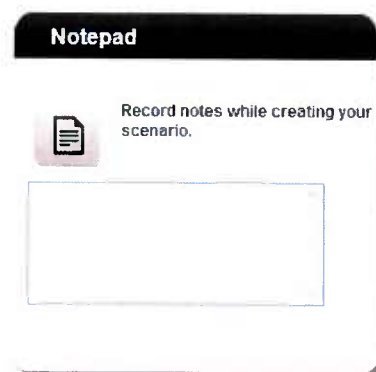
Figure 22   The Notepad

To use the Notepad:

1. Move the cursor to the text box and enter your notes.

    The system adds your notes to any other notes you may have already recorded for this scenario.

9 MANAGING SCENARIOS

9.1 Deleting an Unpublished Scenario

To delete a scenario:

1. From the View Scenarios panel on the Home page, click Start.

2. Click the Unpublished Cases tab.

   The system lists the scenarios you have drafted but not published.

3. Click the check box of the scenario you wish to delete.

4. Click 🗑

9.2 Deleting a Published Scenario

Because of concerns over the potential loss of information, only a system administrator can delete a scenario that has been published.

XCapture ADT
User Guide

Unclassified

January 2013

Prepared by

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success.

Notice
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Contents

Figures

1 INTRODUCTION

XCapture ADT is a web-based authoring tool designed to help National Guard Agribusiness Development Teams (ADTs) quickly and easily create after action reviews (AARs).

Figure 1   The Home page

With XCapture ADT, you can:

> ➤ Create AARs
> ➤ Review and edit your AARs
> ➤ Share your AARs with others in the XCapture ADT community
> ➤ View AARs shared by others
> ➤ Develop a list of contacts you encounter on missions

Using a guided interview, the system helps you document:

> ➤ Pre-mission information, including:
>   ▪ The mission purpose

- The mission schedule
- Assumptions about:
  - The weather
  - The terrain
  - Driving conditions
- Planned tasks
- Civil considerations
- An assessment of risk
- Mission information, including:
  - The tasks that were actually attempted or completed
  - A review of the mission as a whole
- Lessons learned, including:
  - A review of the actual risk
  - Suggestions for things to sustain and things to improve

In XCapture ADT, information is structured and stored in a database. The system has a search function you can use to locate AARs of interest.

Although the user interface has tabs that allow you to skip from page to page, it is best to follow the sequence of tabs when developing an AAR, since some information you'll need to enter is dependent on other information already being there. (For example, before you can develop a risk plan for the mission, you must first enter the tasks you plan to accomplish.)

Once you've completed an AAR, you'll be able to:

- Edit it
- Print it
- Export it to Microsoft Word
- Share it with others who have system access

This guide explains how to use XCapture ADT.

2 GETTING STARTED

2.1 What You Need

XCapture ADT is a web application that requires one of the following browsers:

- Google Chrome (the preferred browser choice)
- Internet Explorer 8 or 9 (preferably with the Google Chrome Frame plug-in)

Use of XCapture ADT also requires an account. Once your account has been activated and you receive your login and password, you can log in.

2.2 Logging In and Out

To log in:

1. Go to http://xcapture.alphaact.com.
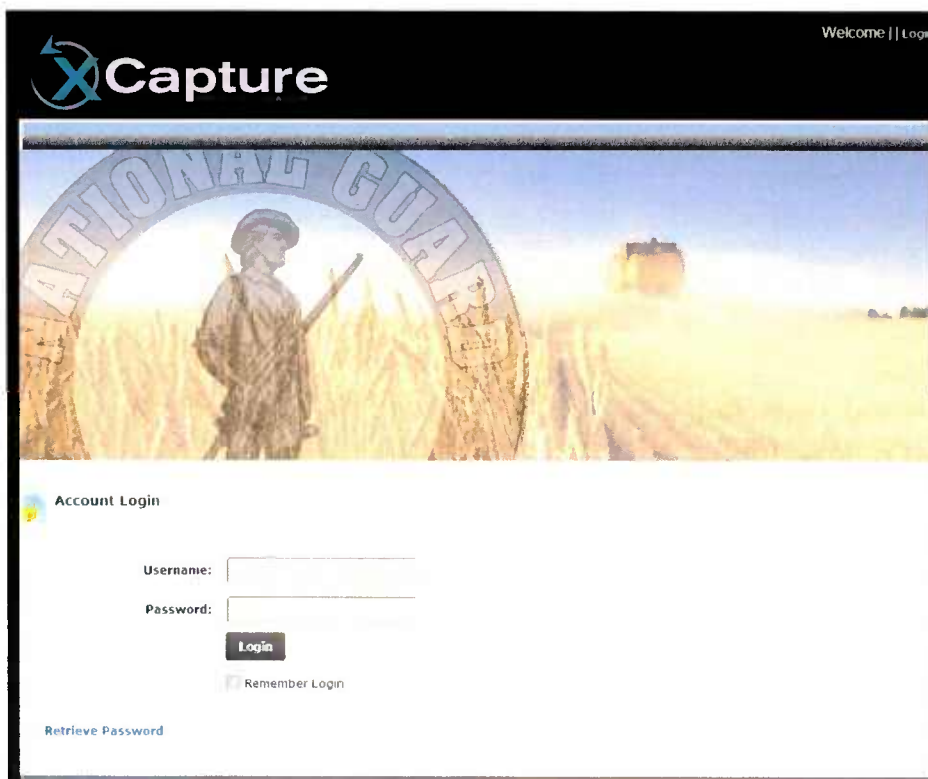
   The system presents the Login page.

Figure 2   The Login page

2. Enter your user name and password.

3. Press Enter or click Login.

   The system presents the Home page.

Figure 3   The Home page

To log out:

1. Click Logout.

    The Logout link is on the upper right corner of the page.
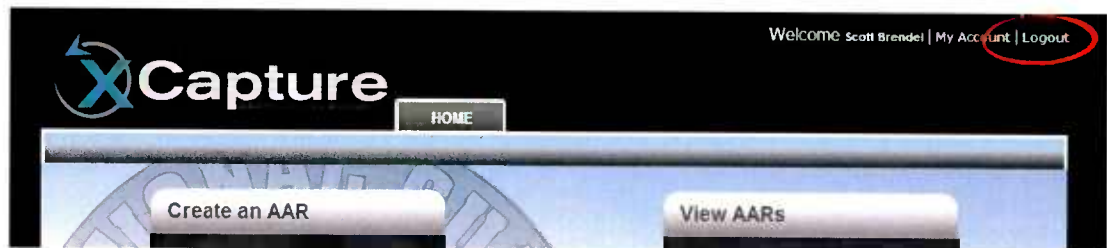
Figure 4   The Logout link

2.3   Automatic Log Out

For security reasons, XCapture ADT will log you out after ten minutes of inactivity. Five minutes prior to logging you out, a pop-up will warn you.

2.4 Basic Navigation

From the Home page, use the Start buttons to move to one of the functional areas.

Figure 5   Moving to a functional area

Once in a functional area, use the tabs along the top of the pages to move to a different functional area.

Figure 6   Moving between functional areas

While creating or editing an AAR, use the tabs on the guided interview pages or the Next Section links to move from page to page.
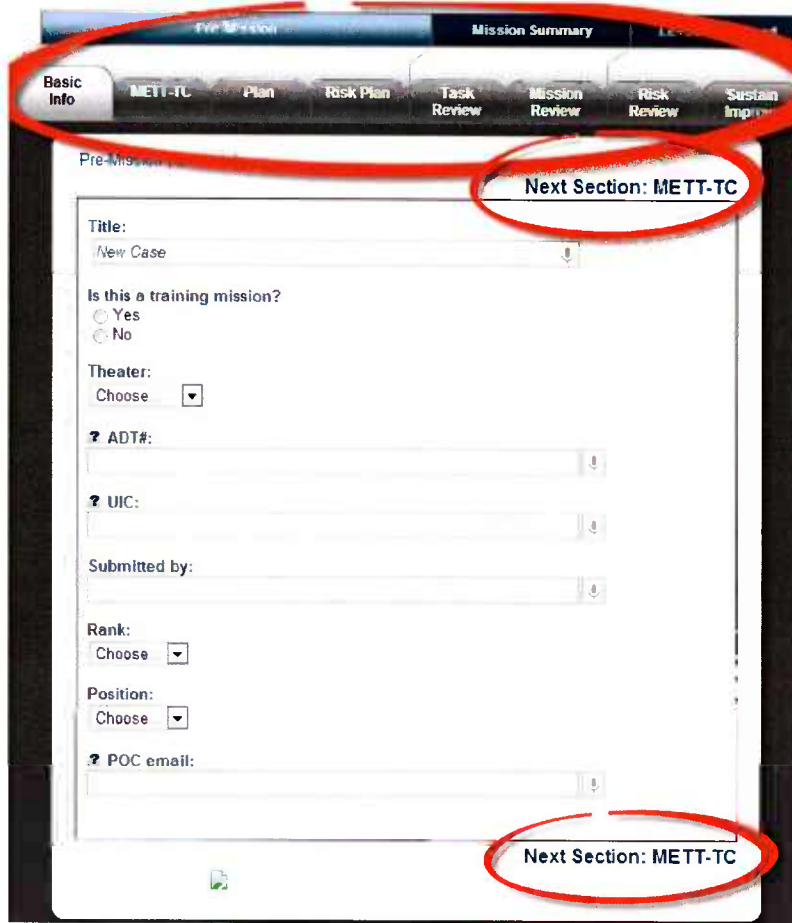
Figure 7   Moving from page to page in the guided interview

2.5 Getting Help

 XCapture ADT provides access to contextual help on many pages. Just look for this symbol.

To access help, click the question mark icon.

Figure 8   Opening a help panel

To close a help panel, click the x button on its upper right corner.

Figure 9   Closing a help panel

2.6   Saving Work

Even though XCapture ADT includes a Save button on each page, the system automatically saves the changes you make every five seconds.

Before your entries have been saved, you'll see this:
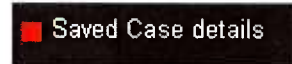
After your entries have been saved, you'll see this:
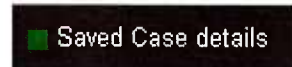
3 CREATING AN AAR

An AAR contains three kinds of information:

➤ Pre-mission plans
➤ Information about what actually occurred during the mission
➤ Lessons learned

This section explains how to:

➤ Enter pre-mission information
➤ Enter mission summary information
➤ Capture lessons learned
➤ Review your progress through the topics
➤ Attach supporting files

3.1 Entering Pre-mission Information

To enter pre-mission information:

1. Log in to the system.

2. From the Create an AAR panel on the Home page, click Start.

Figure 10   The Create an AAR panel

The system takes you to the first page of the guided interview.

Figure 11   The Basic Info page

The tabs along the top of the panel show the topics included in the guided interview.

3. Enter a name for the AAR in the field labeled Title.

The system will use the name you provide as the AAR name.

Tip: Give your AAR a descriptive name.

4. Enter the rest of the requested information on the Basic Info page.

5. Click Next Section: METT-TC and enter the requested information.

Figure 12   The METT-TC page

6. Click Next Section: Plan and enter the requested information.

    Note: On the Plan page, you enter information about the tasks you planned to conduct before you began the mission. A later page (the Task Review page) will ask you about the tasks you actually attempted or completed during the mission.

    Tip: You must enter the tasks you plan to undertake before you can develop a risk plan for the mission.

Figure 13   The Plan page

To add a task:

    a.   Click the Plus button

Figure 14   Adding a planned task

    b.   Describe the task (the description will be used as the task name)
    c.   Specify the task location

    d. Enter the task objectives

    e. Click Add

    f. Enter the additional information prompted for on the Plan page.

To edit a task:

    a. Click the edit button beside the item

    b. Modify the information as needed

    c. Click Update

To delete a task, click the delete button beside the item

Reminder: Because a risk plan is based on the tasks planned for a mission, all planned tasks must be entered before the risk plan can be completed.

7. Click <u>Next Section: Risk Plan</u> and, for each task, expand the task window and enter the requested information.
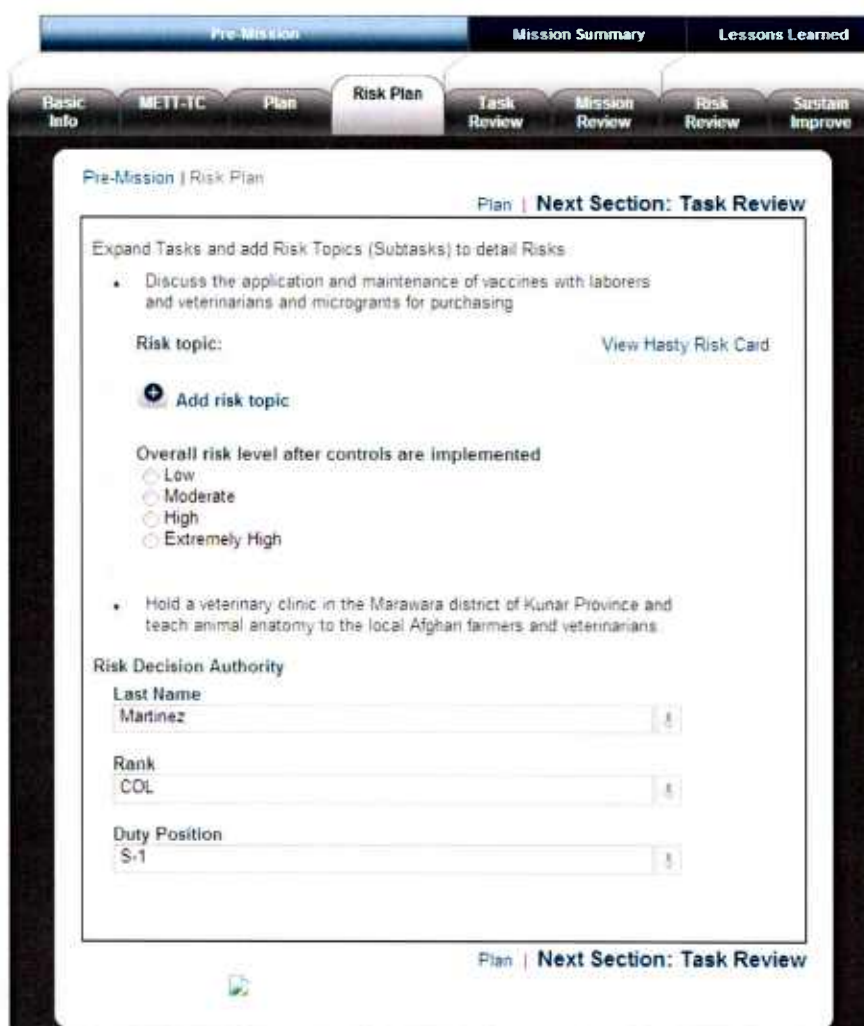
Figure 15   The Risk Plan page

Note: On this page, you enter information about the risks you planned for before you began the mission. A later page (the Risk Review page) will ask you how well your risk mitigation strategy worked during the mission.

Reminder: Because a risk plan is based on the tasks planned for a mission, all planned tasks must be entered before the risk plan can be completed.

To add a new risk topic:

  a.   Click the Plus button

Risk topic: View Hasty Risk Card

Answer the questions below to add a risk topic

Describe

Hazards

Initial risk level
Choose ▼

Controls

Residual risk level
Choose ▼

How to implement

How to supervise (who)

Cancel   Add

Overall risk level after controls are implemented
○ Low
○ Moderate
○ High
○ Extremely High

Figure 16   Adding a risk topic

b. Describe the risk (the description will be used as the risk topic name).
c. Describe the hazards.
d. Select the initial risk level using the dropdown list.
e. Explain the controls that will help mitigate risk.
f. Select the residual risk level using the dropdown list.
g. Enter a description of how you will implement the risk controls.
h. Identify who will supervise risk management and how they will do it.
i. Click the radio button indicating the overall risk level after controls are implemented.
j. Click Add.

Tip: XCapture ADT lets you "re-use" risk topics you've created for another task in the same AAR so you don't have to re-enter the same information over and over.

To "re-use" an existing risk topic:

    a. Click the Plus button beside Import previous risk topics.

        XCapture ADT imports *all* the risk topics from the other task.

    b. Delete the risk topics that do not apply.
    c. Edit details of the imported risk topics as needed.

To edit a risk topic:

    a. Click the edit button beside the item.
    b. Modify the information as needed.
    c. Click Update.

To delete a risk topic, click the delete button beside the item.

To identify who has risk decision authority, enter the last name, rank, and duty position of the person with the mission's risk decision authority.

Figure 17   Risk decision authority

This completes the pre-mission information section of the AAR.

3.2   *Entering Mission Summary Information*

To enter mission summary information:

1. Click the Task Review tab.

    The system shows the planned tasks you previously entered on the Plan page.
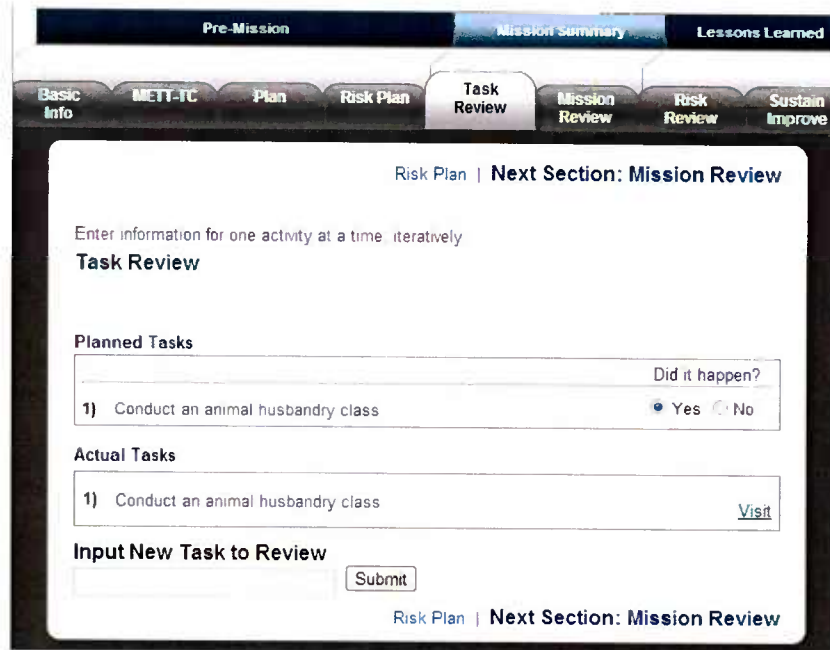
Figure 18   The Task Review page

2. If:

- A planned task was not attempted, click No under Did it happen?

    You'll be prompted to explain why the task was not conducted.

- A task you did not enter on the Plan page was attempted or completed, enter the task in the Input New Task field and click Submit.
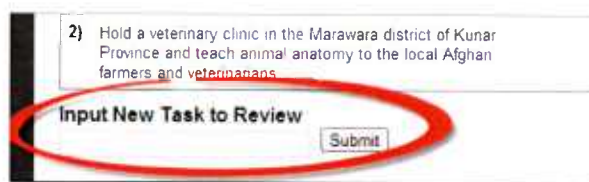
Figure 19   Inputting new tasks

Although you can use this feature to document unplanned tasks for the mission, you cannot assess or review the risk of an unplanned task after the fact except via lessons learned.

3. For each task that was actually attempted or completed:

    a. Click Visit

       The system displays the first in a series of pages that prompts you to enter more detail about the task. This includes:

- Overview
- Description
- Resources
- Results
- Conditions
- Task Review

Figure 20   The Task Review Overview page

    b. Enter the requested information, then click Next Section: Description.
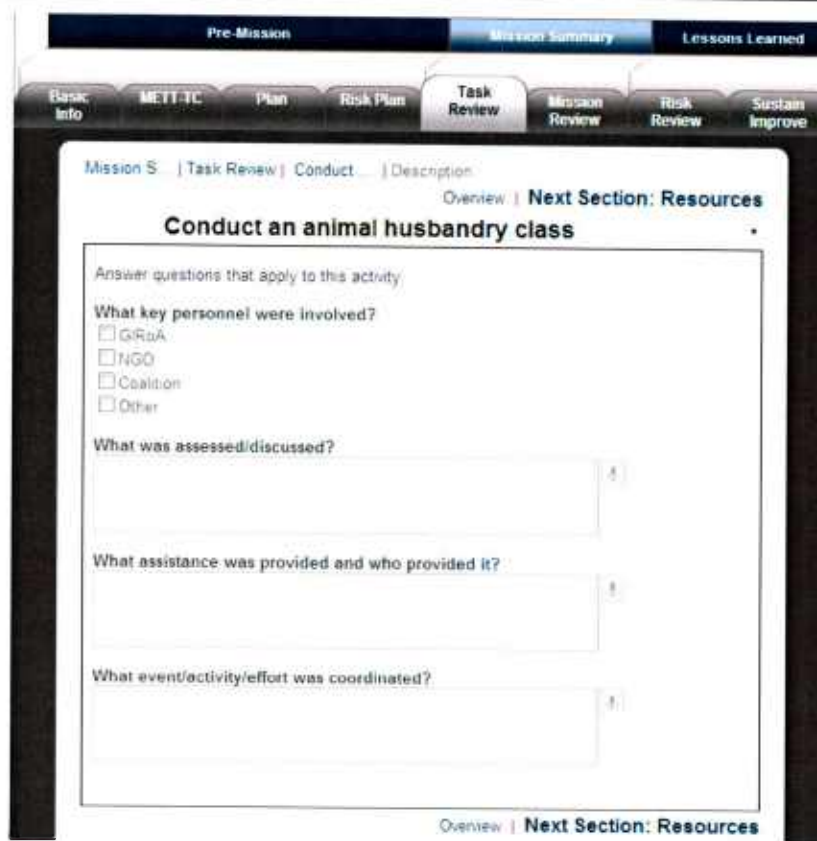
Figure 21   The Task Review Description page

c. Enter the requested information, then click Next Section: Resources.

Figure 22   The Task Review Resources page

d.   Enter the requested information, then click Next Section: Results.

Figure 23   The Task Review Results page

e. Enter the requested information, then click Next Section: Conditions.
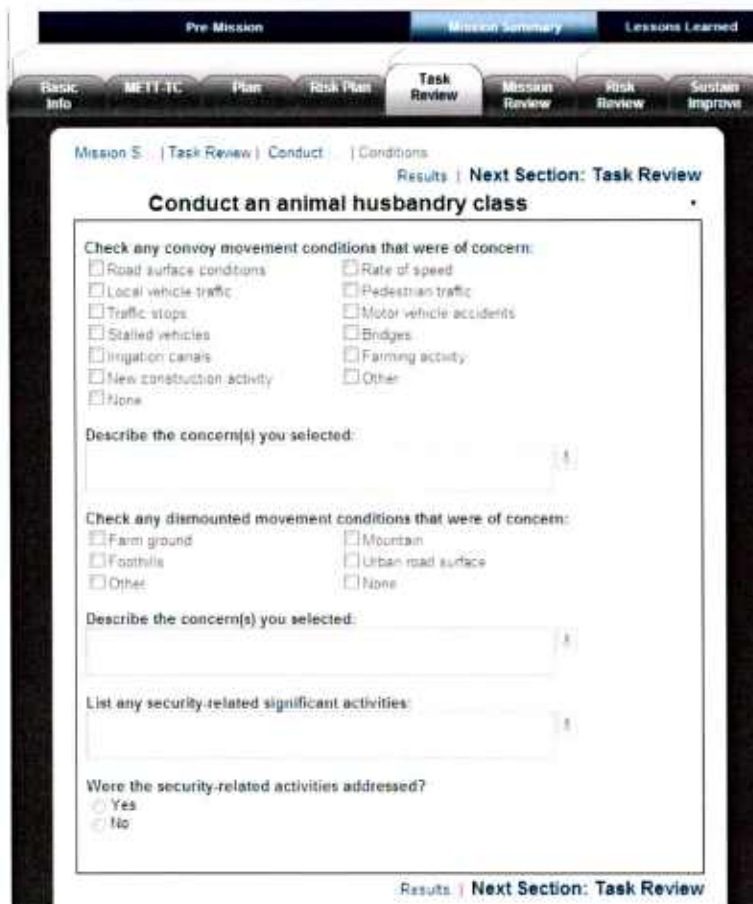
Figure 24   The Task Review Conditions page

f. Enter the requested information, then click Next Section: Task Review.

This returns you to the Task Review page, where you can:

- Enter information about the other tasks you completed
- Exit the Task Review page by clicking Next Section: Mission Review

4. To:

   ▪ Delete a task you added on the Task Review page, click the x button beside the item
   ▪ Change the order of tasks, click the Arrow Up and Down buttons until the list is sorted as you want it

5. Click the Mission Review tab.

The system shows the Mission Review page.
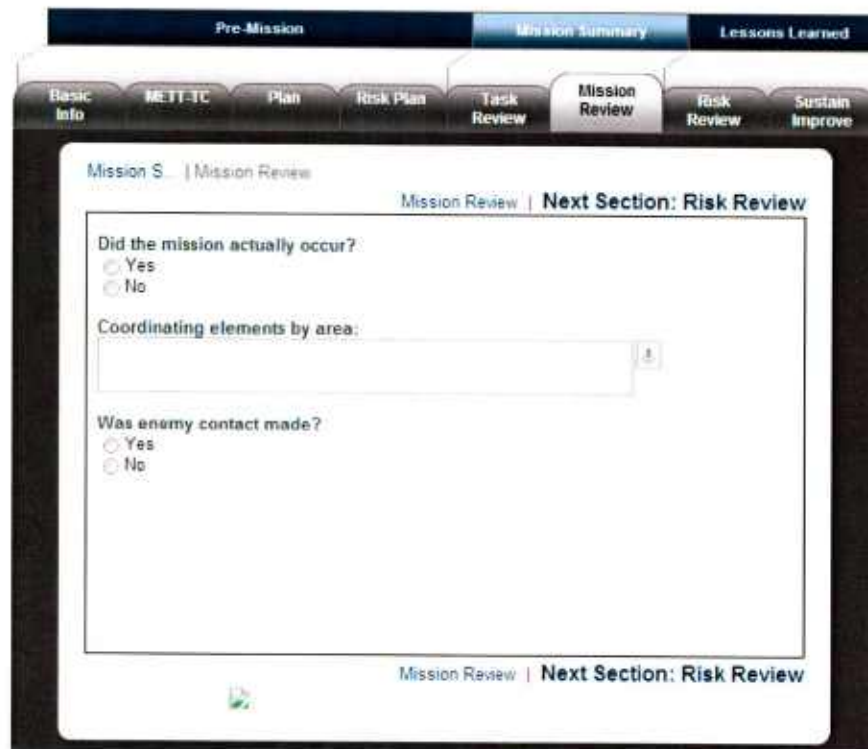
Figure 25   The Mission Review page

6. Enter the requested information, then click Next Section: Risk Review.

3.3   *Capturing Lessons Learned*

To enter information about lessons learned on the mission:

1. Click the Risk Review tab, then open the sub-task window beneath each task.

    The system shows the risk topics you previously entered on the Risk Plan page.

Figure 26   The Risk Review page

2. For each risk, indicate whether the risk mitigation strategy was successful and why.

3. Click the Sustain/Improve tab.

   The system lets you add, edit, or delete topics for sustaining or improving practices.

Figure 27   The Sustain/Improve page

4. To:

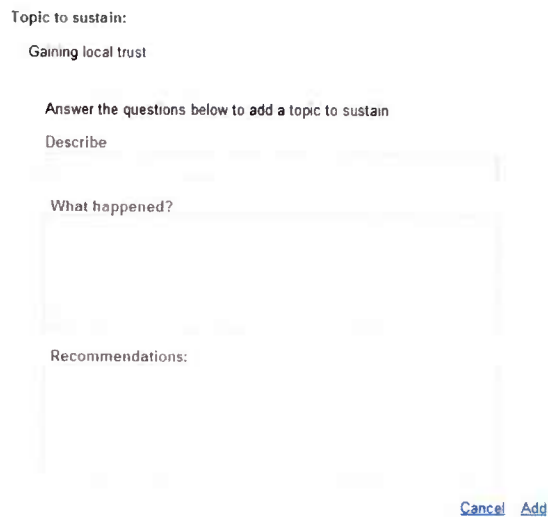   ▪   Add a new topic:
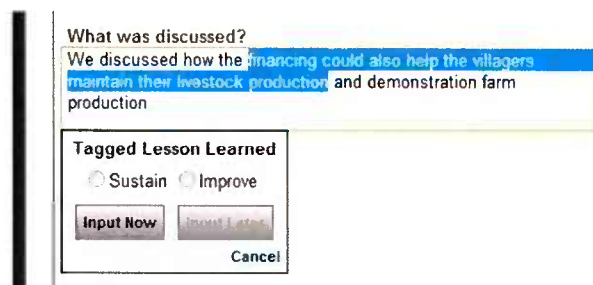
        a. Click the Plus button

Figure 28   Addition a lessons learned topic

        b. Describe the lesson (the description will be used as the lesson topic name)
        c. Describe what happened and the recommendations you're making

d. Click Add

- Edit a topic:
  a. Click the edit button beside the item
  b. Modify the information as needed
  c. Click Update

- Delete a topic, click the delete button beside the item

Tip: On any page of XCapture ADT, you can also highlight text, tag it as a lesson learned, and then add additional information about the lesson when prompted.


What was discussed?
We discussed how the financing could also help the villagers maintain their livestock production and demonstration farm production

Tagged Lesson Learned
 Sustain Improve

Input Now Input Later
Cancel

Figure 29   Tagging text for a lesson learned

3.4 Reviewing Your Progress

The Overall Progress panel shows your progress through the guided interview, including:

➤ The percentage of topics you have visited
➤ The percentage of topics you have completed
➤ The percentage of questions you have answered

Overall Progress: Topics Visited •
7%
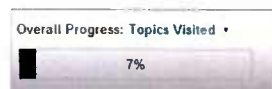
Figure 30   The Overall Progress panel

3.5 Attaching Files

XCapture ADT lets you attach image files to an AAR from any page of the guided interview.

Tip: Before attaching files to an AAR, name them descriptively.

To attach a file to an AAR:

1. Open the AAR.

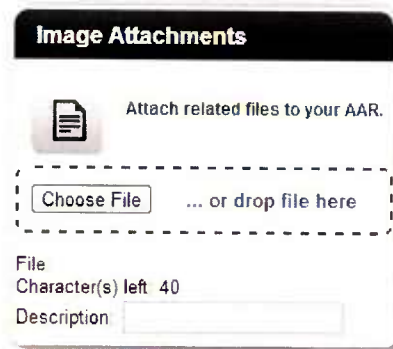2. From the Attachments panel, click Choose Files.

Figure 31   The Attachments panel

3. Navigate to the folder that contains the file and select it.

4. Click Open.

    OR

    Drag the file into the drop box on the Attachments panel.

    This attaches the file to the AAR and shows the filename in the Attachments panel.

5. Add a description of the file.

    You can add a description of up to 40 characters to explain what the attachment is. This description will be used to caption the file in the system.

    Tip: Give your files descriptive file names before uploading them.

4 EDITING AN AAR

Once you have prepared an AAR, you can edit it even if it has been shared with the XCapture ADT user community. You can also rename it if necessary.

4.1 Revising an AAR

To add to or revise an AAR:

1. From the View AARs panel on the Home page, click Start.

   The system lists the AARs you have prepared. This includes the ones you have shared and those you haven't.

2. Click the title of the AAR you wish to edit.

   The system opens the AAR in the full report view and provides buttons for several options.

3. Click the Edit AAR button.

   The system displays the Basic Info page of the guided interview.

4. Using the tabs, navigate through the pages and make the additions, deletions, and changes you want.

4.2 Renaming an AAR

Renaming an AAR is a matter of changing the name you gave it when it was first created. By defaults, AARs are named New Case if you fail to provide a title of your own.

To rename an AAR:

1. From the View AARs panel on the Home page, click Start.

   The system lists the AARs you have prepared. This includes the ones you have shared and those you haven't.

2. Click the title of the AAR you wish to rename.

   The system opens the AAR in the full report view and provides buttons for several options.

3. Click the Edit AARs button.

   The system displays the Basic Info page of the guided interview.

4. Enter a new name for the AAR, then click Save.

4.3   Sharing an AAR

When you share an AAR, you enable others in the XCapture ADT community to view it. XCapture ADT will list it on the Shared AARs page (you'll still see it on the My AARs tab when you log in).

Beside AARs that have been shared, you'll see this:

Beside AARs that have *not* been shared, you'll see this:

To share an AAR:

1. From the View AARs panel on the Home page, click Start.

   The system lists the AARs you have prepared. This includes the ones you have shared and those you haven't.

2. Select the AAR(s) you wish to share by clicking the checkbox beside it.

3. Click the Share AAR button

   The system adds the AARs to the library of shared AARs.

5 VIEWING AARS

5.1   Reading an AAR

Once an AAR is shared, all users in the XCapture ADT community can read it. XCapture ADT gives you the option to view:

➤ The full report
➤ The trip report
➤ The storyboard format
➤ The composite risk management report
➤ A custom report tailored to user needs

To read an AAR:

1. From the View AARs panel on the Home page, click Start.

Figure 32   The View AARs panel

Note: From inside the system, click the AARs tab.

By default, the system shows the AARs that you have prepared. You can also view AARs that have been shared by other users by clicking the Shared AARs tab.

2. Click the name of the AAR you want to read.

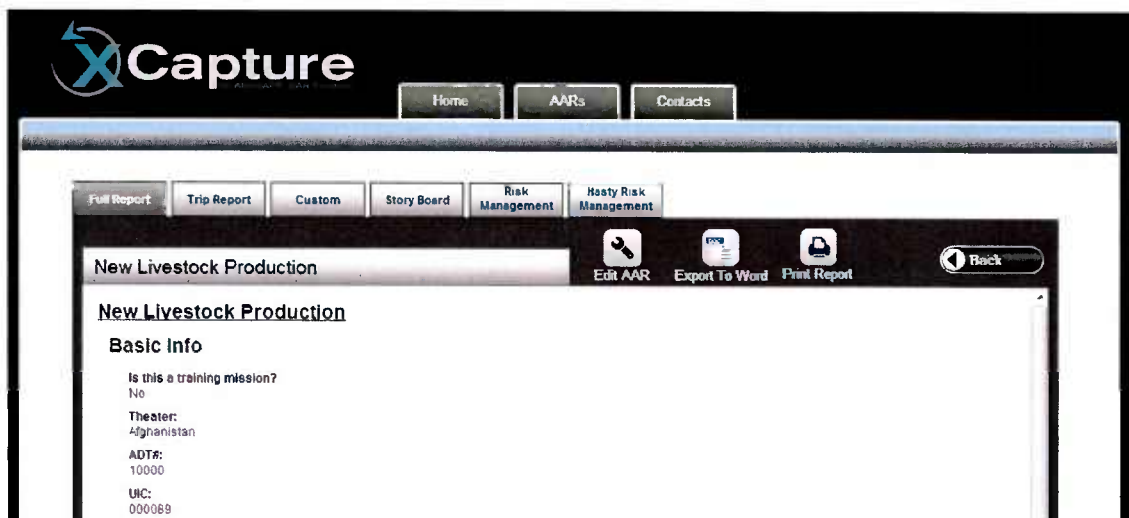The system opens the AAR in the full report view.

Figure 33   The full report view

3. Click the tab for the report view you'd prefer.

5.2   Sorting AARs

From both the My AARs and Shared AARs pages, you can sort AARs by one or more of the following options:

> Date
> User (only shown on the Shared AARs page)
> Location

The controls for the sort function are at the top of both pages and use the Search button to execute the sort. You can sort by a single option (for example, User) or by several options in sequence (for example, sort first by User, then by Date, then by Location).

Figure 34   Sorting controls for AARs

To sort AARs:

1. Sequence the sort options (from left to right) in the order you wish by dragging them into place.

    When you place the cursor over the option label, it will turn into a cross of arrows. You can then drag it into position.

2. Activate the options you want to sort by and deactivate (remove) the others.

3. Click Search.

    XCapture ADT will reorder the AARs according to the sort criteria you have established.

5.3   Searching AARs

XCapture ADT lets you search the content of AARs for words or phrases. It will locate exact matches of the word or text strings you enter.

There are two types of search:

> A quick search will report only exact matches of the words or phrases you input, with no sorting of the results by frequency of the searched terms.
> An advanced search will search for all possible arrangements of the search words you input. It will also order the results by the frequency of the searched terms, listing AARs with multiple mentions of the terms or phrases higher than AARs with only a single mention of them.

To search for a word or phrase:

1. From the View AARs panel on the Home page, click Start.

   Reminder: From inside the system, click the AARs tab.

2. Navigate to the tab containing the AARs you want to search.

   You can search your own AARs or the shared AARs.

3. Enter the word or phrase in the box at the top of the page and click Quick Search or Advanced Search.
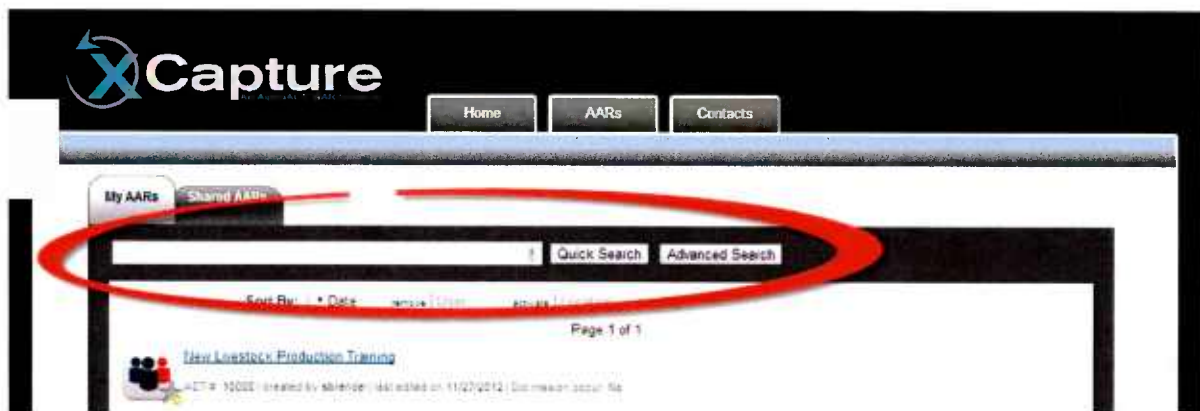
Figure 35   The Search panel

The system lists the AARs that contain the word or phrase.

5.4   Sorting and Searching at the Same Time

You can combine the sort and search functions to conduct even more sophisticated and targeted searches. Just set up your sort parameters, then enter a word or phrase and click the Quick Search or Advanced Search button.

5.5   Printing an AAR

XCapture ADT provides several standard report formats that you can print out. It also allows you to prepare a customized report and then print it out (as discussed in Section 6).

To print an AAR in a standard format:

1. Open the AAR.

    The system displays the full report view of the report.

2. Select the report type by clicking its tab.

Figure 36   Selecting a report type

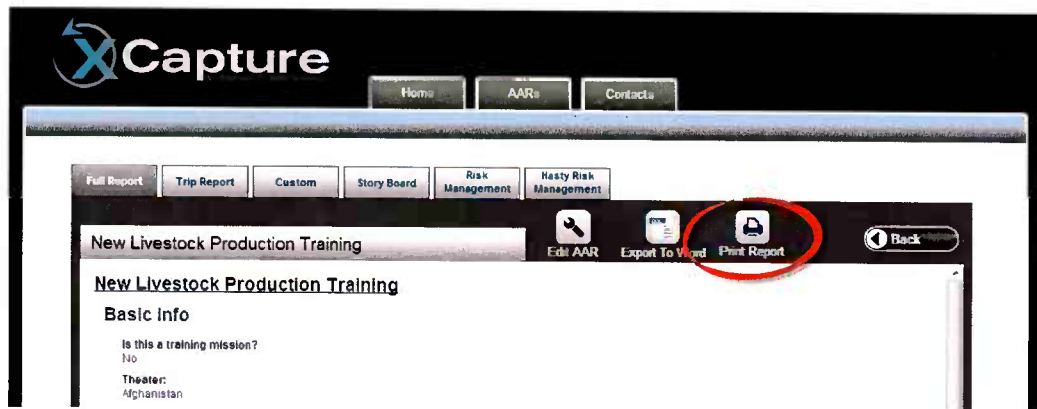3. Click Print Report.
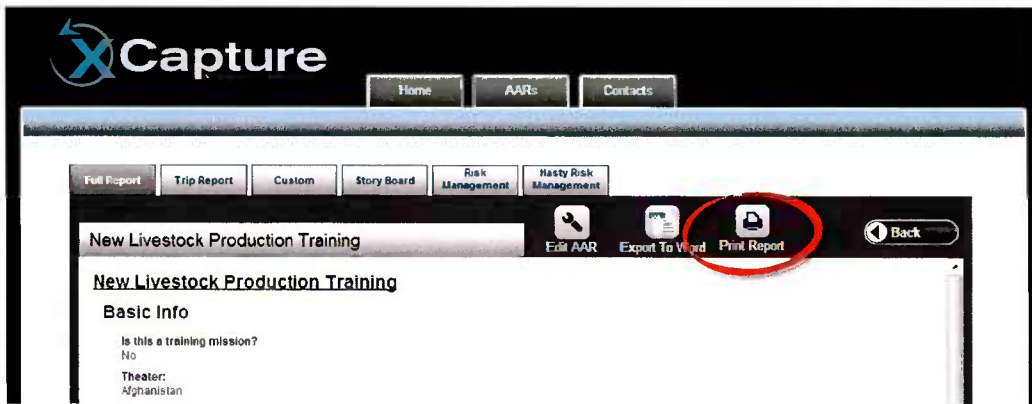
Figure 37 The Print Report button

The system displays the first browser print window.

4. Click Click to Print This Page.

Figure 38 The first browser print window

The system displays the second browser print window.

5. Click Print.
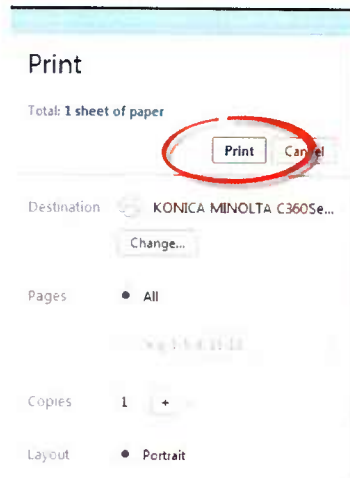
Figure 39   *The second browser print window*

The system prints the report.

5.6 Exporting an AAR to Word

You can export an AAR to Microsoft Word for further word processing.

Note: Once an AAR has been exported to Word and changed in any way, you cannot bring it back into XCapture ADT.

To export an AAR to Word:

1. Open the AAR.

2. Click the Export to Word button.

   The system converts the file to Microsoft Word, opens the Save As box, and asks what you want to name the file and where you want it saved.
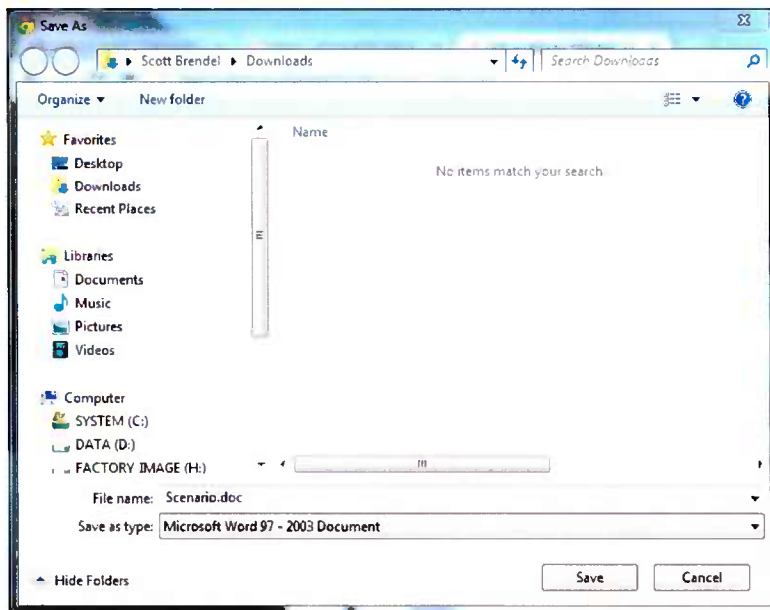
Figure 40   Exporting to MS Word

Reminder: Once an AAR has been exported to Word, you cannot bring it back into XCapture ADT.

5.7   Saving an AAR in .pdf Format

Some of the print screens you will encounter during this procedure are specific to the browser you are using with XCapture ADT. The illustrations in this section depict Google Chrome.

To save an AAR as a .pdf file:

1. Open the AAR.

    The system displays the full report view of the report.

2. Select the report type by clicking its tab.

Figure 41   Selecting a report type

3. Click Print Report.

Figure 42   The Print Report button

The system displays the first browser print window.
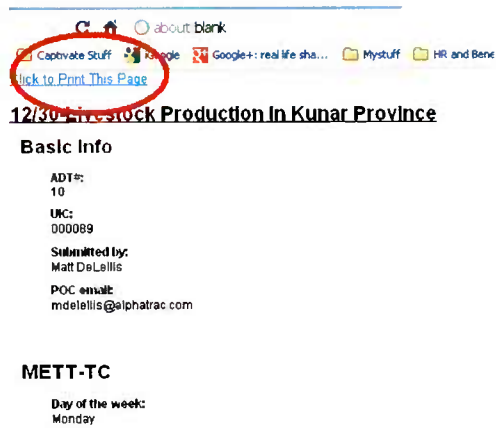
4. Click Click to Print This Page.

Figure 43   The first browser print window

The system displays the second browser print window.
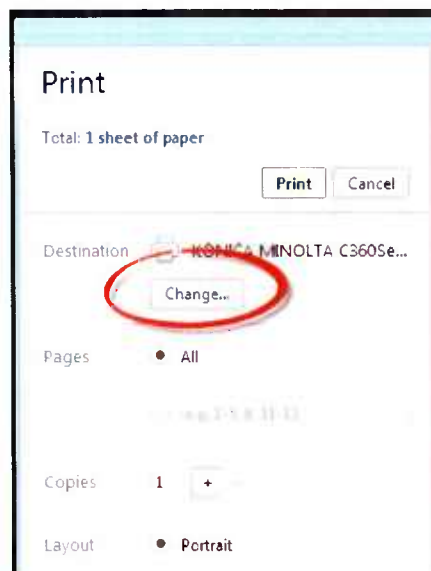
5. From the second browser window, click Change.

Figure 44   The second browser window

The system presents you with a panel that lets you change the print destination. This includes an option to Save as PDF.
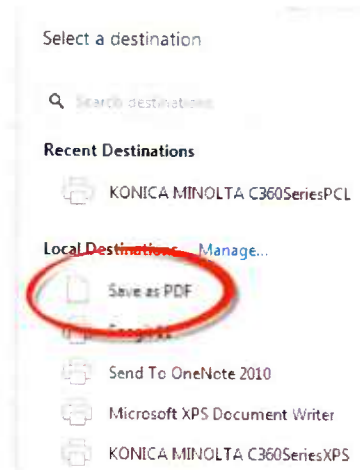
6. Click Save as PDF.

Figure 45   Saving as pdf

The system generates a pdf of the report.

5.8   Emailing Reports

Once you complete an AAR, you can email it as an attachment. The type of attachment depends on the type of report you want to send:

➤ To email a full report, trip report, or risk management report, export the report to Word (as described in Section 5.6) and attach the Word file to your email.

➤ To email a storyboard, save the report as a pdf (as described in Section 5.7) and attach the pdf to your email.

6 CREATING STORYBOARD REPORTS

A storyboard is a specialized report that covers basic information about a single task.

Storyboards can be prepared directly using a subset of the pages and fields in XCapture ADT, as shown in the following table.

Figure 1   XCapture fields used in a Storyboard report

XCapture tab	Field/question
Basic Info	Title*
Task Review	Key personnel involved
	Project number
	Task description
	Objectives
	Agribusiness products of interest
	Task date
	Location
Outcomes	What were the outcomes/outputs of this task?
	What was assessed/discussed?
	What assistance was provided and who provided it?

*Used as the name of the AAR on the View AARs page, but does not actually appear in the Storyboard report.

To prepare an AAR specifically for a single Storyboard report:

1. Log in to the system.

2. From the Create an AAR panel on the Home page, click Start.

Figure 46   The Create an AAR panel

The system takes you to the first page of the guided interview for a complete AAR.

3. From the Display Mode panel on the right side of the screen, select Storyboard from the dropdown menu.
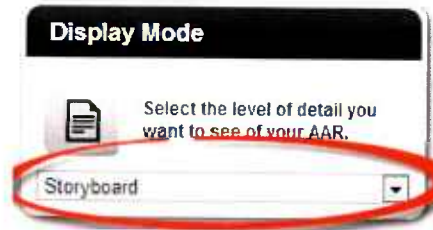
Figure 47   The Storyboard display mode

The system takes you to the first page of the guided interview for a Storyboard AAR.

Figure 48   The first page of the Storyboard guided interview

3. Enter a name for the Storyboard in the field labeled Title.

The system will use the name you provide as the Storyboard name (although it will not actually appear in the Storyboard content).

4. Attach images, if available.

   Although not required, the standard Storyboard format fits three images and can accommodate from zero to ten.

   Note: The image preview may not work, but the images will be available for use in the Storyboard.

   a.   From the Attachments panel, click Choose Files.

   b.   Navigate to the folder that contains the file and select the file.

   c.   Click Open.

           This attaches the image file to the AAR and shows the filename in the Attachments panel.

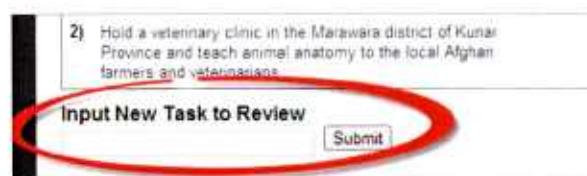   d.   Add a description of the file.

           You can add a description of up to 40 characters to explain what the attachment is. This description will be used to caption the file in the system.

           Tip: Give your files descriptive file names before uploading them.

5. Click the Task Review tab.

   Note: Although the system will warn you that planned tasks have not been entered, you can ignore this warning; Storyboards do not require planned tasks.

6. Enter the task in the Input New Task field and click Submit.

Figure 49   Inputting new tasks

The task name you provide will be used as the Storyboard header.

The system presents you with a page that prompts you for details about the task.

7. Identify the key personnel involved in the task:

   a. Click the checkbox for the organization of the first person.

      Options are GIRoA, NGO, Coalition, and Other. The system opens a box and prompts you for information about the person's title, name, and affiliation.

   b. Enter information about the individual and then click the check box of the next person's affiliation you need to add.

      The system opens a box and prompts you for information about the next person's title, name, and affiliation. You can enter information about individuals for up to four organizations.

8. Enter information in the other fields on this page, including:

   - Project number
   - Task description
   - Objectives
   - Agribusiness products of interest
   - Task date
   - Location

9. Click <u>Next Section: Outcomes</u>.

   The system prompts you for information about the task you just entered. Only the fields mentioned in the next step will be included in the Storyboard.

10. Enter information in the following fields on this page:

    - What were the outcomes/outputs of this task?
    - What was assessed/discussed?
    - What assistance was provided and who provided it

    This completes Storyboard entry.

Multiple images may be associated with an AAR. If you want to associate one or more of them with a task-specific Storyboard report, you need to identify which of the images already attached to an AAR should be associated with a particular Storyboard report.

To associate previously attached images from an AAR to a Storyboard report:

1. Click View Reports.

   The system presents the report by default in the full report format, but it also lists the other report formats in the tabs near the top of the page.

2. Click Storyboard.

   The system presents the report in the Storyboard format.

3. Click Import Previously Attached Image.

   The system presents thumbnails of the images that have already been attached to the AAR.

4. Click the image you wish to attach.

   The system attaches the image to the Storyboard report.

To view a Storyboard report:

1. Click View Reports.

   The system presents the report by default in the full report format, but it also lists the other report formats in the tabs near the top of the page.

2. Click Storyboard.

   The system presents the report in the Storyboard format.

To export the AAR in the Storyboard to PowerPoint:

1. Click Export Storyboard to PowerPoint.

   The system prompts you for where you'd like to save the report.

2. Navigate to the folder where you'd like to save the file to and click Save.

   The system saves the report in the selected location as a .xml file that will open in PowerPoint.

To share the Storyboard report with other ADTs:

1. With the report opened in the authoring mode, click Share.

   The system presents a preview of the report and prompts you to read through the scenario before you publish it.

2. Once you're satisfied with the report, click Share again.

   The system publishes the report and makes it viewable under the Shared AARs tab where other XCapture ADT users can view it.

7 DEVELOPING CUSTOM REPORTS

XCapture ADT lets you create custom reports that assemble the pieces of information you're most interested in in the order you'd like it presented. You can then save this arrangement of information elements into a custom report template, which you can apply to new or existing AARs.

To prepare a custom report:

1. Open the AAR.

   The system displays the full report view of the report.

2. Click Custom.

Figure 50   Preparing a custom report

The system shows the page you'll use to determine what elements to put in your customized report.

3. Select the report elements from the Available Report Items box and use the arrow button to add them to the Report Preview box.
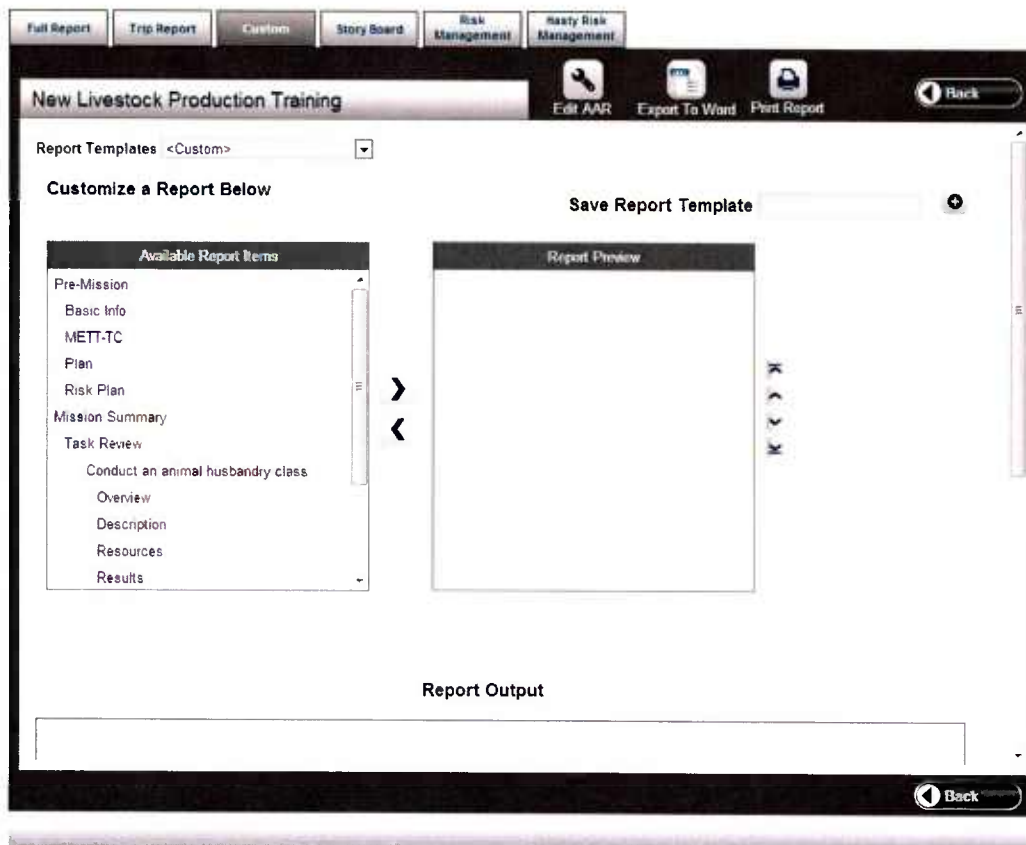
Figure 51   Selecting elements for a custom report

The Report Output box will show how the elements you've chosen are arranged in the report.

4. Rearrange the elements by selecting them and then using the arrow buttons beside the Report Preview box.

5. Save the report template by giving it a name and then clicking the Plus button.

   This adds the new template to the Report Templates dropdown list so you can use it for other reports.

8 MANAGING AARS

Beside AARs that have been shared, you'll see this:

Beside AARs that have *not* been shared, you'll see this:

8.1 Deleting a Shared AAR

Because of concerns over the potential loss of information, only a person with administrative privileges can delete an AAR that has been shared.

This restriction also applies to the AARs that you created and shared—that is, once you share an AAR you created, even you cannot delete it.

8.2 Deleting an Unshared AAR

The only AARs you'll be able to delete are those that you created but have not shared.

To delete one of your unshared AARs:

1. From the View AARs panel on the Home page on the Home page, click Start.

   Reminder: From inside the system, click the AARs tab.

   Reminder: The only AARs you'll be able to delete are those that you created but have not shared.

2. Click the check box of the AARs you wish to delete.

Check boxes will not appear beside shared AARs, so you won't be able to select them to delete.

3. Click Delete AAR.

9 MANAGING CONTACTS

XCapture ADT lets you help build a contacts list of the people you and others on your ADT team encounter on missions. The contacts list is a shared resource of the ADT, not a personal one.

9.1 Adding Contacts

There are two ways you can add contacts in XCapture ADT:

➤ From the Contacts tab
➤ From within an AAR

Note: You can only delete contacts that you added.

Tip: Before adding a contact, check to see if the person is already on the list.

To add a contact using the Contacts tab:

1. Login to the system.

The system presents the Home page.

Figure 52   The Home page

2. Click either Create an AAR or View AARs.

3. Click the Contacts tab.

    The system presents the main page of the existing list of contacts.

Figure 53   The contacts page

4. Click Add New Contact.

The system presents the contact information entry page.

Figure 54   The contact information entry page

5. Enter basic information about the contact.

The system provides entry fields for the person's:

- First name
- Last name
- Date of birth (DOB)
- Location
- Tribe
- Religion
- Adversary

6. Upload a photo of the person.

   a. Click Choose File.
   b. Navigate to the photo file of the person.
   c. Click Open.

7. Enter additional information about the contact using the other buttons on the page.

   This is useful for later searches of the contacts database and can include information about:

   - Key words
   - Family members of the contact
   - Information about their affiliation

8. Click Create Contact.

   The system creates an entry for this contact.

To add a contact while preparing an AAR:

1. From within any text entry field (except the POC email field on the Basic Info page), type @ immediately followed by the person's name.
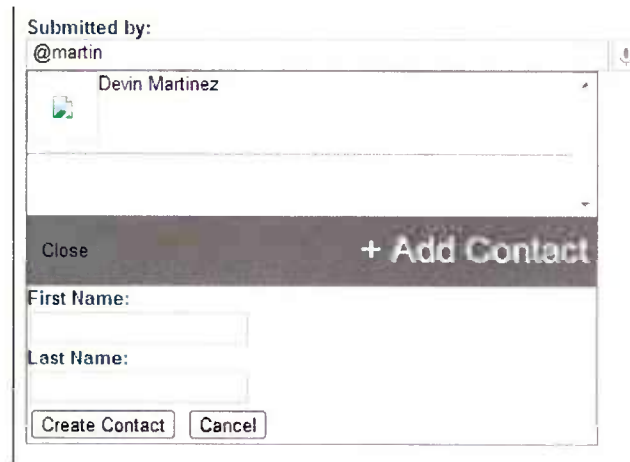
   As you enter the name, the system shows matching names already in the database and lets you select a name or add a contact.
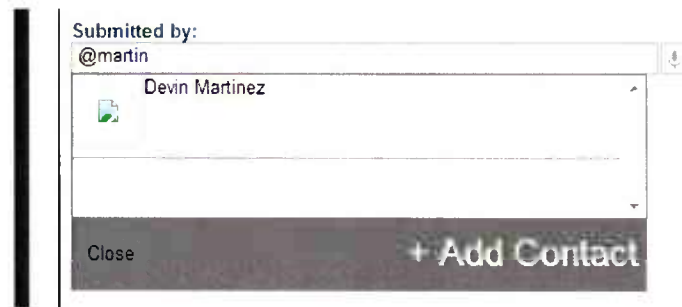
Figure 55   Adding a contact from within an AAR

2. Click + Add Contact.

    The system opens a panel that prompts you for the contact's name.

Figure 56   Entering a contact's name

3. Enter the contact's first and last names, then click Create Contact.

    The system adds the person to the Contacts list. Through the Contacts tab, you can complete the entry at a later time.

To cancel out on using the @ feature to find a user, click Close on the Add Contact panel or press Esc.

9.2 Viewing Contacts

To view the contacts list from the Contacts tab:

1. Login to the system.

   The system presents the Home page.

Figure 57   The Home page

2. Click either Create an AAR or View AARs.

3. Click the Contacts tab.

   The system presents the main page of the contacts list.

Figure 58   The contacts page

4. To:

   - Search for someone in the list, enter their first or last name in the search field and click Search.
   - Search for someone by last name, click the initial of their last name.
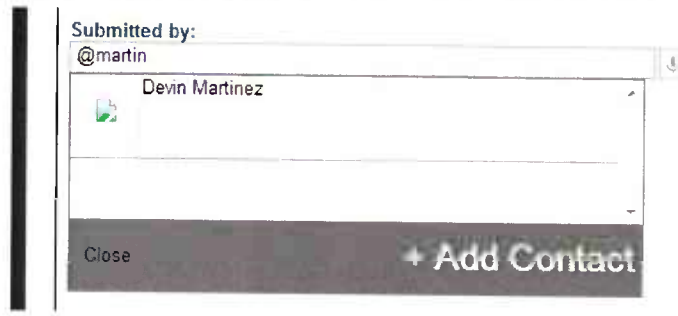

Figure 59   Searching for and sorting contacts

To view a contact while preparing an AAR:

1. From within any text entry field (except the POC email field on the Basic Info page), type @ immediately followed by the person's name.

   As you enter the name, the system shows matching names already in the database and lets you select a name or add a contact.

Figure 60   Viewing a contact from within an AAR

2. Click the contact's name.

   The system adds the contact's name as a link to the field.

3. Click the link for the contact's name.

   The system opens the contact's profile page.

10 TROUBLESHOOTING

If you encounter problems with XCapture ADT, contact Devin Martinez at AlphaTRAC:

   ➤ Email: dmartinez@alphatrac.com
   ➤ Phone: 720-263-4335
   ➤ Skype: Devinmartinez11

An AlphaACT® AAR Solution

XCapture Mobile
User Guide

Unclassified

November 2012

A solution of:

AlphaTRAC®
CRISIS SOLUTIONS THAT SAVE LIVES

Prepared by

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

Contents

Figures

1 INTRODUCTION

XCapture Mobile is a note-taking application that runs on tablets using the Android operating system. It is designed to help National Guard Agribusiness Development Teams (ADTs) quickly and easily take notes in the field which they'll later use to prepare after action reviews (AARs) using XCapture ADT.

With XCapture Mobile, you can:

> ➤ Take notes for a new AAR
> ➤ Add notes to an existing AAR
> ➤ Attach photos and audio files to notes

XCapture Mobile can capture notes in the form of:

> ➤ Text
> ➤ Photos and images
> ➤ Audio clips

Note: When working with existing AARs created in XCapture ADT, you will not be able to modify the pre-mission planning information; you'll only be able to add notes to it. XCapture Mobile is meant to supplement the use of XCapture ADT, not replace it.

This guide explains how to use XCapture Mobile.

2 GETTING STARTED

2.1 What You Need

XCapture Mobile runs on tablets that use the Android platform.

2.2 Tablet Basics

Tablets are touch-screen devices. The buttons along the lower edge of the screen are tablet functions.

> ➤ To turn the tablet on or off, press and hold the power button on the upper left corner of the tablet for about five seconds.
> ➤ To launch an application, tap its icon.

- ➤ To exit an application, tap the Back button in the lower left corner of the screen (the Back button looks like an arrow that takes a 180-degree turn).
- ➤ To return to the tablet's desktop, tap the Home button (the Home button looks like a house).
- ➤ To scroll a page, touch the tablet screen and then slide your finger in the direction you want to scroll.
  - Some screens scroll from side to side.
  - Others scroll up and down.
  - Some screens are fixed and do not scroll at all.

2.3   XCapture Mobile Basics

- ➤ Although tablet applications usually shift between landscape and portrait orientation depending on how you hold the tablet, XCapture Mobile has been locked to only work in a landscape orientation.
- ➤ To enter text into a field, tap the field to select it. This will open the virtual keyboard. After you enter the text, tap Go.
- ➤ To return to a previous page in XCapture Mobile, tap the < button in the upper left corner of the screen.
- ➤ To exit XCapture Mobile, tap the Back button in the lower left corner of the screen.

2.4   Logging into XCapture Mobile

When logging into XCapture Mobile, use the same login and password you use for XCapture ADT.

To log in to XCapture Mobile:

1. Turn on the tablet by pressing and holding the power button on the upper left corner for about five seconds.

   This displays the tablet's initial screen and the padlock icon.

Figure 1   The tablet's initial screen

2. Touch the padlock icon and drag it to the right.

   This unlocks the tablet and provides access to the tablet's desktop and to the XCapture Mobile icon.

Figure 2   The XCapture Mobile icon on the tablet desktop

3. Tap the XCapture Mobile icon.

   This launches the application and opens the login page.

Figure 3   The Username text input field on the login page

4. Tap the text input field beside the Username prompt.

   This selects the field and opens the virtual keyboard.

Figure 4   The virtual keyboard

5. Type your login name.

6. Scroll the page up, tap the text input box beside the Password prompt, and type your password.

7. Tap Go.

    This takes you to the main page of XCapture Mobile, where you'll be able to create notes for a new AAR and add notes to an existing AAR.
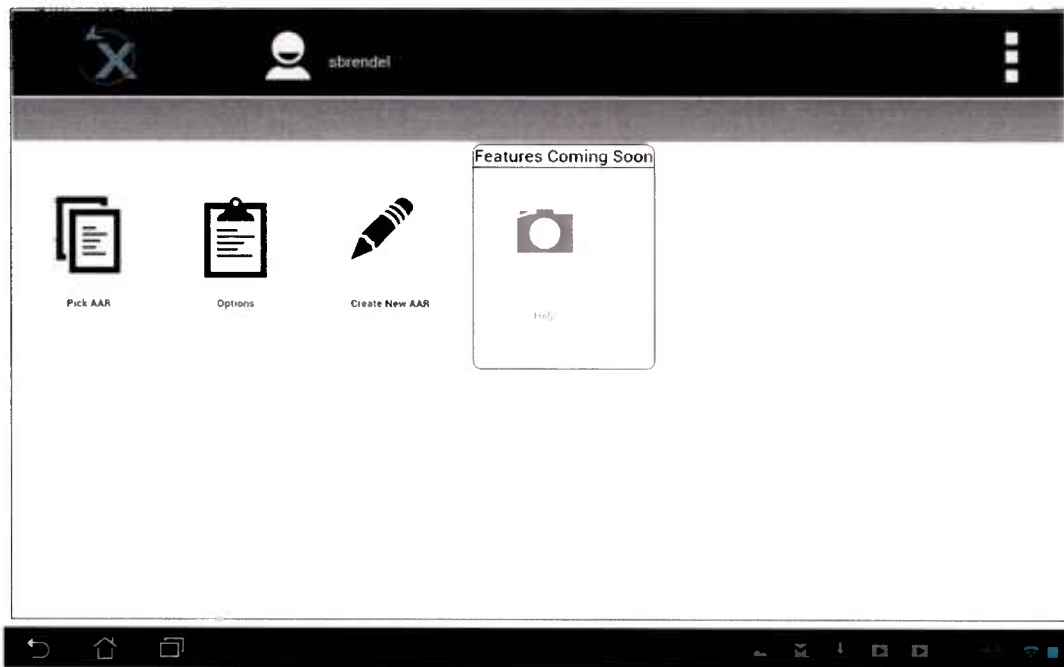
Figure 5   The XCapture Mobile main page

3 TAKING NOTES FOR A NEW AAR

If you haven't yet begun an AAR, you can still take notes with XCapture Mobile for later upload (a future feature) to XCapture ADT.

To take notes on the tablet for a new AAR:

1. From the XCapture Mobile main page, tap Create New AAR.

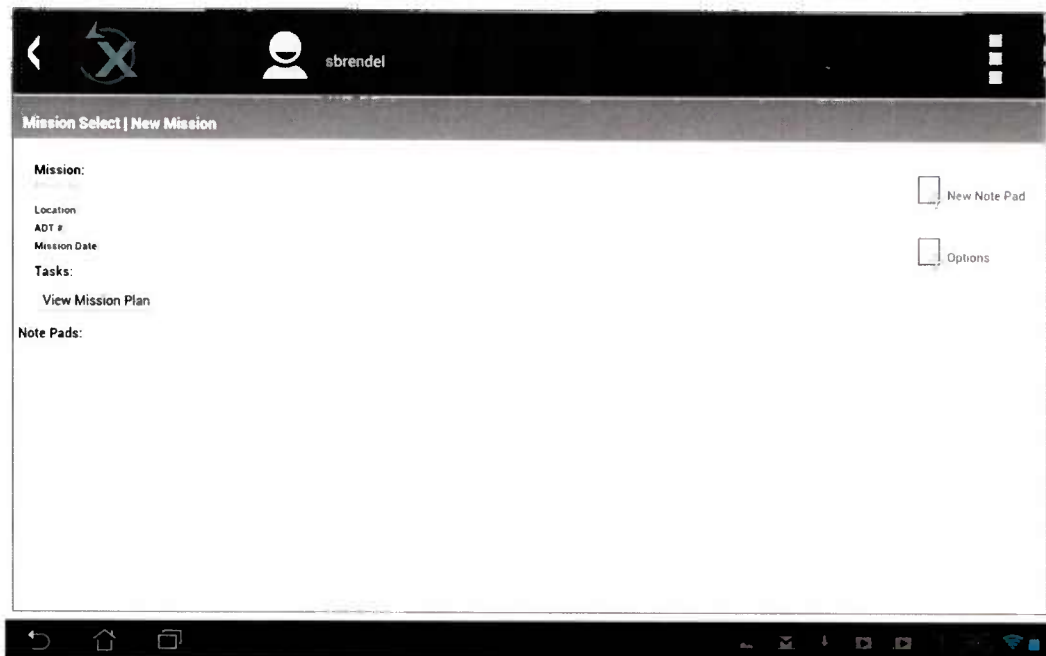   XCapture Mobile opens the New Mission page.

Figure 6   The New Mission page

2. Enter a name for the mission.

    The system will use the name you provide as the AAR name when you upload your notes (a future feature) to XCapture ADT.

    Tip: Give your mission (and therefore your AAR) a descriptive name.

3. Enter the rest of the requested information for:
    - Location of the mission
    - ADT #
    - Mission date

    This information will be transferred to the AAR in XCapture ADT when you upload your notes (a future feature).

    Even though notes are typically associated with tasks, you can't establish the tasks for the mission in XCapture Mobile; they have to be defined after you upload your notes to XCapture ADT.

4. Tap New Note Pad.

XCapture Mobile opens a page that lets you capture notes for a new mission.

Figure 7   The New Mission page

5. Enter a title for the note.

   The system will use the title you provide as the name for the note and will use it as the label for the icon it'll then create.

   Note: The Categories and Flags buttons do not work; they are placeholders for future features.

   Tip: Give your note a descriptive title.

6. Enter the text of the note and tap Submit.

   The text is captured and saved to the display area at the bottom of the page.
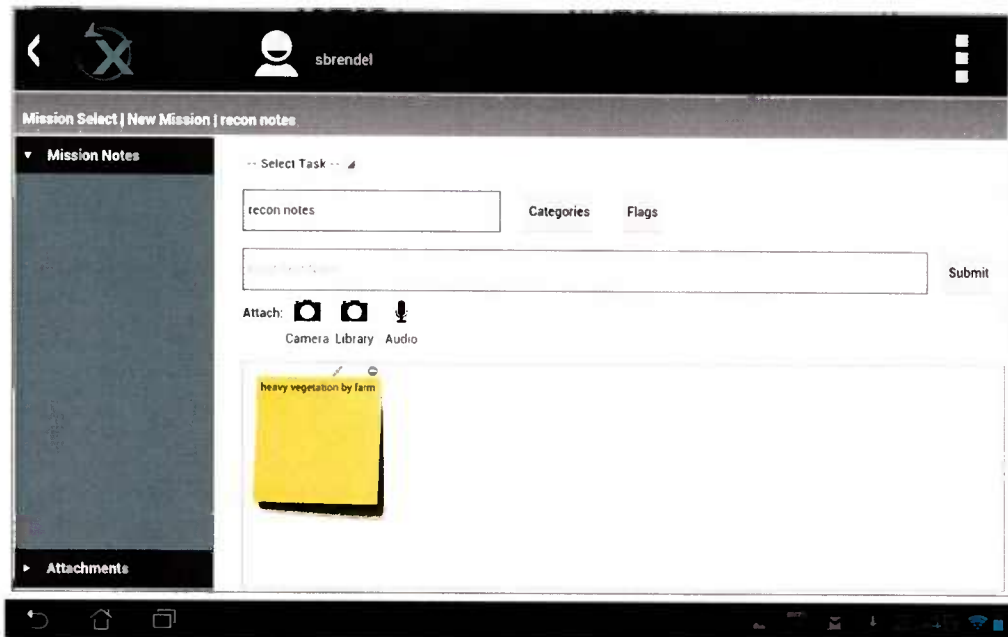
Figure 8   Capturing notes for a new mission

7. Attach files to support the notes, if needed.

   You can attach:
   - Pictures you take with the tablet's camera
   - Images you already have on the tablet
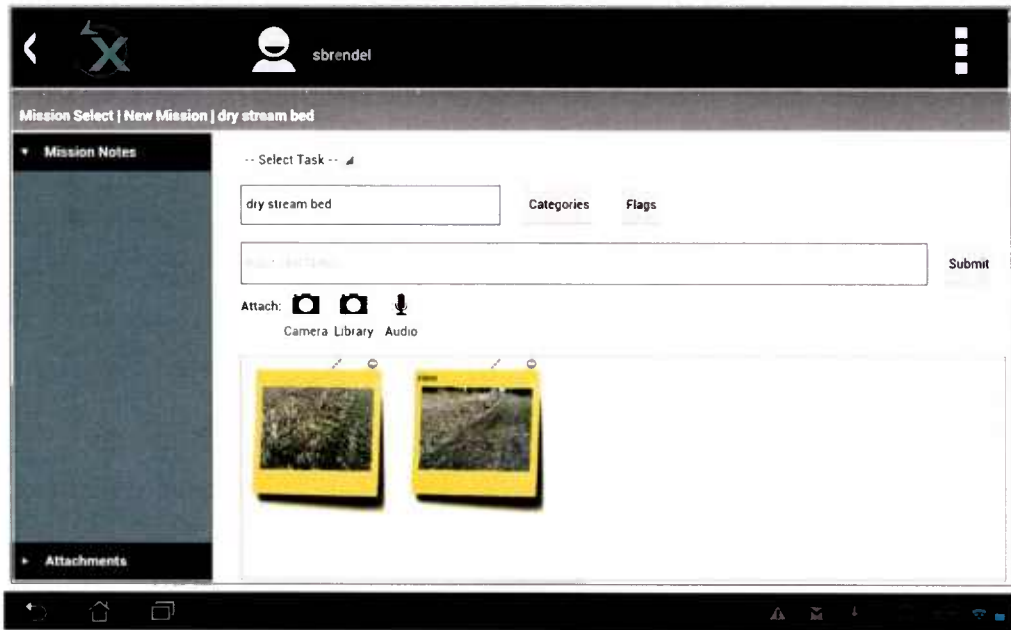   - Audio clips you record with the tablet

Figure 9   Photos as notes

To take a photo and attach it:

    a. Tap the Camera icon to activate the camera

Figure 10   The Camera icon

b. Frame the photo, then tap the blue button on the tablet screen to take the picture

c. Tap Done (to attach the image to the note) or Cancel (to cancel the action)

To attach a photo (or other image file) you already have on the tablet:
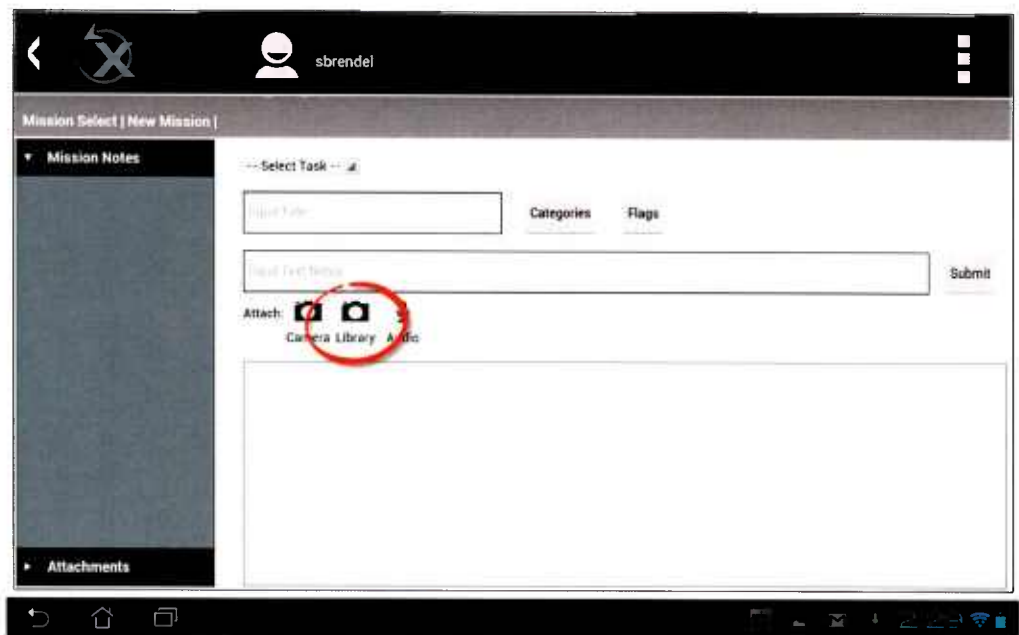
a. Tap the Library icon

Figure 11   The Library icon

b. Navigate to the folder that contains the file

The files are located in the File Manager or the Gallery

c. Tap the image or file you want to attach

To record and attach an audio clip:

a. Tap the Audio icon to begin recording

Figure 12   The Audio icon

The tablet microphone is located along the bottom edge of the tablet. The volume control is a toggle located along the upper left edge of the tablet; to increase the volume, press the upper edge of the control; to decrease the volume, press the lower edge of the control.

b. Tap the Recording icon to end the recording and attach it to the note

4 ADDING NOTES TO AN EXISTING AAR

Before you can add notes to an existing AAR, the AAR must already be on the tablet.

To add notes to an existing AAR:

1. From the XCapture Mobile main page, tap Pick AAR.

   XCapture Mobile shows the AARs on the tablet. For each AAR, it shows the AAR title, location, ADT #, date, number of planned tasks, and number of note pads associated with the AAR.
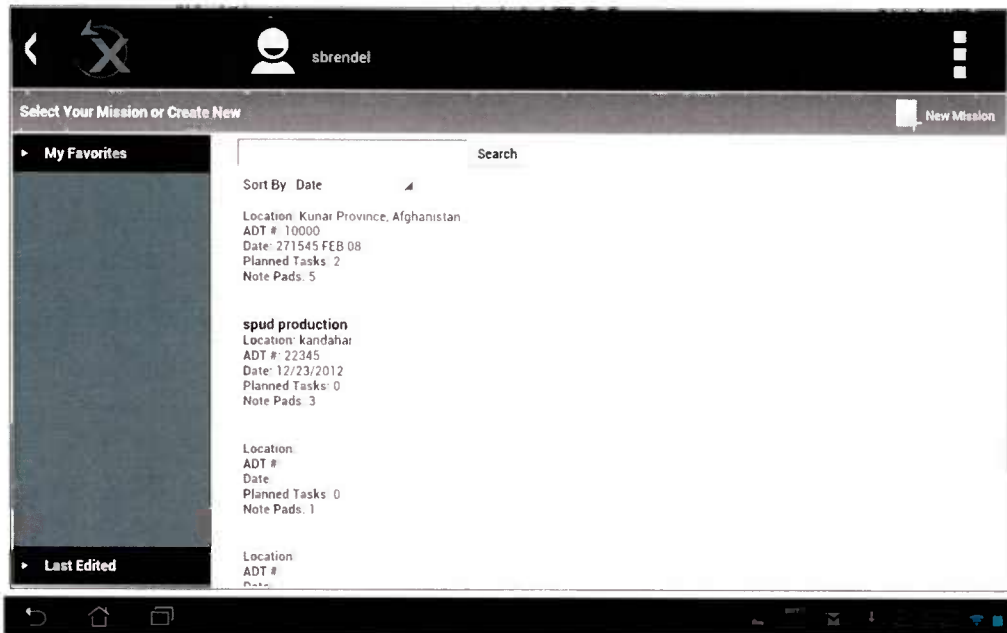
Figure 13   Existing AARs on XCapture Mobile

2. Tap the AAR you want to add notes to.

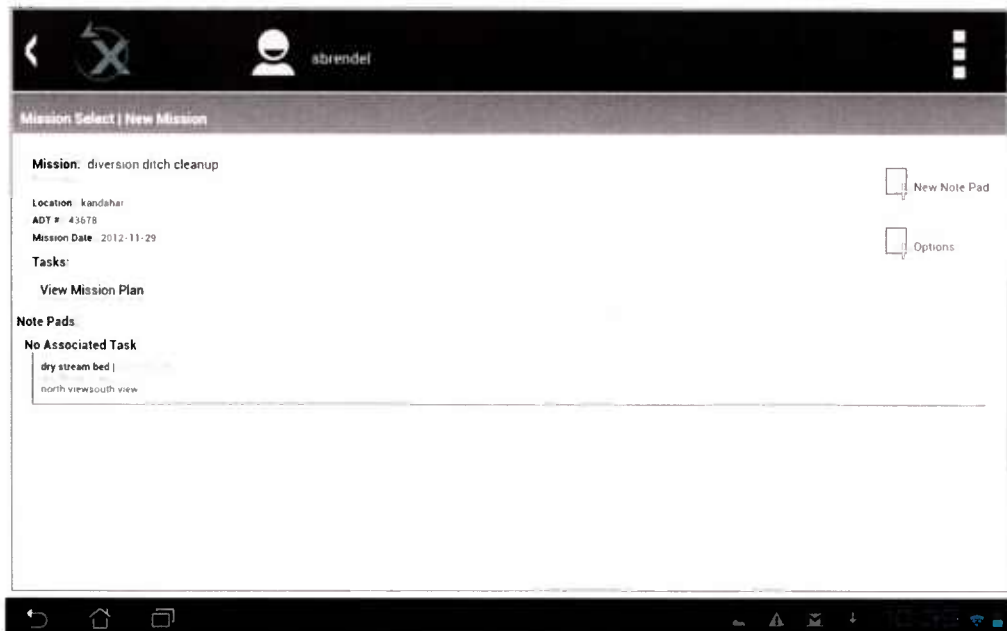   XCapture Mobile opens the AAR.

Figure 14   An AAR on XCapture Mobile

3. Tap New Note Pad.

XCapture Mobile opens a page that lets you capture notes for a new mission.

Figure 15   Capturing notes for a new mission

4. Enter a title for the note.

The system will use the title you provide as the title for the note and will use it as the label for the icon it'll then create.

Note: The Categories and Flags buttons do not work; they are placeholders for future features.

Tip: Give your note a descriptive title.

5. Enter the text of the note and tap Submit.

The text will be captured and saved to the display area at the bottom of the page.

6. Attach files to support the notes, if needed.

You can attach:

- Pictures you take with the tablet's camera
- Images files you already have on the tablet
- Audio clips you record with the tablet

Figure 16   Photos as notes
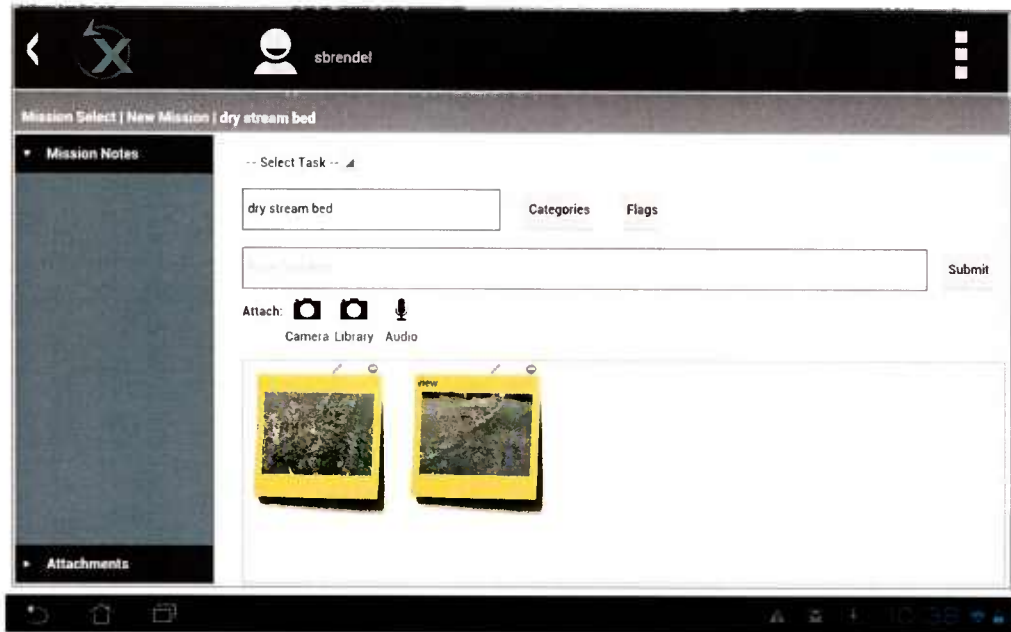
To take a photo and attach it:

a. Tap the Camera icon to activate the camera

Figure 17   The Camera icon

b. Frame the photo, then tap the blue button on the tablet screen to take the picture

c. Tap Done (to attach the image to the note) or Cancel (to cancel the action)

To attach a photo (or other image file) you already have on the tablet:

a. Tap the Library icon

Figure 18   The Library icon

b. Navigate to the folder that contains the file

The files are located in the File Manager or the Gallery

c. Tap the image or file you want to attach

To record and attach an audio clip:

a. Tap the Audio icon to begin recording

Figure 19   The Audio icon

The tablet microphone is located along the bottom edge of the tablet. The volume control is a toggle located along the upper left edge of the tablet; to increase the volume, press the upper edge of the control; to decrease the volume, press the lower edge of the control.

b. Tap the Recording icon to end the recording and attach it to the note

5 MANAGING ATTACHMENTS

To delete an attachment from a note:

1. Tap the minus icon above the note.

    The attachment will be deleted.

To label or annotate an attachment:

1. Tap the pencil icon above the note.

    You're asked if you want to rename the note, and the virtual keyboard appears.

2. Tap the text of the annotation and revise it using the keyboard, then tap OK.

The annotation appears on the icon for the attachment. This is a good way to caption an image or explain what an attachment is.

6 QUICKLY DUMPING XCAPTURE DATA

If you're at risk of capture by an adversary, you can quickly dump all XCapture Mobile information on the tablet. This process wipes all data associated with XCapture Mobile—except for images stored in the tablet Gallery—and closes the application.

Reminder: Images stored in the tablet Gallery must be separately deleted.

To dump XCapture Mobile data:

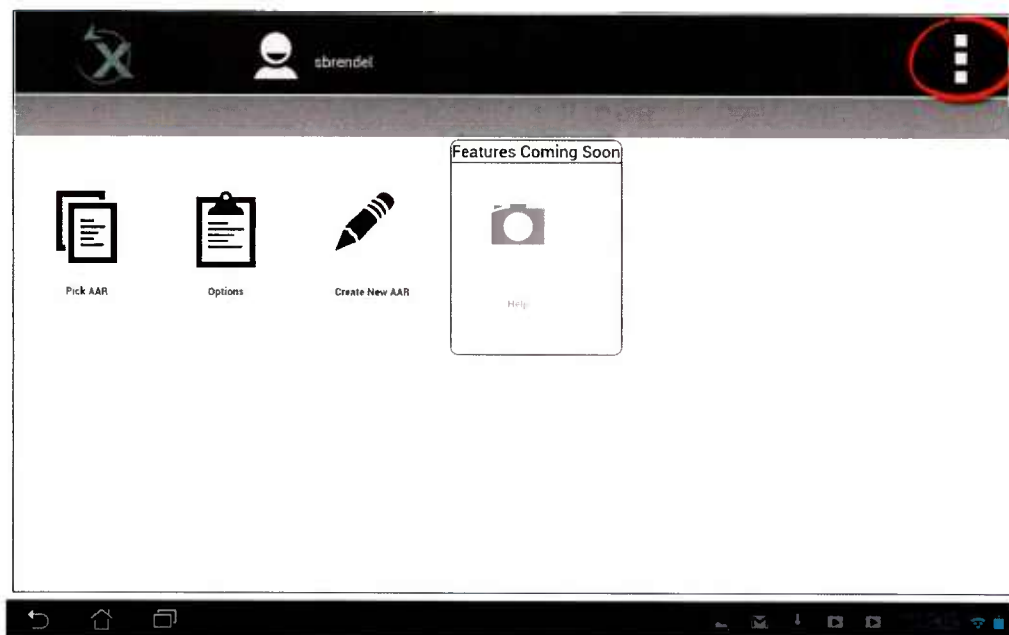1. Tap the squares in the upper right corner of the screen.

Figure 20   The Quick Dump icon

The system will ask you to confirm that you want to dump the application's memory.

2. Tap OK.

The system will ask you to confirm you want to dump all data in the application's memory. It will also give you the chance to cancel in case you inadvertently initiated the data dump feature.

3. Tap OK again.

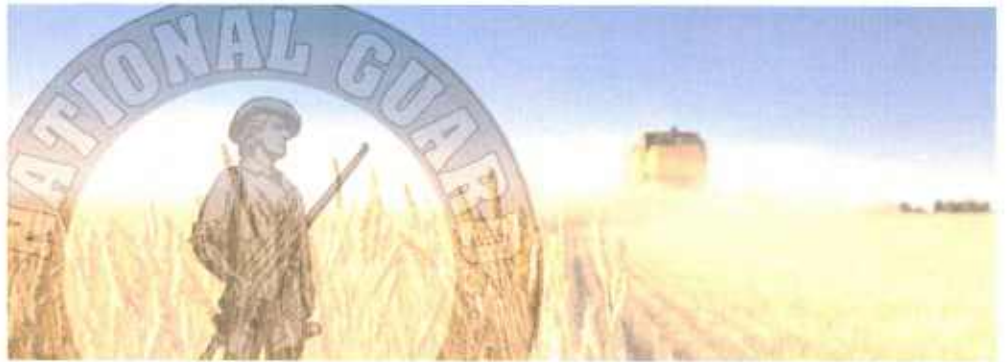The system dumps all data in the application's memory and closes, returning you to the tablet's desktop.

7 TROUBLESHOOTING

If you encounter problems with XCapture ADT, contact Devin Martinez at AlphaTRAC:

➤ Email: dmartinez@alphatrac.com
➤ Phone: 720-263-4335
➤ Skype: Devinmartinez11

An AlphaACT® AAR Solution

XCapture ADT Storyboard Report Quick Reference

Unclassified

January 2013

Prepared by

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

This document is an extract from the XCapture ADT User Guide.

1 CREATING STORYBOARD REPORTS

A storyboard is a specialized report that covers basic information about a single task.

Storyboards can be prepared directly using a subset of the pages and fields in XCapture ADT, as shown in the following table.

Figure 1   XCapture fields used in a Storyboard report

XCapture tab	Field/question
Basic Info	Title*
Task Review	Key personnel involved
	Project number
	Task description
	Objectives
	Agribusiness products of interest
	Task date
	Location
Outcomes	What were the outcomes/outputs of this task?
	What was assessed/discussed?
	What assistance was provided and who provided it?

*Used as the name of the AAR on the View AARs page, but does not actually appear in the Storyboard report.

To prepare an AAR specifically for a single Storyboard report:

1. Log in to the system.

2. From the Create an AAR panel on the Home page, click Start.

Figure 1   The Create an AAR panel

The system takes you to the first page of the guided interview for a complete AAR.

3. From the Display Mode panel on the right side of the screen, select Storyboard from the dropdown menu.
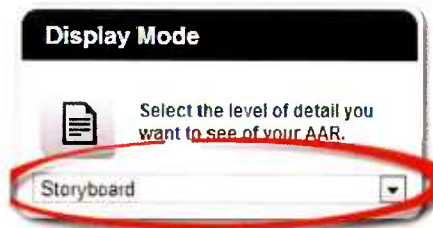

Figure 2   The Storyboard display mode

The system takes you to the first page of the guided interview for a Storyboard AAR.

Figure 3   The first page of the Storyboard guided interview

3. Enter a name for the Storyboard in the field labeled Title.

    The system will use the name you provide as the Storyboard name (although it will not actually appear in the Storyboard content).

4. Attach images, if available.

    Although not required, the standard Storyboard format fits three images and can accommodate from zero to ten.

    Note: The image preview may not work, but the images will be available for use in the Storyboard.

    a. From the Attachments panel, click Choose Files.

    b. Navigate to the folder that contains the file and select the file.

    c. Click Open.

        This attaches the image file to the AAR and shows the filename in the Attachments panel.

    d. Add a description of the file.

        You can add a description of up to 40 characters to explain what the attachment is. This description will be used to caption the file in the system.

        Tip: Give your files descriptive file names before uploading them.

5. Click the Task Review tab.

    Note: Although the system will warn you that planned tasks have not been entered, you can ignore this warning; Storyboards do not require planned tasks.

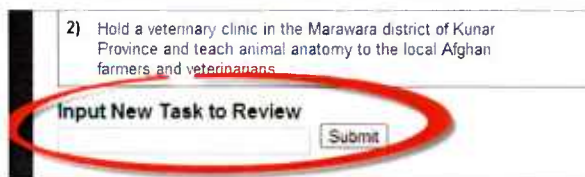6. Enter the task in the Input New Task field and click Submit.

Figure 4   Inputting new tasks

The task name you provide will be used as the Storyboard header.

The system presents you with a page that prompts you for details about the task.

7. Identify the key personnel involved in the task:

   a.   Click the checkbox for the organization of the first person.

         Options are GIRoA, NGO, Coalition, and Other. The system opens a box and
         prompts you for information about the person's title, name, and affiliation.

   b.   Enter information about the individual and then click the check box of the next
         person's affiliation you need to add.

         The system opens a box and prompts you for information about the next person's
         title, name, and affiliation.   You can enter information about individuals for up to
         four organizations.

8. Enter information in the other fields on this page, including:

   - Project number
   - Task description
   - Objectives
   - Agribusiness products of interest
   - Task date
   - Location

9. Click Next Section: Outcomes.

   The system prompts you for information about the task you just entered. Only the fields
   mentioned in the next step will be included in the Storyboard.

10. Enter information in the following fields on this page:

   - What were the outcomes/outputs of this task?
   - What was assessed/discussed?
   - What assistance was provided and who provided it

   This completes Storyboard entry.

Multiple images may be associated with an AAR. If you want to associate one or more of them with a task-specific Storyboard report, you need to identify which of the images already attached to an AAR should be associated with a particular Storyboard report.

To associate previously attached images from an AAR to a Storyboard report:

1. Click View Reports.

   The system presents the report by default in the full report format, but it also lists the other report formats in the tabs near the top of the page.

2. Click Storyboard.

   The system presents the report in the Storyboard format.

3. Click Import Previously Attached Image.

   The system presents thumbnails of the images that have already been attached to the AAR.

4. Click the image you wish to attach.

   The system attaches the image to the Storyboard report.

To view a Storyboard report:

1. Click View Reports.

   The system presents the report by default in the full report format, but it also lists the other report formats in the tabs near the top of the page.

2. Click Storyboard.

The system presents the report in the Storyboard format.

To export the AAR in the Storyboard to PowerPoint:

1. Click Export Storyboard to PowerPoint.

   The system prompts you for where you'd like to save the report.

2. Navigate to the folder where you'd like to save the file to and click Save.

   The system saves the report in the selected location as a .xml file that will open in PowerPoint.

To share the Storyboard report with other ADTs:

1. With the report opened in the authoring mode, click Share.

   The system presents a preview of the report and prompts you to read through the scenario before you publish it.

2. Once you're satisfied with the report, click Share again.

   The system publishes the report and makes it viewable under the Shared AARs tab where other XCapture ADT users can view it.

XCapture ADT:

Final Project Report

Prepared By

November 7, 2013

Prepared by
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Table of Contents

1   INTRODUCTION

This report constitutes the final report on the XCapture ADT project.

Client organization	Rapid Reaction Technology Office
Client contact	Tracy O'Connor
Project funding	$1.4M
Project start date	January 2012
Project end date	May 2013

---

2   SYSTEM DESCRIPTION

XCapture ADT is a web-based authoring tool designed to help National Guard Agribusiness Development Teams (ADTs) quickly and easily complete after action reviews (AARs).

Figure 1   The Home page

XCapture ADT:
Final Project Report

With XCapture ADT, you can:

- Create AARs
- Review and edit your AARs
- Share your AARs with others in the XCapture ADT community
- View AARs shared by others
- Develop a list of contacts you encounter on missions

Using a guided interview, the system helps you document:

- Pre-mission information, including:
    - The mission purpose
    - The mission schedule
    - Assumptions about:
        - The weather
        - The terrain
        - Driving conditions
    - Planned tasks
    - Civil considerations
    - An assessment of risk
- Mission information, including:
    - The tasks that were actually attempted or completed
    - A review of the mission as a whole
- Lessons learned, including:
    - A review of the actual risk
    - Suggestions for things to sustain and things to improve

In XCapture ADT, information is structured and stored in a database. The system has a search function you can use to locate AARs of interest.

Once you've completed an AAR, you'll be able to:

- Edit it
- Print it
- Export it to Microsoft Word
- Share it with others who have system access

3 FUNDING

The funding for this project was sufficient.

Features built into the system would not have been possible without the funding provided. A minimum solution could have been provided for less funding, but would not have sufficiently met the end user needs accomplished during the period of this project.

4 SCHEDULE

The start date of January 2012 and the end date of May 2013 allowed for proper development and testing. By prioritizing features and end-user suggested changes, we were able to tackle the project improvements necessary to complete the project on schedule.

5 DELIVERABLES

Planned deliverables for this project were achieved during the performance period.

Deliverables for the project include:

- Technical Readiness Level -7 tool, ready for home station testing
- Technical Readiness Level -8 tool, ready for pilot operation
- After Action Review tool and Agribusiness Development Team ready for in-theater pilot
- After Action Review tool deployed in-theater
- XCapture After Action Review tool with extended functionality
- In-theater and CONUS pilot testing with warfighters
- Transition to committed Program of Records

Materials and deliverables submitted to National Guard teams engaged with the projects will remain with the teams, or in some cases to their replacements in theater. Access to XCapture remains active for all service members previously linked to the system and for the Program of Records engaged with the project. Any future service members requesting access or support and data share is set up with multiple ongoing stability operations.

6 TESTING AND TEST RESULTS

Extensive testing of the system was conducted with National Guard Agribusiness Development Teams prior to deployment and while they were in theater in Afghanistan.

Testing conducted with teams prior to deployment included iterative trial deployments of XCapture to determine its potential effectiveness for meeting the requested project need. Teams gave specific and constructive feedback that was then prioritized and either immediately incorporated into the system or added to a list of desired features and changes for future build iterations.

Testing conducted in theater was focused primarily on accessibility and security. Given the variable nature of security requirements for these forces, each team's barriers were addressed individually and solutions established.

7 FUTURE PLANS

7.1 Procurement

XCapture is a platform technology, with planned deployment across a spectrum of military and non-military applications.

Current or planned military commercialization plans include:

- National Guard Agribusiness Development Teams (deployed)
- Special Operations Command Civil Affairs Brigades (planned for FY-14)
- National Guard state partnership programs (planned)
- Joint stabilization operations (planned)
- Coalition stabilization operations (planned)
- Non-governmental stabilizations operations (planned)
- Operations for multiple services and programs (in planning)

Current or planned non-military emergency response and disaster management commercialization plans include:

- Firefighting emergency response (deployed)
- Hazardous materials emergency response (deployed)
- International Association of Fire Chiefs (IAFC) National Near Miss lessons Learned Program – fire response (in deployment)
- IAFC National Near Miss lessons Learned Program – public safety response (in deployment)
- Law enforcement (planned)
- Disaster management (planned)

7.2 Follow-on Testing

Testing has continued with teams in theater using XCapture to quickly retain and share after action review data and lessons learned with other teams operating similar missions.

Current engagement with teams deploying to Afghanistan and Pakistan out of the Joint Regional Training Center at Ft Polk in Louisiana is providing ongoing testing and system feedback.

7.3 Opportunities for Leveraging the Technology

XCapture is a platform-independent application. It has been designed for stand-alone operation; operation across networks; and integration with existing planning, command and control, and lessons learned capabilities. Applications include public, private (NGO), governmental, and military platforms.

8   ISSUES

Key issues included:

- Providing usable unclassified internet access for teams in theater
- Dealing with security concerns of teams and providing appropriate protocols to address the concerns
- Initial engagement with teams, which was critical to facilitating an understanding of the project and setting expectations for system functionality
- Providing some hardware to teams at their request for engagement with the system

9   SUGGESTIONS FOR IMPROVEMENTS

Suggestions for improvement to this project include:

- Quickly and early on expand to different, but related, missions to ensure project longevity and adaptability to changing military needs
- Even though it can be difficult to find early adopters in the military, it would have been helpful to have more than one team engaged from the beginning of the project. Early on in the project, our initial end user group was taken off of their planned mission and therefore were no longer able to participate in the project. There was a short lapse of direct end user feedback, which is critical to AlphaTRAC's development process.

10 LESSONS LEARNED

- Having an engaged end user group is critical to developing a useful product
- Setting realistic expectations for early adopters and ensuring that they are the right group of people is important for continued support and participation in the project
- When end users go silent, they most likely have some type of technical or political problem that they are not communicating. By establishing a comfortable dialogue and method of communication with end users, we were able to identify and break through barriers that otherwise would not have been brought to the technical
- It is important to establish, at least midway through the project, a continued funding source for ongoing operational support

AlphaACT Pattern Recognition Technology

A White Paper

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TABLE OF CONTENTS

INTRODUCTION

Pattern recognition technology is key to the workings of AlphaACT®
USMC, an online, immersive training system being designed to teach
small unit leaders how to rapidly reach effective decisions in the high-
stress, chaotic environment of a combat patrol.

This document describes how the pattern recognition system in
AlphaACT USMC works.

ALPHAACT USMC

To understand the role that pattern recognition plays, you must first
understand how AlphaACT USMC will operate.

Working through realistic combat scenarios, small unit leaders will learn
how to recognize and apply past experiences (their own and those of
others) to rapidly changing combat situations.

AlphaACT USMC scenarios will be prepared using a tool called 360Recall,
which collects information about an event from subject matter experts
(SMEs) in a highly structured way.

Trainees using the scenarios in AlphaACT USMC will be presented with
visual, audible, and textual cues to help them identify a potential attack.

KEY CONCEPTS

Since the pattern recognition system operates in terms of cases, cues,
and scenarios, the terms are defined in greater detail in the sections that
follow.

CASES

A case is the "captured" story of a warfighter. It is the saved and
published record of someone (e.g., a warfighter or trainer) using a tool
called 360Recall to capture information about the event in a structured
fashion. 360Recall is designed around a guided interview of sections,
questions, and cues that prompts the user for specific information.

CUES

A cue is an important or significant piece of information—a fact associated with the case that is observable (based on sight, smell, hearing, etc.) or obtainable (mission intelligence, communications, etc.).

A good cue is usually from one to four words in length and captures only the essential words. For example, "red wire," "dead dog in street," "empty marketplace," or "religious holiday" could be significant cues.

The pattern recognition system is particularly interested in cues that contribute to situational awareness, are related to significant events, or are linked to mission outcomes or success. This is what distinguishes a cue from a simple fact or detail in a case.

Cues are identified or "tagged" in 360Recall by the user capturing the case and can be suggested to the user by 360Recall, which is analyzing and comparing the entered text against cues currently in the system.

TRAINING SCENARIOS

A training scenario is an event (either real or fictional) presented to a student by AlphaACT USMC for decision-making training. During the dynamic training session, key cues from the scenario will be revealed to the student, inputted by the student, and then used by the pattern recognition system to retrieve and present relevant cases to the student in support of decision-making.

THE PATTERN RECOGNITION ENGINES

The pattern recognition system of AlphaACT USMC has two pattern recognition engines:

- One for case retrieval
- One to identify the next best question

THE CASE RETRIEVAL PATTERN RECOGNITION ENGINE

The pattern recognition engine for case retrieval aims to bring back a relevant case given a set of cues. In this context, "relevant" means cases

that are analogous to the situation presented in an AlphaACT USMC scenario.

This is a classic information retrieval problem. It is most commonly encountered as a web search using Google. Google returns a document (a web page) given a query (words typed into the search box). All documents are ranked; weighted according to their relevance to the query balanced with additional information regarding the importance of the hosting website (PageRank); and the top results are presented to the user.

The case retrieval pattern recognition engine is presented with a very similar problem: given a set of cues, return the most *relevant* cases. At present, the case retrieval pattern recognition engine is focused on returning cases that share similarity with the training scenario, as represented by the query cues.

The seed algorithm underlying the case retrieval pattern recognition engine assigns a score for every case given the extent to which it is "similar" to the query. We have examined numerous similarity measures common to case-based reasoning systems including Dot Product, Dice, Jaccard, and Cosine.[1] At present, Cosine has emerged as the best performing option (with the best balance of speed, precision, and recall measures).

Cosine can be visualized as a measure of the angle between the vector formed by a query and the vector formed by the case, in a multi-dimensional space where each cue represents a dimension. As is standard in Cosine similarity measures, more uncommon cue matches are more valuable than extremely common cues. In other words, when two situations (the training scenario and some case from the database) share a cue in common, it means more if that cue occurs rarely (e.g., riot in street) than it would if it were extremely common (e.g., sunny weather).

---

[1] These algorithms are pervasive in case-based reasoning and information retrieval literature, but an excellent description of all four can be found here: Grossman, D. A., & Frieder, O. (2004).*Information retrieval: algorithms and heuristics* (2nd ed.). Dordrecht: Springer. 18-20.

The Cosine algorithm also normalizes the score of each match so that longer documents are not returned more often simply because they reference more cues in total. As an improvement on the original Cosine algorithm, our implementation also includes SME weighting factors for each cue, leveraging an SME's belief that "empty marketplace," for example, is extremely significant even before we have sufficient case data to realize its importance statistically.

The case retrieval pattern recognition engine has a major advantage unavailable to most generic document retrieval (like Google) or other case-based reasoning systems. Where other systems contend with documents of varying structure, format, and authorship, cases in AlphaACT USMC are well structured data obtained via 360Recall. As a result, the pattern recognition system has a great deal of data regarding context and sequence.

So, for example, in a scenario where a user has *just* noticed "red wire" and "dead dog in street," a case where those occur in close temporal proximity—answered in the same section or even the same question within 360Recall—would be of more interest than one where those cues appeared far apart.

Further, a case where those cues appear in the same sequence (noticing "dead dog," then "red wires" on closer examination) or in the same context as the user's current context within the scenario should be of greater value. For example, noticing discarded wire in the same context as a dead dog may signal an improvised explosive device, whereas a case that spotted a dead dog and, hours later, some discarded wire is of less immediate interest. While the current implementation of the case retrieval pattern recognition engine does some initial reweighting of cases using this contextual knowledge, further development and ongoing balancing of factors is planned.

As synonymy (multiple ways of expressing the same words or concept) has been identified as a major challenge, the algorithm incorporates a growing semantic network of cues. At its simplest, this can be visualized as a thesaurus, turning one cue into several that mean essentially the

same thing (e.g., "red wire" might become "red wire," "bright red wiring," and "crimson wire").

Initially, semantic information needs to be entered by SMEs. There are several concepts in development beyond straightforward SME knowledge capture for building the semantic network in 360Recall, capturing semantic relationships at the time of entry. More complex semantic relationships are supported and are planned for further exploration (like "AK-47" *is* a "rifle" or "small arms").

One significant future path of research and development deals with selecting among cases of sufficient similarity according to other relevance metrics. For example, when the system has numerous cases of sufficient similarity, presenting particularly successful and/or particularly unsuccessful cases to the user may be more valuable for case-based reasoning.

NEXT BEST QUESTION PATTERN RECOGNITION ENGINE

The pattern recognition engine for next best question aims to support teaching the student how to search for the most important cues in a scenario in order to quickly converge on situational awareness in a potentially overwhelming environment. We have termed this concept the "next best question."

The next best question pattern recognition engine does this by returning "interesting" (or statistically decisive) cues to the user. Given the cases the system has identified as likely via the case retrieval pattern recognition engine, what are the important cues that would nudge one case above another as a good analogy for the scenario?

This pattern recognition-based statistical interest must be balanced against the practical, real-world importance of a cue as it applies to situational awareness. For example, one may always want to be on the lookout for glints in the windows of tall buildings, even if that cue is not mentioned in the most likely cases.

The current implementation of the next best question pattern recognition engine calculates a score for each cue in the system, incorporating its standard deviation across likely cases balanced with a

cue's statistically calculated importance and SME-rated importance. This offers a balance between the statistical interest (helping the pattern recognition engine quickly converge on likely cases) and real-world importance as defined by SMEs. The fine-tuning of this balance will be adjusted in user testing. The statistical importance should become more meaningful and therefore weighted more heavily, as the number of actual cases in the system increases and cue distribution reflects accurate data.

As previously stated, the primary purpose of the next best question pattern recognition engine is to teach novices about critical cues. This is a cornerstone of AlphaACT HAZMAT, a system that has the benefit of millions of simulated cases. With extensive SME input, cues have been correlated to modeled results such that a few rounds of questions (cue entry) quickly converge on any unknown characteristics (the few key or super-cues that more or less define situational awareness in the HAZMAT decision space).

The extent to which next best questions will be featured in AlphaACT USMC is an open question, since system users will encounter cues in a steady, unrelenting stream and have few opportunities to seek out specific information. This question will shape whether the next best question pattern recognition engine is used primarily to converge on similar cases or to teach novice users what critical cues to be aware of. To assist in answering that question, AlphaACT USMC can track usage of the next best question feature through the user interface. In addition, AlphaTRAC product developers will get end-user and SME feedback on its utility and accuracy.

AlphaACT FIRE

User Guide

January 2014

A solution of:

AlphaTRAC®
CRISIS SOLUTIONS THAT SAVE LIVES

Prepared by

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AlphaTRAC provides integrated solutions that save lives, protect property, and ensure mission success. We specialize in crisis decision-making training solutions.

Notice
Every effort was made to ensure that the information in this document was accurate at the time of release. However, information is subject to change.

Contents

Figures

1 INTRODUCTION

AlphaACT® FIRE is a web-based training solution that helps firefighters learn how to make effective decisions in the high stress, chaotic environment of a fire response. An application integrated into a web portal, it uses training scenarios to help you improve your decision-making skills, even when event information is sketchy or incomplete.

With AlphaACT FIRE, you learn by doing. The system presents you with the often murky, changeable facts of an event scenario and helps you decide what to do.

With AlphaACT FIRE, you can:

> ➤ Take self-paced training and test yourself against the clock
> ➤ Track your learning progress
> ➤ Compare your results with those of others
> ➤ Join discussions of issues through the Community forums

This guide is for firefighters and first responders who wish to learn how to use AlphaACT FIRE.

2 HOW AlphaACT FIRE WORKS

AlphaACT FIRE lets you practice crisis decision-making using scenarios that present the kind of information you'd encounter during an actual event. It helps you use the observable characteristics of a fire to identify similar events from the past (in this case, a knowledge base) and then use that information to determine the appropriate actions to take.

This structured approach to fireground decision-making is based on a six-step process shown in the following figure.

Step:	Where the decision maker:
1. Characterize	Sizes up the situation
2. Recognize	Examines similar events from the knowledge base
3. Analyze	Evaluates the events to see if they fit current conditions
4. Customize	Tailors the selected event to current conditions
5. Dramatize	Mentally rehearses the decision
6. Utilize	Puts the decision into play
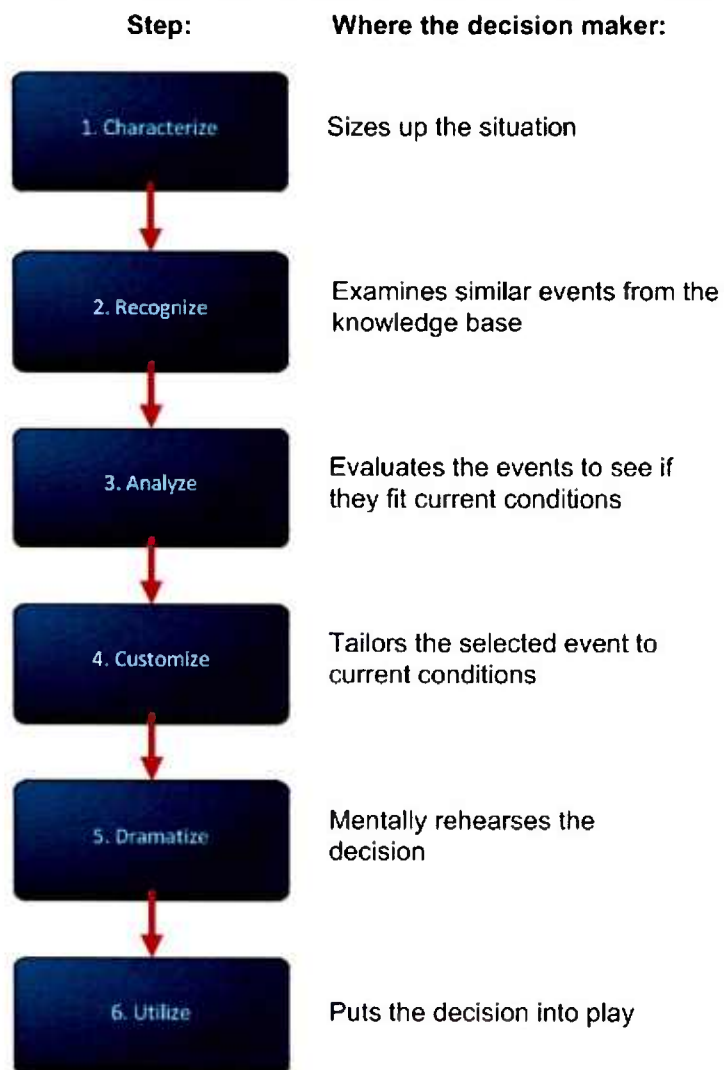
Figure 1   The AlphaACT FIRE decision process

As you'll see, the AlphaACT FIRE interface is designed around this structured approach.

Using scenarios based on actual events, AlphaACT FIRE simulates the flow of information as you'd experience it during a response to an actual event. The scenarios include audio and visual cues—like verbal dispatch reports and simulations of the event scene—to heighten the sense of realism.

Because fireground incidents can be so complex, the scenarios presented by AlphaACT FIRE are divided into several parts. Each part of a scenario is separately scored, so you can see how well you did on one part before advancing to the next.

After you select a training scenario to play, the system presents an initial dispatch message (as text and audio). Since the scenario is specific to a particular place, the system shows the current weather conditions specific to the scenario, which may affect your approach to the fire.

Figure 2   The initial dispatch message

After starting the scenario, you receive further information about the event as you are hypothetically en route to the scene.
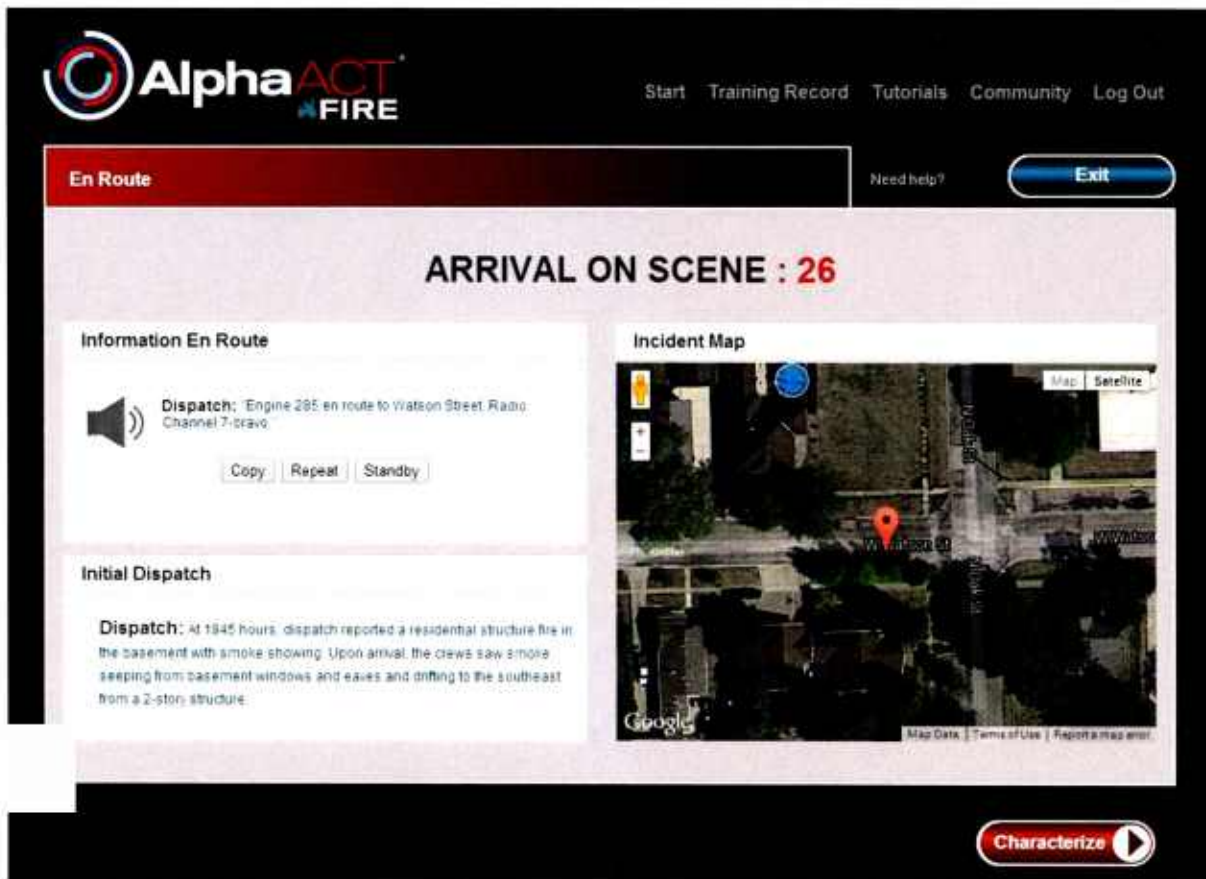
Figure 3   Information received en route

2.1   Characterize

When you "arrive at the scene" (and the Characterize page), you'll be able to view a simulation of the event scene and a map of the surrounding area.
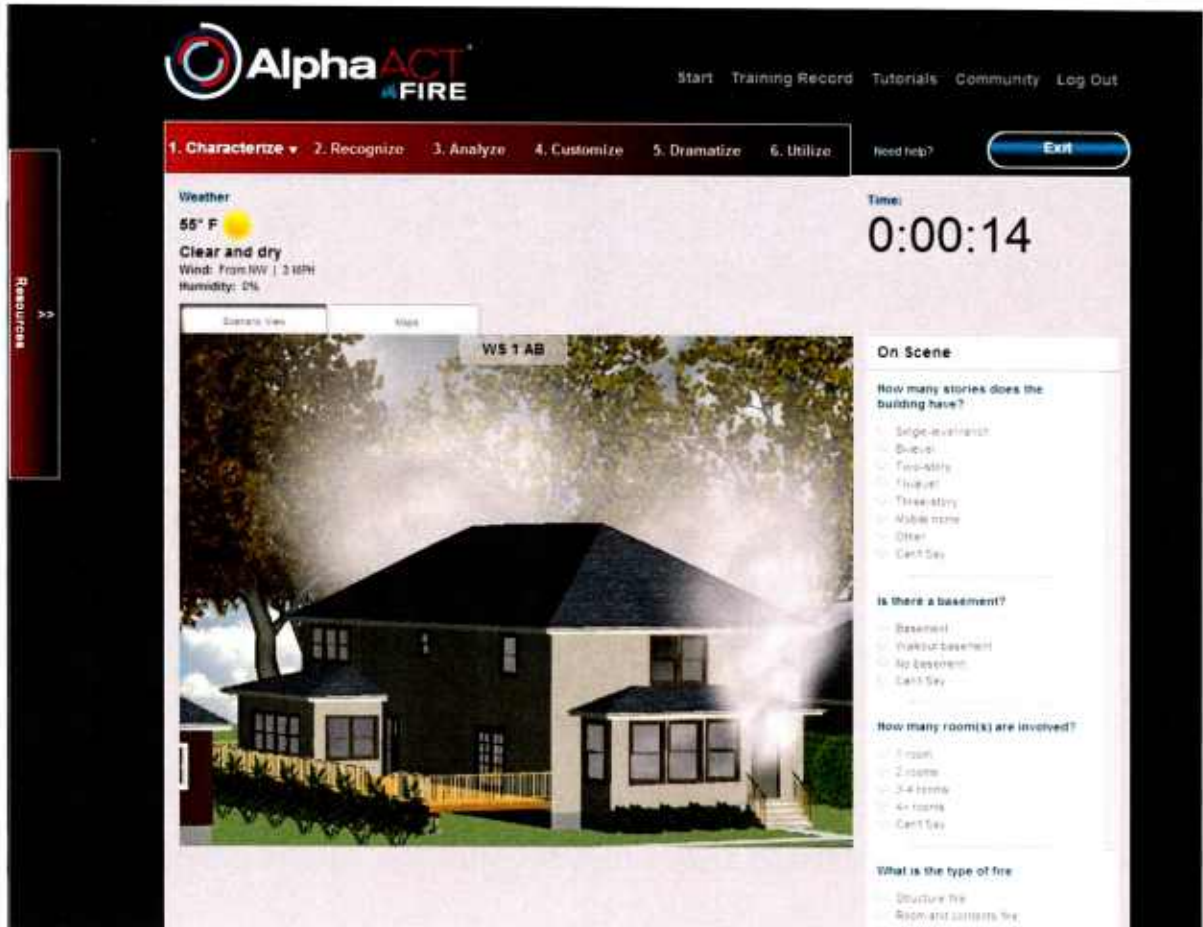
Figure 4   The Characterize page

Updates arrive audibly and appear as text along the top of the screen. You can acknowledge them (by clicking Copy), ask that they be repeated (by clicking Repeat), or request that the speaker wait until you're ready (by clicking Standby).

A pull-out panel along the left side of the screen informs you of the availability of additional resources and their projected arrival time to the scene.
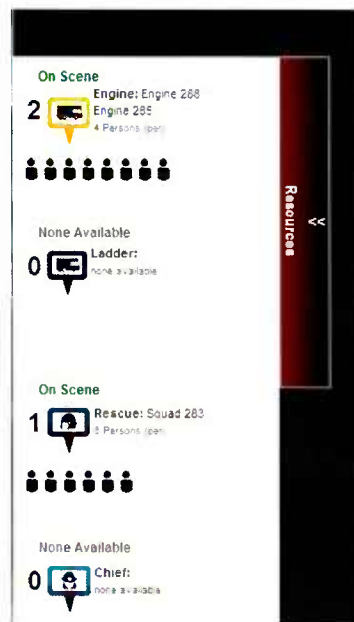
Figure 5   The Resources pull-out panel

A timer starts, which tracks how long it takes you to complete the scenario.

The system prompts you with questions about the event as you conduct an initial size up of the scene. It will ask about:

> The characteristics of the structure
> The type of fire
> Fire conditions
> The likelihood of life hazards
> Victim viability

A meter visually depicts the likelihood of victim viability. It assumes the best at the beginning of the scenario, but as you enter information about event conditions, it takes that information into account and adjusts its assessment.
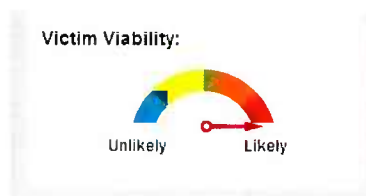
Figure 6   The victim viability meter

As part of size-up, you select the initial command mode and strategic mode.

Figure 7   Selecting the command and strategic modes

Command mode options are:

➤ Command
➤ Fast attack
➤ Investigative

Strategic mode options are:

➤ Offensive
➤ Defensive
➤ Transitional

After entering information about the fire on the Characterize page, you click Recognize.

2.2   Recognize

The Recognize page presents the answers you provided on the Characterize page. You'll then be able to conduct a 360-degree size up of the scene and capture additional information about the fire. The system also suggests event characteristics to consider.

Figure 8   The Recognize page

Based on the inputs made, AlphaACT FIRE searches its knowledge base for events with characteristics similar to the ones you entered. Along the bottom half of the page, the system presents the top three events in its database that best match what you have input already. These cases provide information, including the actual event outcomes, which might be useful to consider as you develop your own plan of attack for this particular fire.

Figure 9   Returned cases on the Recognize page

While you work the scenario, event updates—information about changing event conditions that you need to take into account—continue to arrive, just as they would during a real event.

When you reach the Recognize page, a second timer begins a countdown to a decision point to remind you of the importance of making prompt decisions about strategy and tactics.

Figure 10   The decision point countdown timer

The system allows adequate time for you to review the information you need to help in your assessment of the situation. However, if you take too long and the timer reaches zero, a question appears, which is intended to remind you of the important things to consider in your handling of the event. To move forward, you'll have to click Hide to return to the Recognize page, and when you do, the decision point countdown will go into negative territory, something that will negatively affect your score. From there, you may either continue marking important things or move on to the Analyze page.
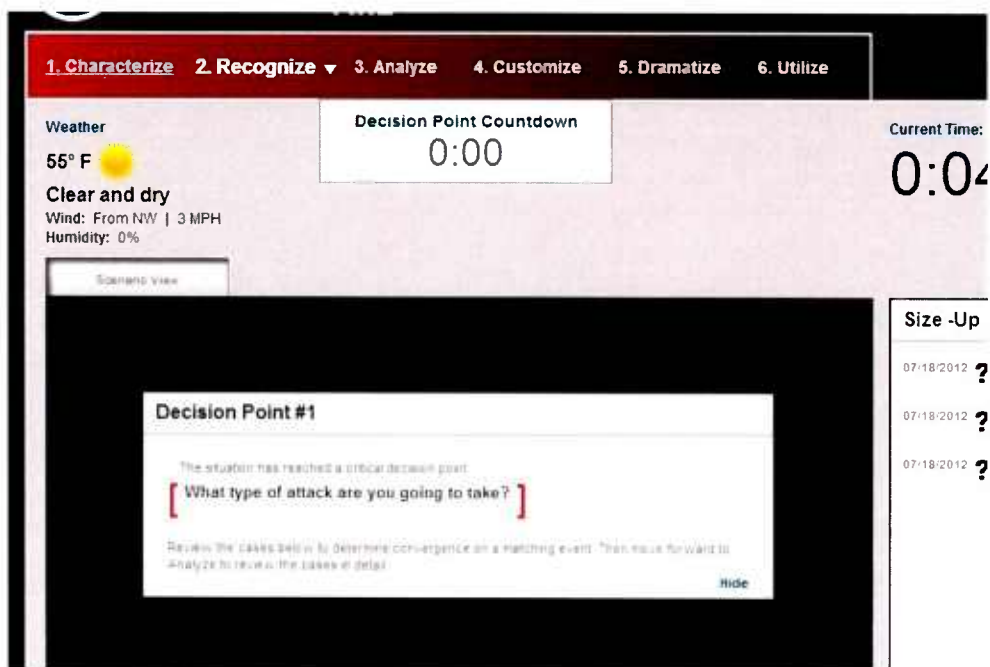
Figure 11   The decision point

As you add more and more details regarding your in-depth size up, the system continues to refine its presentation of matching cases. When you're done, click Analyze.

2.3 Analyze

On the Analyze page, the timer pauses so you can read about the events that most closely resemble the one you're actually working on. This gives you time to determine how closely each of the three cases match the conditions of the scenario you're working on.
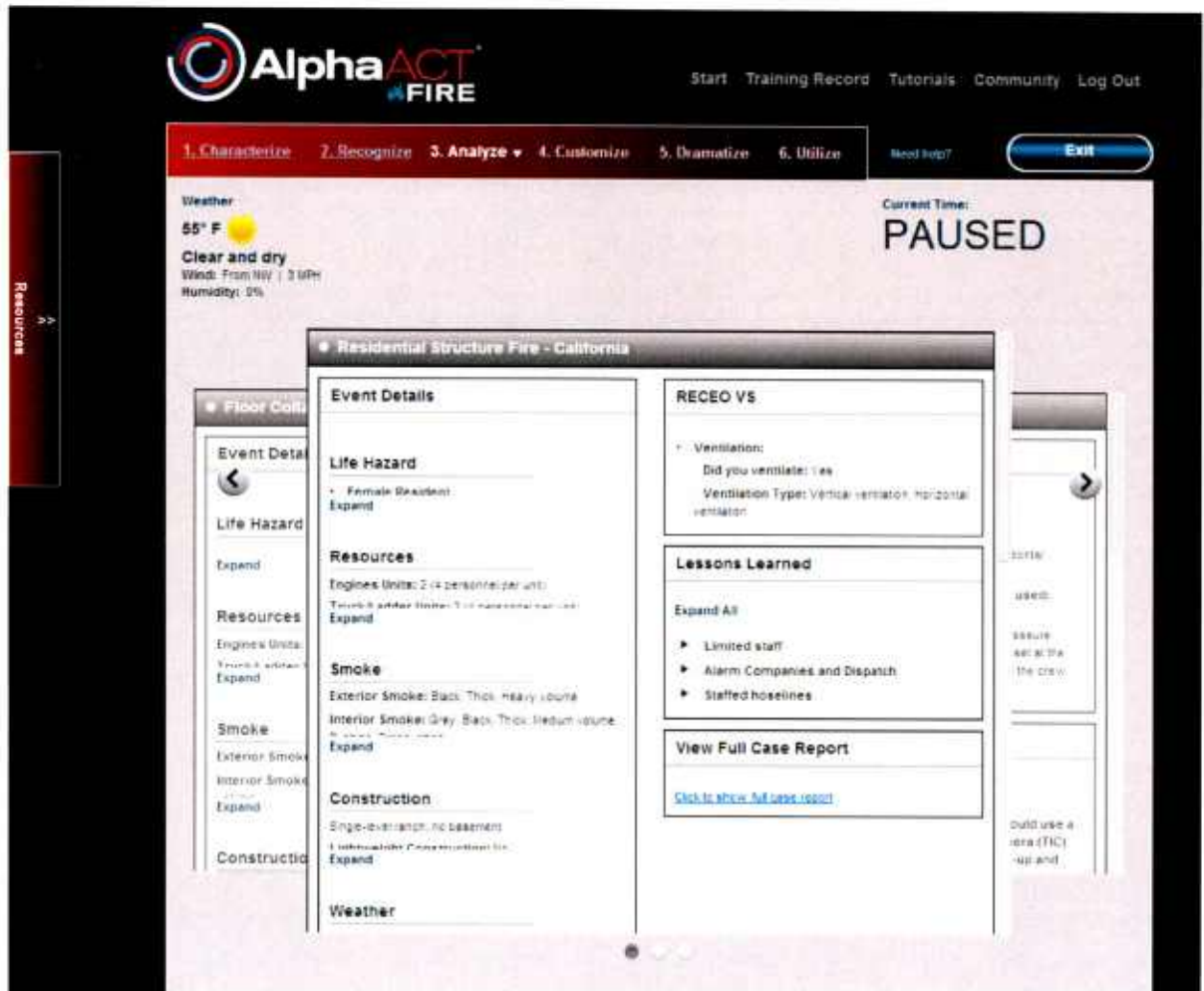
Figure 12   The Analyze page

You can flip through the cases to their details.

Once you've selected the event to use as the basis of your decision, you click Customize.

2.4 Customize

The Customize page carries over the event scene simulation and shows the details of the event you selected along the bottom of the page.
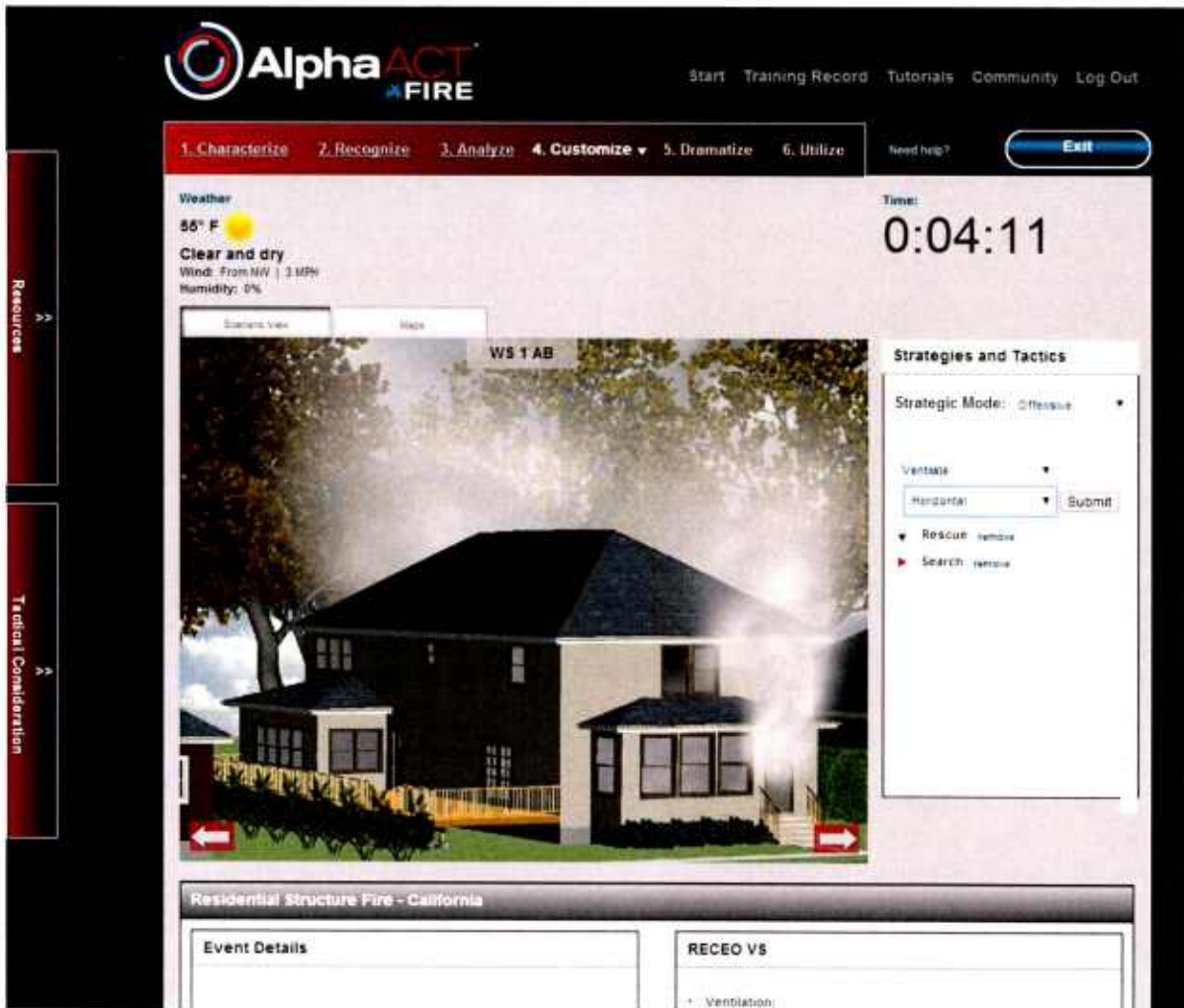
Figure 13   The Customize page

In Customize, you begin building an action plan for the event, by selecting your initial strategy and tactics from a range of options, including:

➤ Rescue
➤ Exposure
➤ Confinement
➤ Extinguishment

> Overhaul
> Ventilation
> Salvage

Note: Although the system asks you to select your strategy and tactics, your choices are not evaluated by the system; AlphaACT FIRE is intended to help you learn decision-making skills, not fireground strategy and tactics. However, you can review your strategy and tactics after completing the scenario via a self-assessment and by comparing what you chose to do to what others did.

The system also provides a checklist (available from a pull-out panel along the left of the screen) that lets you identify tactical considerations to take into account as part of your planning.
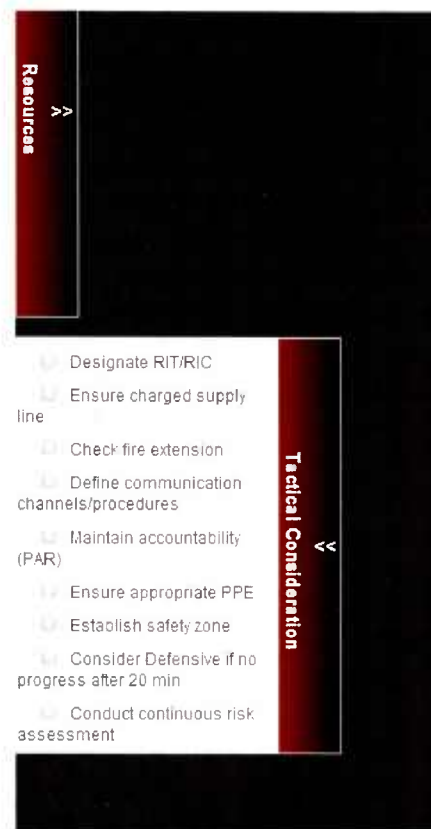
Figure 14   The tactical considerations pull-out panel

Once done selecting your strategy and tactics, you click Dramatize.

2.5   *Dramatize*

Using the Dramatize page, you identify tactical considerations and, thus, rehearse how you intend to tackle the fire.
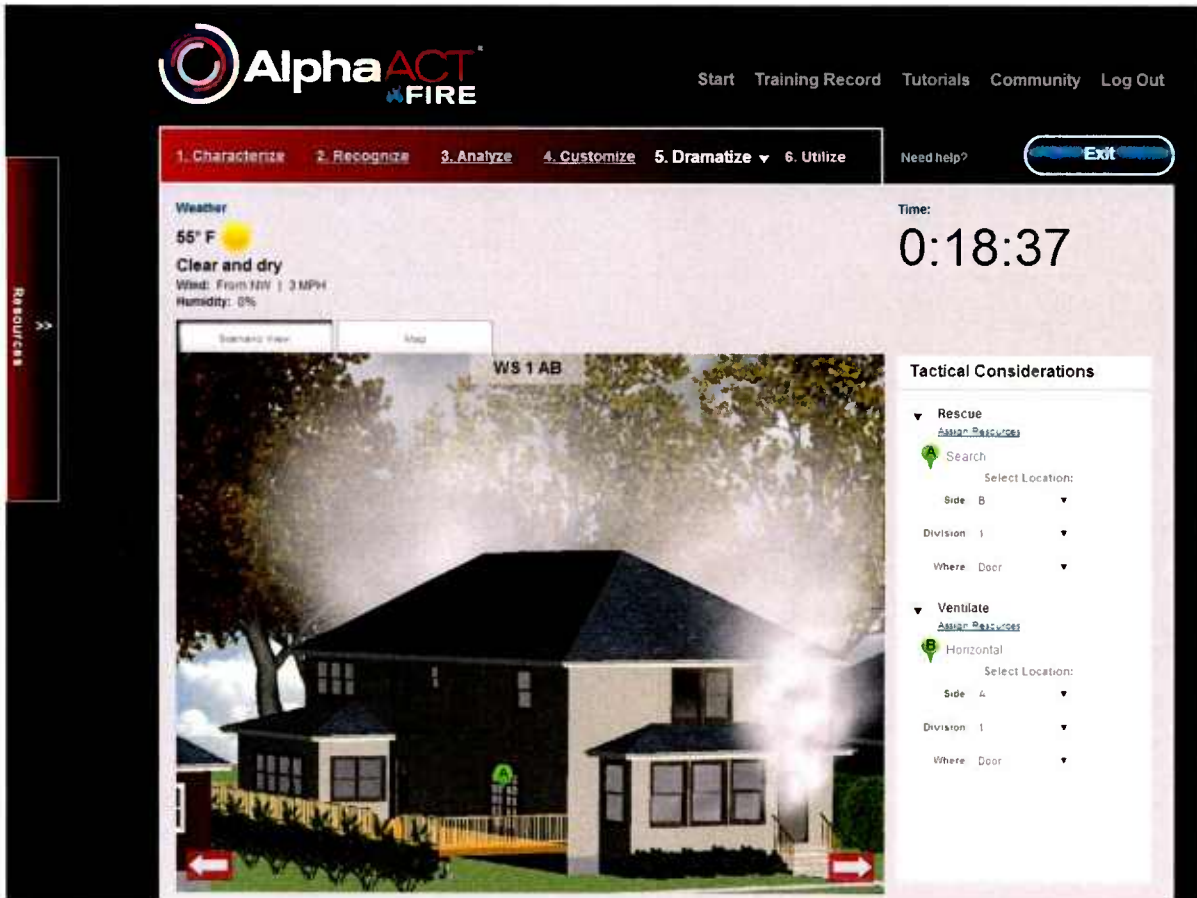
Figure 15   The Dramatize page

For the strategy and tactics you've chosen, you assign the resources you'll deploy and identify where you'll deploy them using the Resources pull-out panel, a feature intended to assist you in establishing your incident command structure for the event.

Figure 16   The Resources pull-out panel

Under the Maps tab, you'll be able to mark up an aerial map of the event scene to illustrate key aspects of the event scene and to show your plans for resource deployment.
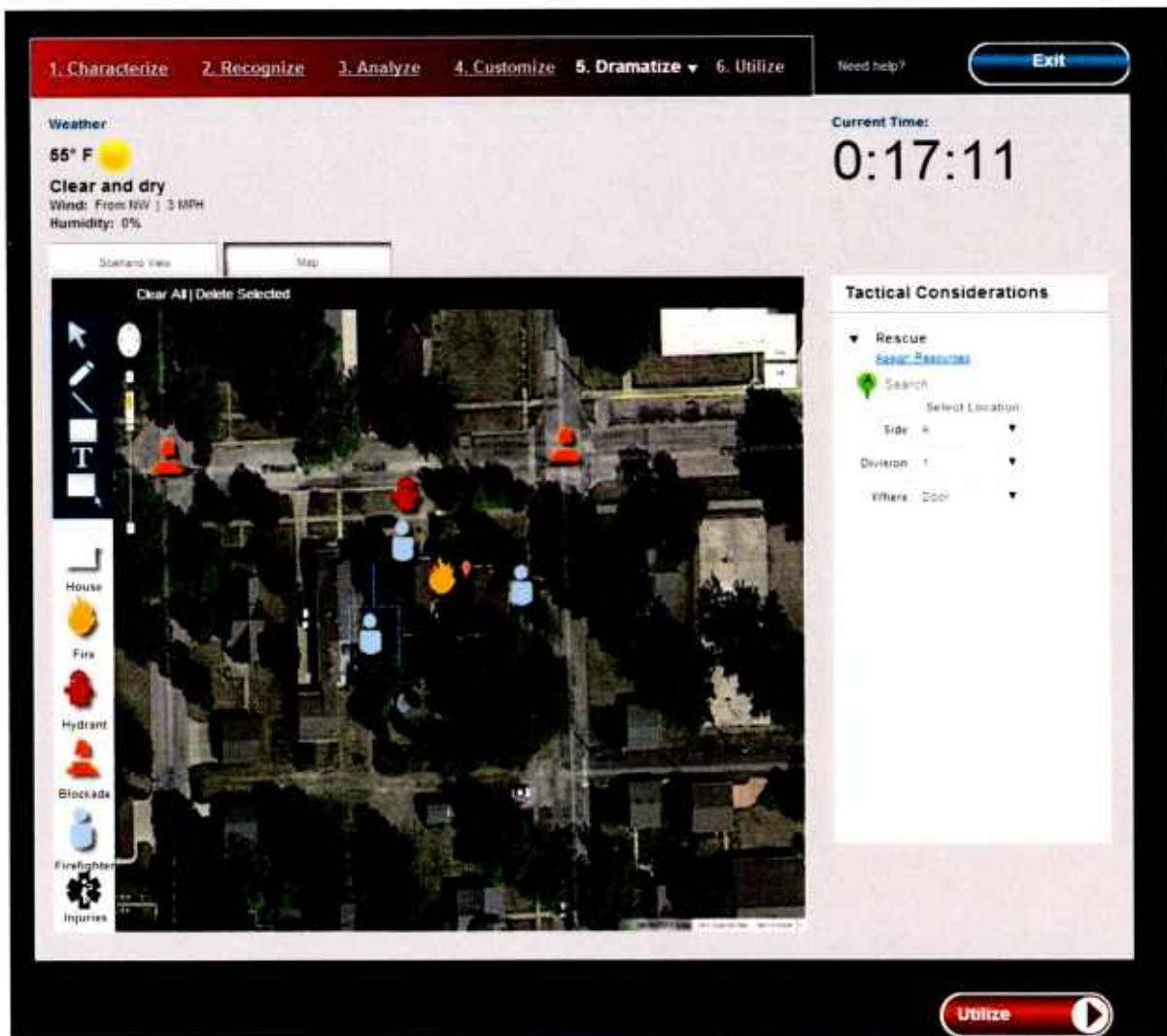
Figure 17   Marking up a map of the event scene

Once you've completed the Dramatize page, you click Utilize.

2.6   Utilize

The Utilize page of AlphaACT FIRE:

> Summarizes the course of action you specified
> Carries over the event scene sketch you prepared on Dramatize (although you can no longer modify it)

➤ Presents a question about strategy and tactics and asks you to evaluate the effectiveness of the answers that are provided
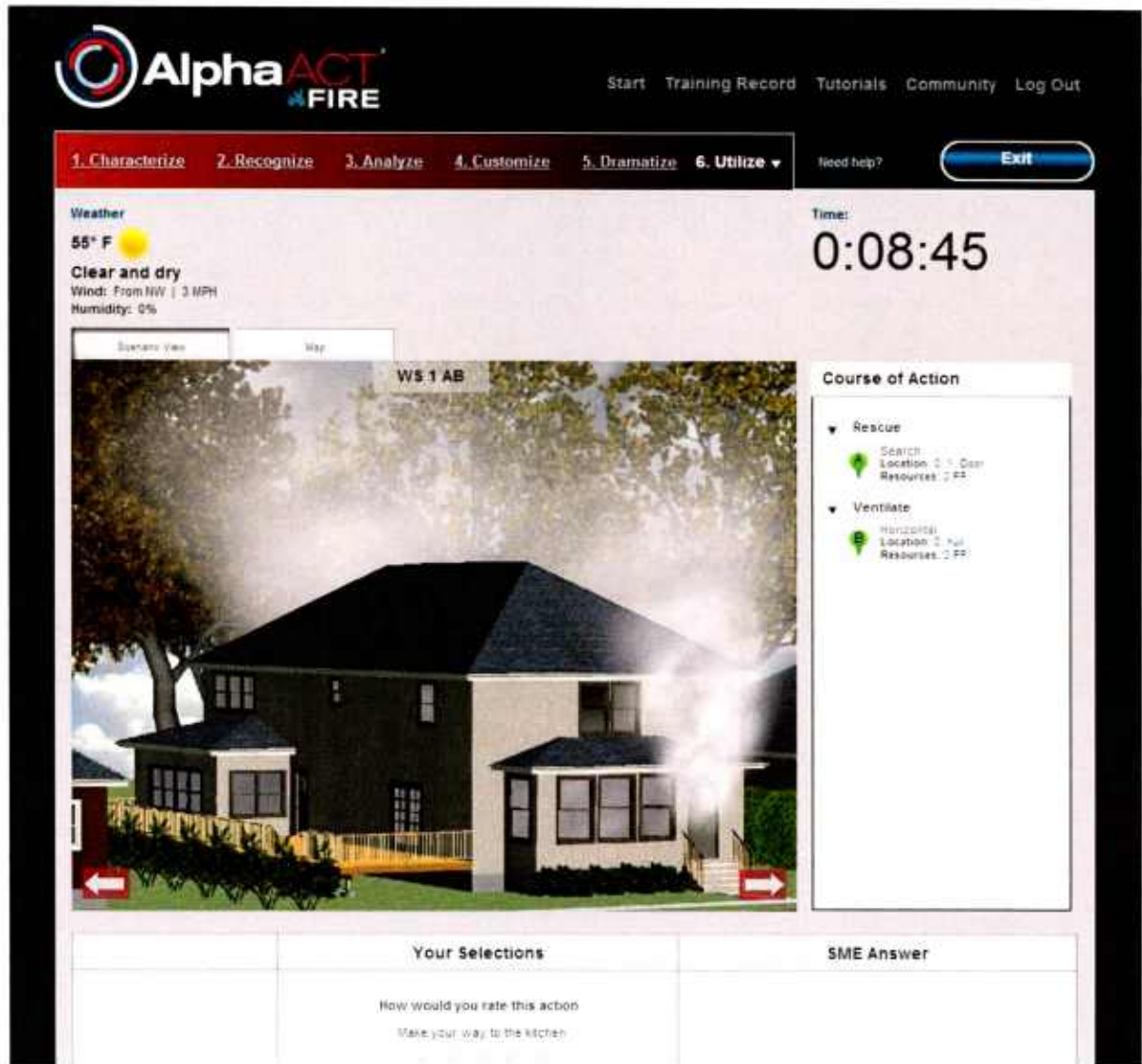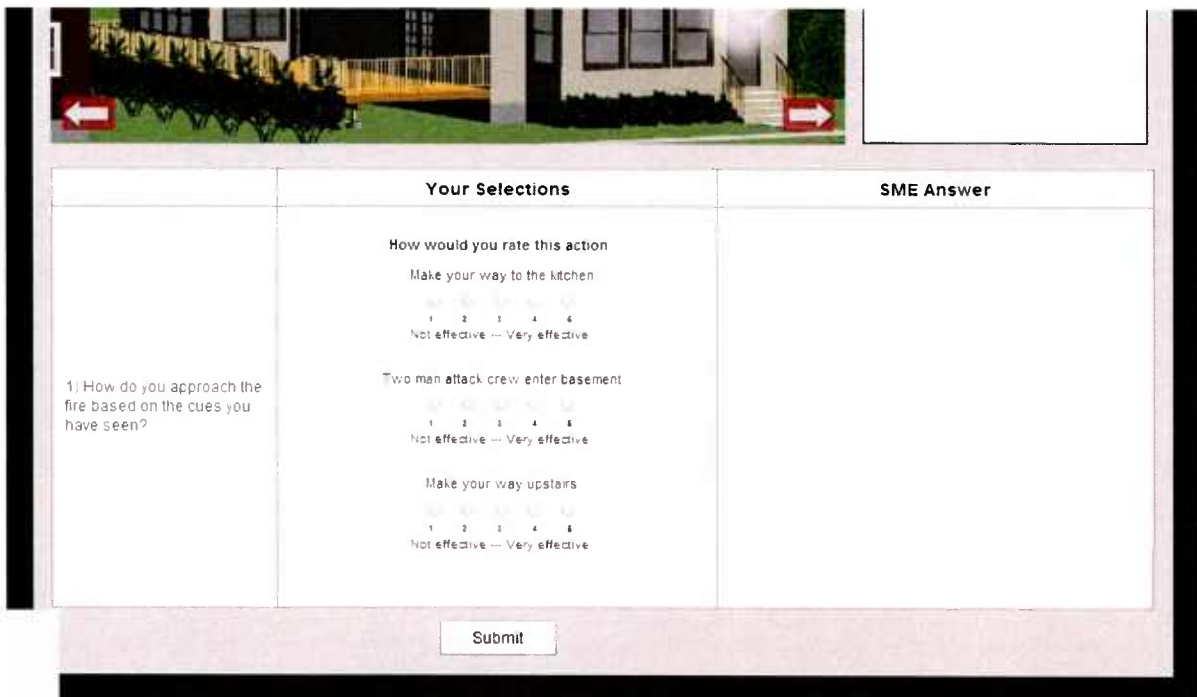
Figure 18   The Utilize page

Figure 19   Rating actions on the Utilize page

The system then compares your answers and ratings to those of an independent subject matter expert (SME) and considers them in the final scoring of the scenario.

2.7 Feedback

Having completed the training scenario, you can review how well you did by clicking on Feedback.

Session Feedback   Need help?   Exit

Feedback	Your Score	Available Score
▸ TACTICAL THINKING	4	21
▾ SELF-DEVELOPMENT	0	2
Assessing the scene **Analyze**		
• The time you spent on Analyze was 00:00:15		
▸ JOB KNOWLEDGE	2	10
▸ ADAPTABILITY	0	3

| Time | Your Time | Recommended | |
		Minimum	Maximum
Characterize	06:46	02:00	04:00
Recognize	01:26	05:00	09:00
Analyze	00:15	03:00	15:00
Customize	00:54	04:00	06:00
Dramatize	01:31	03:00	05:00
Total Time	11:22	17:00	39:00

Figure 20   The Feedback page

To continue on to the next part of the scenario, click Continue. If you're finished for now, click Exit.

3 GETTING STARTED

3.1 What You Need

AlphaACT FIRE is a web-based application that operates from devices that run:

> ➤ Google Chrome
> ➤ Internet Explorer 10

System use is based on subscriptions and requires an account.

3.2 Requesting an Account

To request an account, go to www.alphatrac.com/alphaact/registration.aspx and follow the instructions there to sign up. Once your account has been activated, you can log in.

3.3 Logging In and Out

Before logging in, you must have an active account.

To log in:

1. Go to www.alphatrac.com/alphaact.aspx
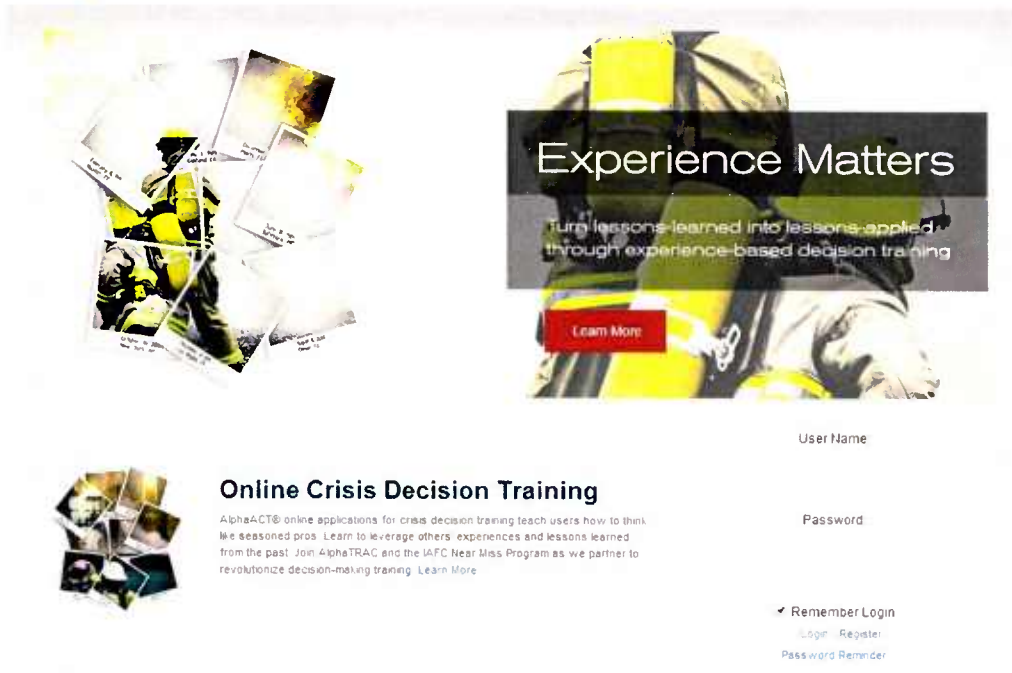
Figure 21   The Login page

2. Enter your user name and password.

3. Press Enter or click Login.

To log out:

1. Click Logout.

    The Logout link is on the upper right corner of the page.

Figure 22   The Logout link

3.4 Accessing Tutorials and Help Information

AlphaACT FIRE comes with a Tutorials page that can be accessed from any page of the system.

You must be logged in to access the Tutorials page.

To access the tutorials and help information, click Tutorials.
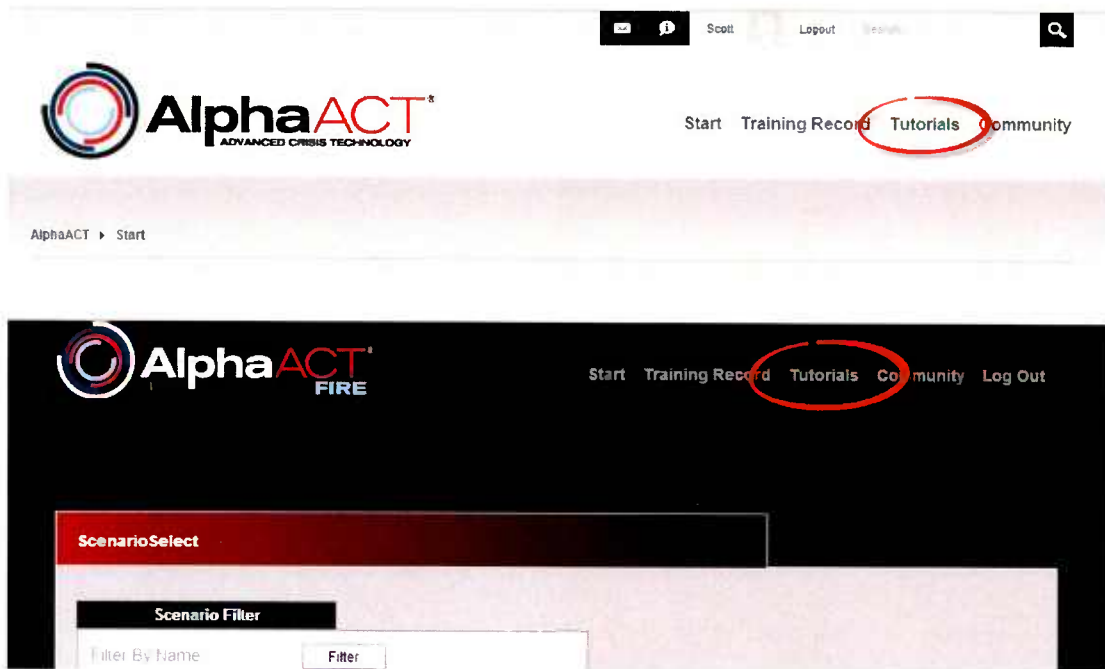
Figure 23   Accessing tutorials and help information

The system shows the Tutorials page, which gives you access to different types of information.
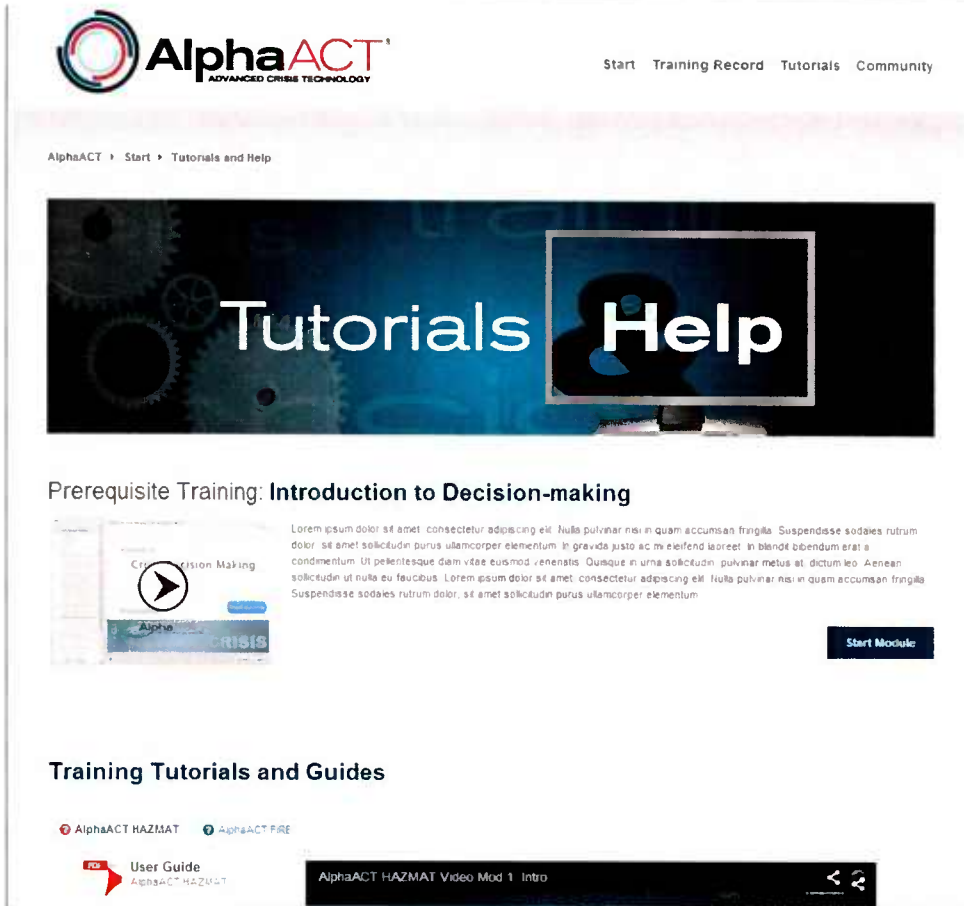
Figure 24   The Tutorials page

3.5   Getting Help during Scenario Play

AlphaACT FIRE comes with an online help function that can be accessed from any page within the training mode during scenario play.

To get help during scenario play, click Need help?

Figure 25   Getting help during scenario play

The system presents a help screen describing system options for the page you are on.

Figure 26   A help screen

By default, a help screen will appear automatically each time you move to a different page in the system. If you wish it to stop, click the checkbox beside Do Not Show Again.

3.6   Leaving a Scenario in Mid-play

You can leave a scenario in mid-play at any time. However, exiting a scenario before you complete it may ensure a low score, which cannot be removed from your training record.

To leave a scenario:

> ➤ Click Exit to return to the Scenario Select page.
> ➤ Click Start to return to the Start page.

4 RUNNING A SCENARIO

AlphaACT FIRE is a scenario-based training solution. It presents you with the often ambiguous and confusing facts of a residential fire. Then, under the simulated pressure of a ticking clock, it asks you to decide what strategy and tactics to use to safeguard those who may be in danger and to mitigate the event.

The scenarios in AlphaACT FIRE simulate the conditions that you'll need to take into account as you determine the best course of action.

4.1   About Scenarios

The scenarios in AlphaACT are divided into several parts, reflecting the scale and complexity of major events and the possibility that conditions may suddenly change, requiring you to rapidly adapt strategy and tactics.

While it's best to play the scenario parts in sequence, it's not required, although there are differences you should be aware of.

4.1.1   Playing Scenario Parts in Order

When you play the first part of a scenario, you'll start with the initial dispatch call and learn further details about the event while you're en route to the event scene, just as you would in responding to a real call. AlphaACT FIRE will lead you through the six-step process for Part One, present feedback on how well you did, and then give you the option to continue on to Part Two.

If you continue, the system will carry over the information you entered during Part One on the Characterize page and your play of Part Two will begin with the Recognize page, avoiding the need to repeat size-up and reflecting the possibility that event conditions continue to evolve and change.

4.1.2 Playing Scenario Parts Out of Order

Sometimes, it may be useful to play scenario parts based on the nature of the challenge they present, rather than in the sequence in which they would normally unfold. AlphaACT FIRE supports that kind of use.

If you begin a scenario on a later part, you'll be shown a screen that will describe what's happened so far (during the course of the unplayed parts) and shows the decisions that should have been made so far. Then you'll begin on the Characterize page and go through the six-step process as you normally would when beginning with Part One.

4.2 Logging In and Selecting a Scenario

To run a scenario:

1. Log in to the system.

   The system presents the Start page.

Figure 27   The Start page

Depending on what subscriptions you have, you may only see the Start button for residential fire training.

2.   Click Start under Residential Fire.

The system presents a list of training scenarios.

Figure 28   The scenario list

As you can see, scenarios are divided into several parts. You must play each part individually, and each part will be separately scored.

The scenario list shows:

- The scenario title and its parts
- Whether you have played it (and, if so, how many times)
- The highest score you achieved
- The number of times the scenario has been played by others in the community
- The highest score achieved by someone in the community

A filter box lets you search for a scenario based on the words in the scenario title.

The system also lets you filter scenarios based on the size of the fire department that responded in the case the scenario is based on. So, for example, if you work for a small-town fire department, you might not find scenarios involving high-rise commercial buildings in large metropolitan cities of much interest or relevance.

3. Click the title part of the scenario part you wish to play.

The system presents the initial dispatch message for the scenario and gives you the option to acknowledge the dispatch message (by clicking Copy), ask for the message to be repeated (by clicking Repeat), or ask the dispatcher to wait a moment (by clicking Standby). You can:

- Click Respond to begin the scenario
- Click Exit to return to the preceding page and select a different scenario

Figure 29   The initial dispatch message

4. Click Respond.

The system displays a panel containing the information you receive while hypothetically en route to the scene. A timer shows a countdown to when you will automatically "arrive at the scene" and gives you the option to arrive more quickly.
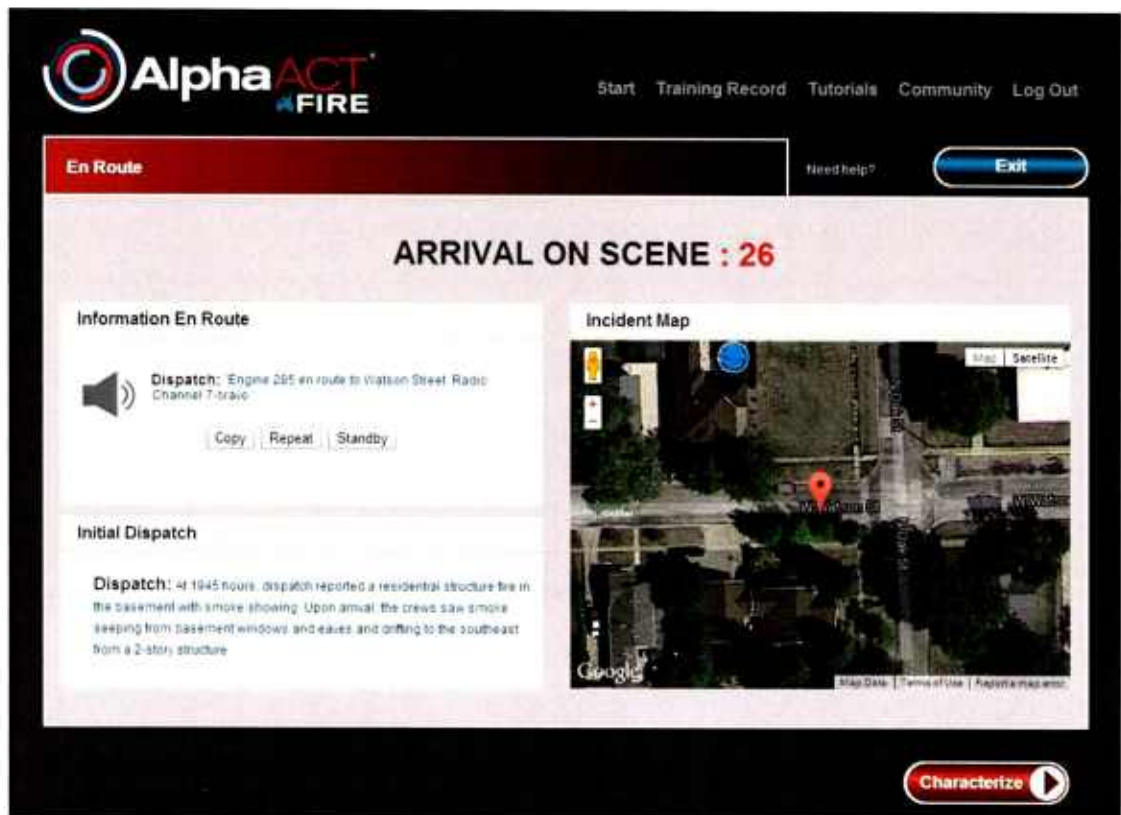
Figure 30   Information received en route

4.3   The Decision Process

5. Click Characterize.

Characterize The system presents the Characterize page, which shows:

- A simulation of the event scene
- A map of the event area, available via the Maps tab

- The timer, which measures how long it takes you to work the scenario
- Questions which let you capture information about the event
- A visual indicator of victim viability (based on the answers you provide)
- A dropdown for the command mode and strategic mode you wish to choose
- A pull-out panel which shows the resources either en route or already on the scene
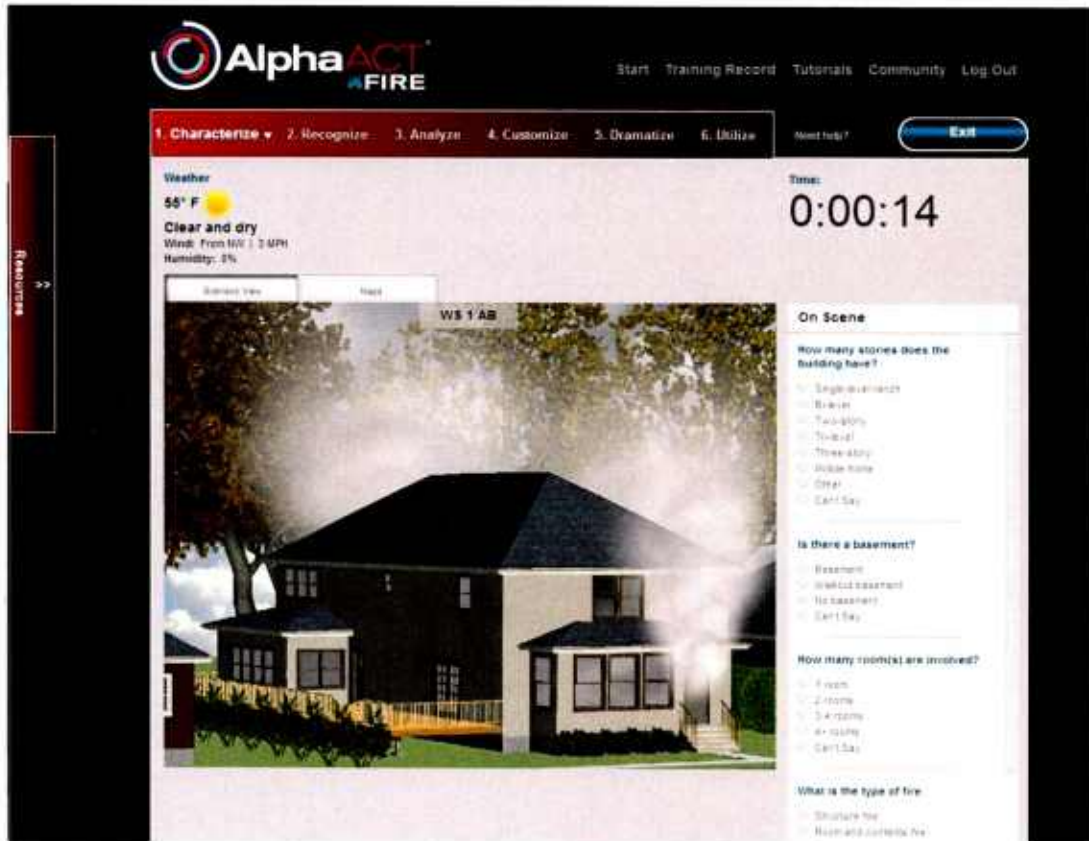
Figure 31   The Characterize page

6. Enter information you know about the event into the fields.

    ▶**Tip**: The system is designed to handle ambiguity. If you're not sure about an answer, select *Can't say*.

    As you answer questions related to victim viability, the indicator on the page will adjust to show the likelihood of the victim still being alive. This is important to consider as you evaluate the risk to emergency responders of attempting to save the life of a victim.
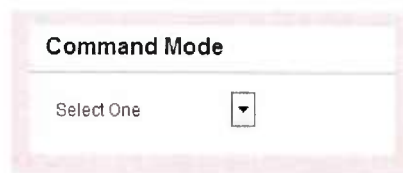
Recognize The system presents the Recognize page, which includes:

- A simulation of the event scene, with controls that let you view different sides of the structure
- The map of the event area
- The timer, which measures how long you take to work the scenario
- A second timer, showing the decision point countdown, which reminds you of the importance of making prompt decisions
- The information you captured on the Characterize page
- Additional suggestions to include in your 360-degree size up
- The top three events that best match the information you've provided so far
- Incident updates, which reflect changes to event conditions
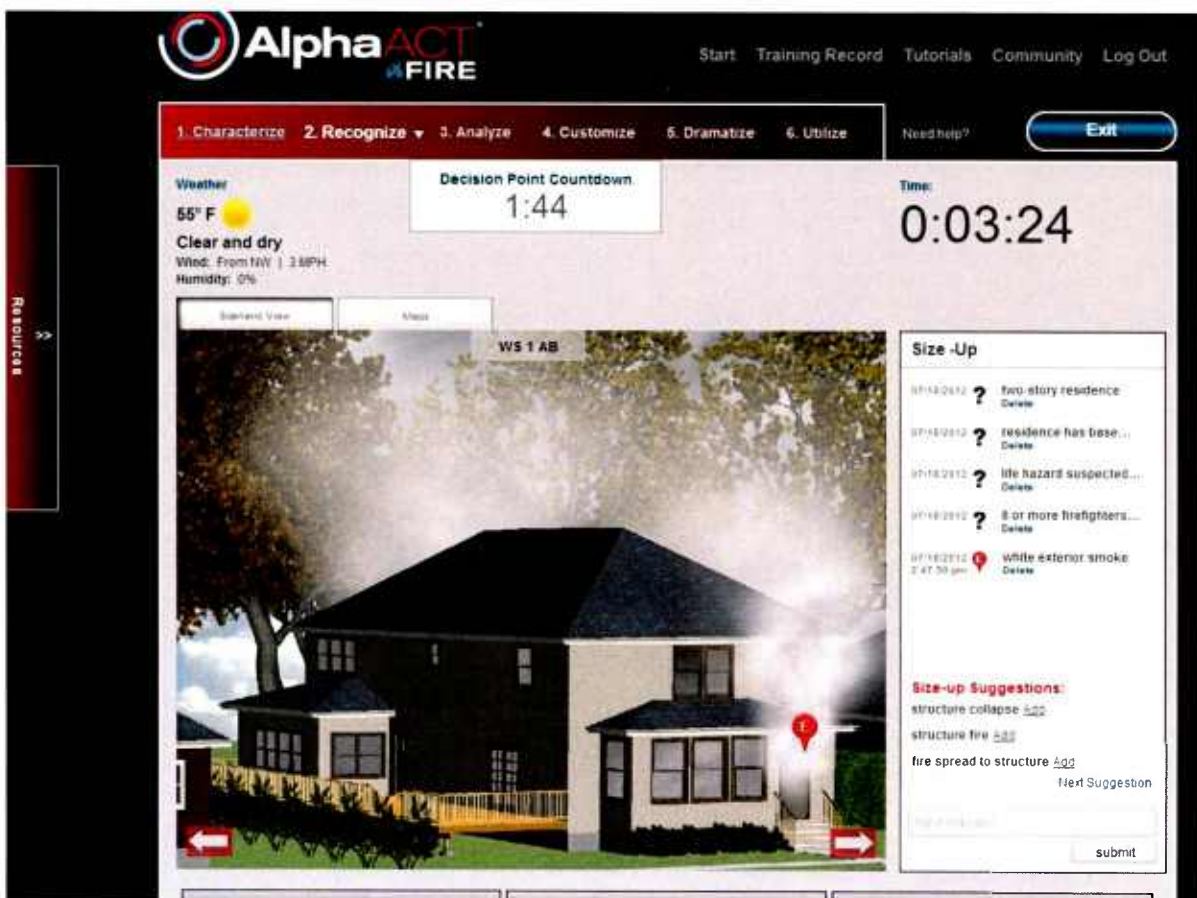
Figure 35   The Recognize page

▶**Tip**: Clicking the arrows on either side of the event scene simulation lets you conduct a 360-degree size up and examine the state of the fire.

▶**Tip**: The Update label flashes to warn that you have not acknowledged an update. Scenarios may have multiple updates you must consider, and a later one will not be delivered until you have acknowledged the ones before it. If the Update label flashes, click Ready to have the system repeat the message.

▶**Tip**: You can drag and drop the question mark beside the size-up cues onto the image. (While this may enhance your analysis of the event, it has no effect on your score.)

▶**Note**: The decision point counter reminds you of the importance of making prompt decisions. When it reaches zero, a question appears to remind you of things to consider in your handling of the event. The decision point counter will move into negative territory, detracting from your score because you're taking too long to move to Analyze.

10. Update the Size-Up panel by:

- Adding or deleting answers
- Entering new indicators and clicking Submit.

You can click on the simulation to enter indicators about what the fire is doing—for example, describing the smoke's color or velocity. This provides additional detail that allows the pattern recognition engine to bring back more relevant cases.

Figure 36   Entering additional indicators

The system adjusts the events at the bottom of the page based on the answers you give.

11. When the events better match the information known about the event, click Analyze.

Analyze The system carries the events to the Analyze page, and the timer pauses so you can examine each one in greater detail.

The Analyze page includes the three event summaries you can flip through and review.
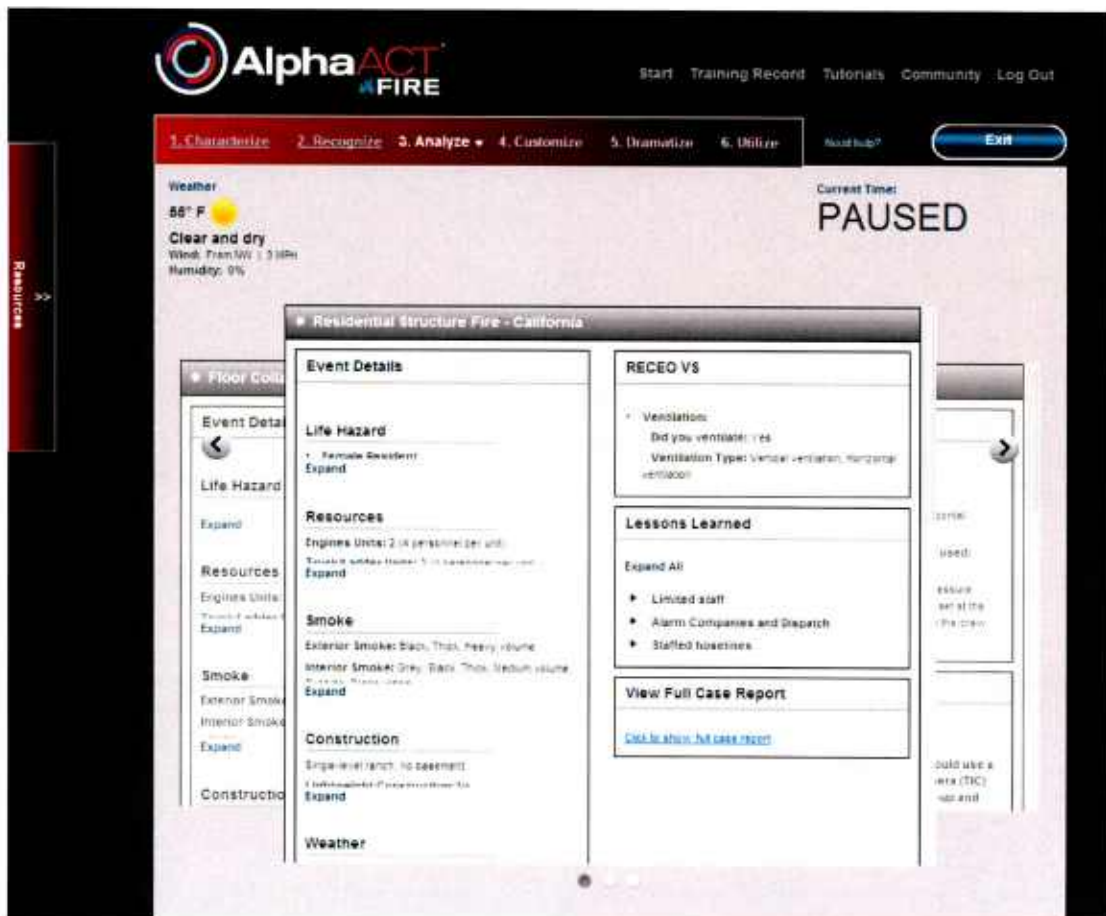
Figure 37   The Analyze page

▶**Tip**: Clicking the arrows in the side margins allows you to flip from one event summary to the next.

12. Click the radio button beside the event title that best matches current conditions, then click Customize.

Customize The system restarts the timer and carries the selected event to the Customize page, where you can choose the strategy and tactics to implement.

The Customize page includes:

- The simulation of the event scene
- The map of the event area and the timer
- Details of the event you selected, including a case summary, the strategies and tactics that were employed, and the lessons learned
- A panel where you can select strategy, tactics, and strategic mode
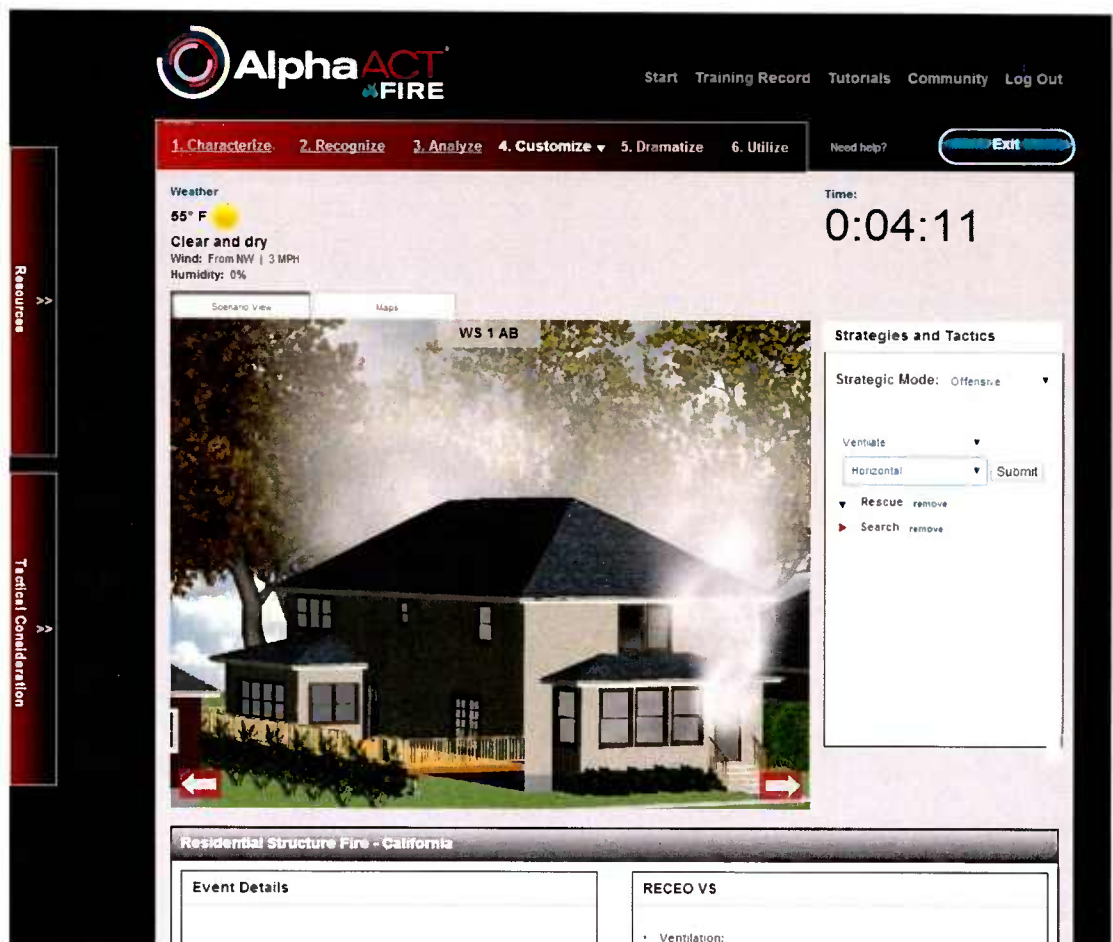
Figure 38   The Customize page

13. Select or change the strategic mode.

Options are:

- Offensive
- Defensive
- Transitional

14. Select your strategy and tactics using the dropdown, then click Submit.

15. Once you have selected the strategy and tactics you plan to use, click Dramatize.

Dramatize The system carries the customized event to the Dramatize page, which includes:

- The simulation of the event scene
- The timer
- A map of the event scene you can mark up with notes
- The strategy and tactics you selected on the Customize page
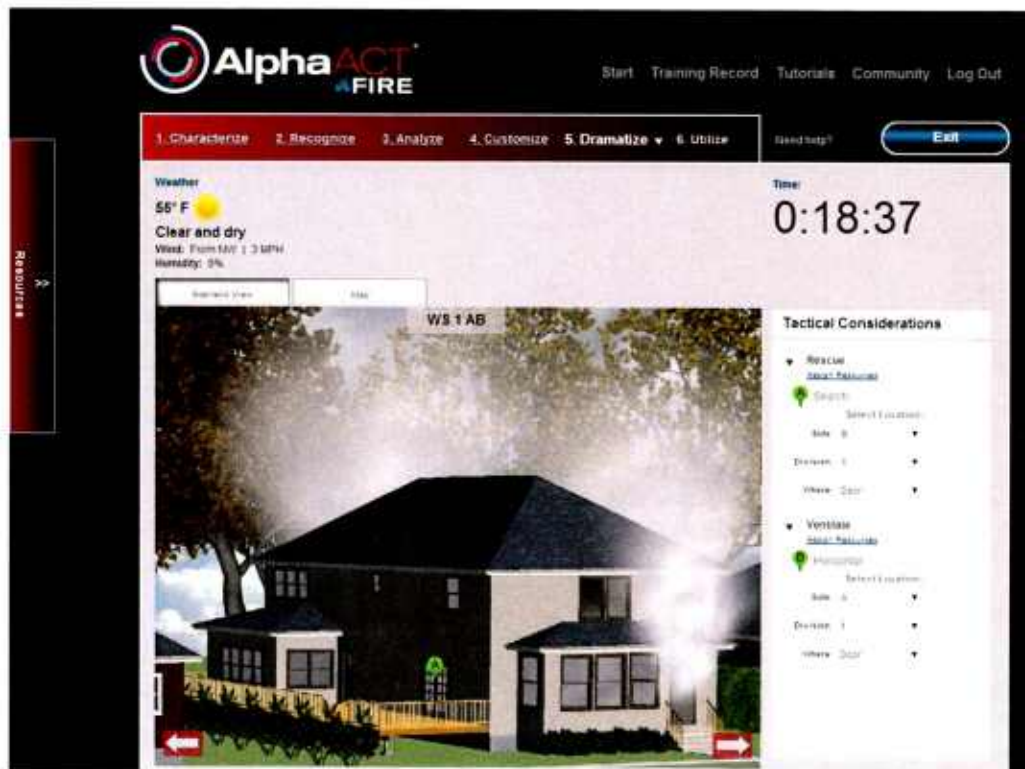
Figure 39   The Dramatize page

16. Select the details of your plan of attack on the tactical considerations panel OR drag and drop them onto the simulation.
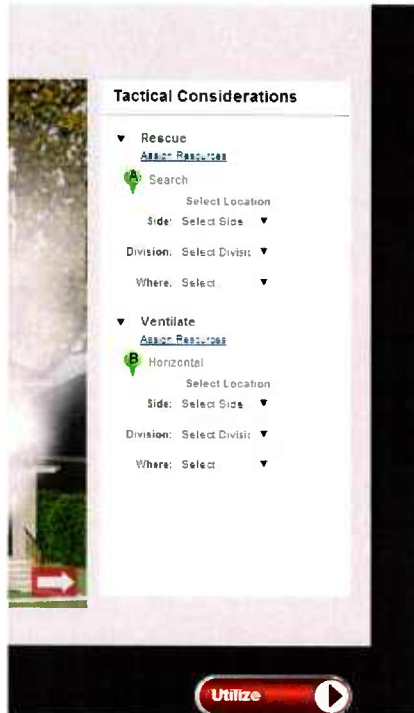
Figure 40   The tactical considerations panel

17. Click Assign Resources on the tactical considerations panel.

The Resources panel opens.
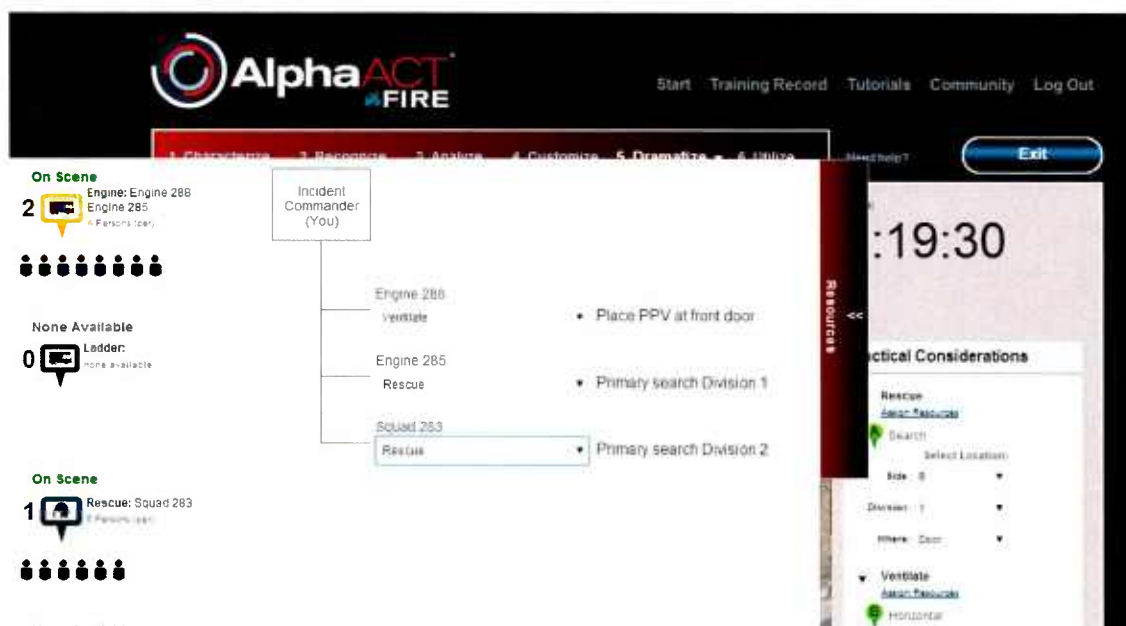
Figure 41   The Resources pull-out panel

18. Select which strategy to assign to each available resource.

19 Mark up the map (under the Map tab) to document event scene details and your plans for deploying response assets.

See Section 5 for details on how to use the map and graphical tools.

20. Click Utilize.

Utilize The system stops the clock and carries the information to the Utilize page, which includes:

- The event scene simulation that lets you view different sides of the structure
- The map of the event area and the timer
- The course of action you chose
- A question about strategy and tactics for which you'll evaluate answers the system provides
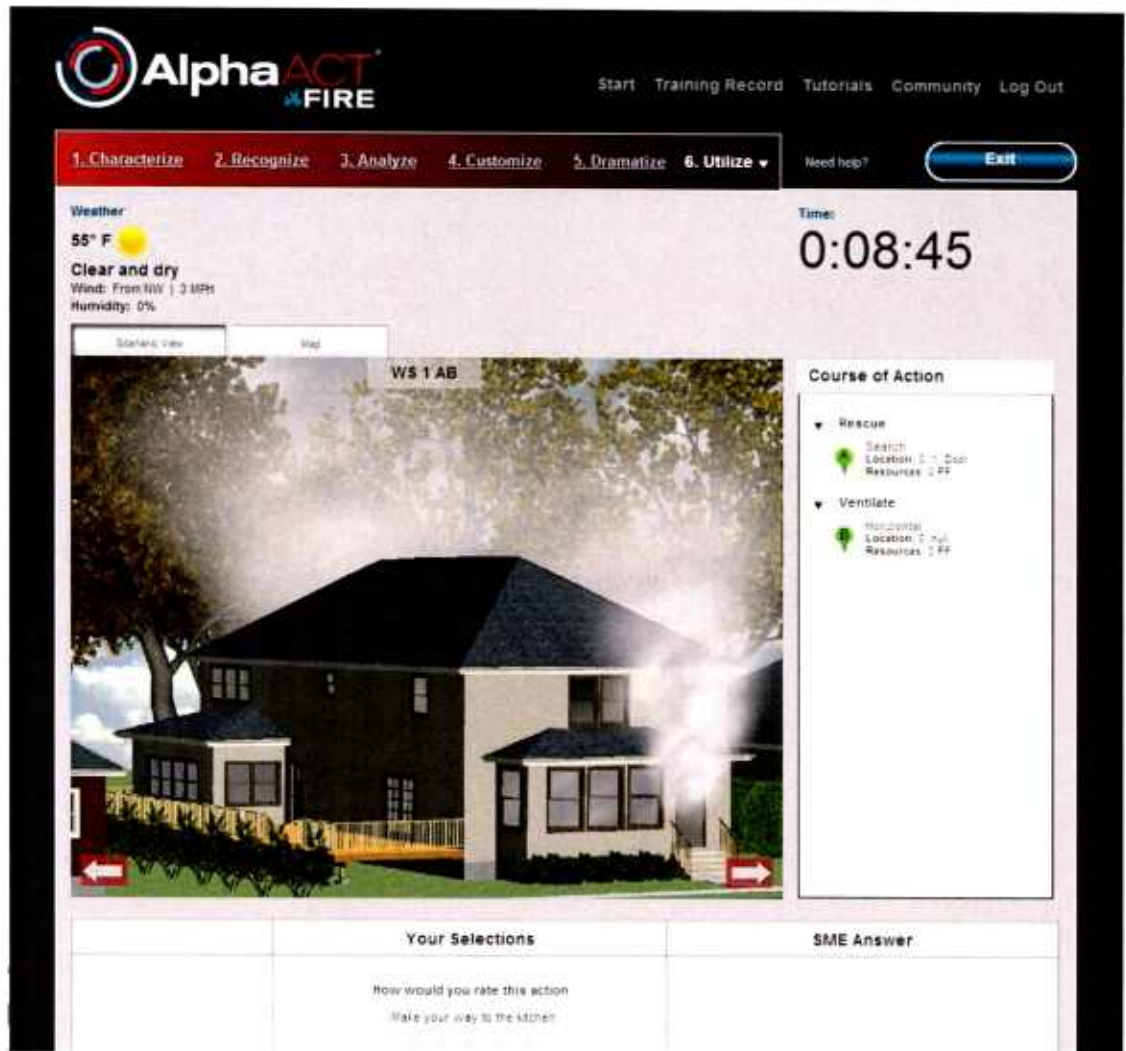
Figure 42   The Utilize page

21. Rate the effectiveness of the actions listed in response to the question(s) asked about courses of action, then click Submit.

    The system displays the answers provided by subject matters experts, allowing you to compare your approach to the situation to veterans in the field.

    This concludes the training scenario.

4.4 Finishing Up

22. Click Feedback.

The system shows how well you did on the training scenario, including:

- Your score
- The scoring breakdown
- The time it took to complete the scenario

AlphaACT FIRE

Start   Training Record   Tutorials   Community   Log Out

Session Feedback   Need help?   Exit

Feedback	Your Score	Available Score
▶ TACTICAL THINKING	4	21
▼ SELF-DEVELOPMENT	0	2
Assessing the scene Analyze		
▪ The time you spent on Analyze was 00:00.15		
▶ JOB KNOWLEDGE	2	10
▶ ADAPTABILITY	0	3

		Recommended	
Time	Your Time	Minimum	Maximum
Characterize	06:45	02:00	04:00
Recognize	01:26	05:00	09:00
Analyze	00:15	03:00	15:00
Customize	00:54	04:00	06:00
Dramatize	01:31	03:00	05:00
Total Time	11:22	17:00	39:00

Figure 43   The Feedback page

At this point, you can:

- Continue on to the next part of the scenario
- Exit the system

5 ANNOTATING THE EVENT SCENE MAP

AlphaACT FIRE provides an aerial map of the event scene on the Dramatize page (available by clicking the Map tab) and lets you mark it up to document event scene details and your plans for deploying assets.

The map includes a set of icons that you can drop onto the map to identify the location of:

- Houses or structures
- The fire
- Hydrants
- Blockades
- Firefighters (to represent your deployment of personnel and resources)
- People who have suffered injuries

The system also includes simple graphics tools for:

- Adding boxes and shapes
- Drawing straight lines
- Drawing freehand
- Entering text for captions or labels
- Selecting and moving objects
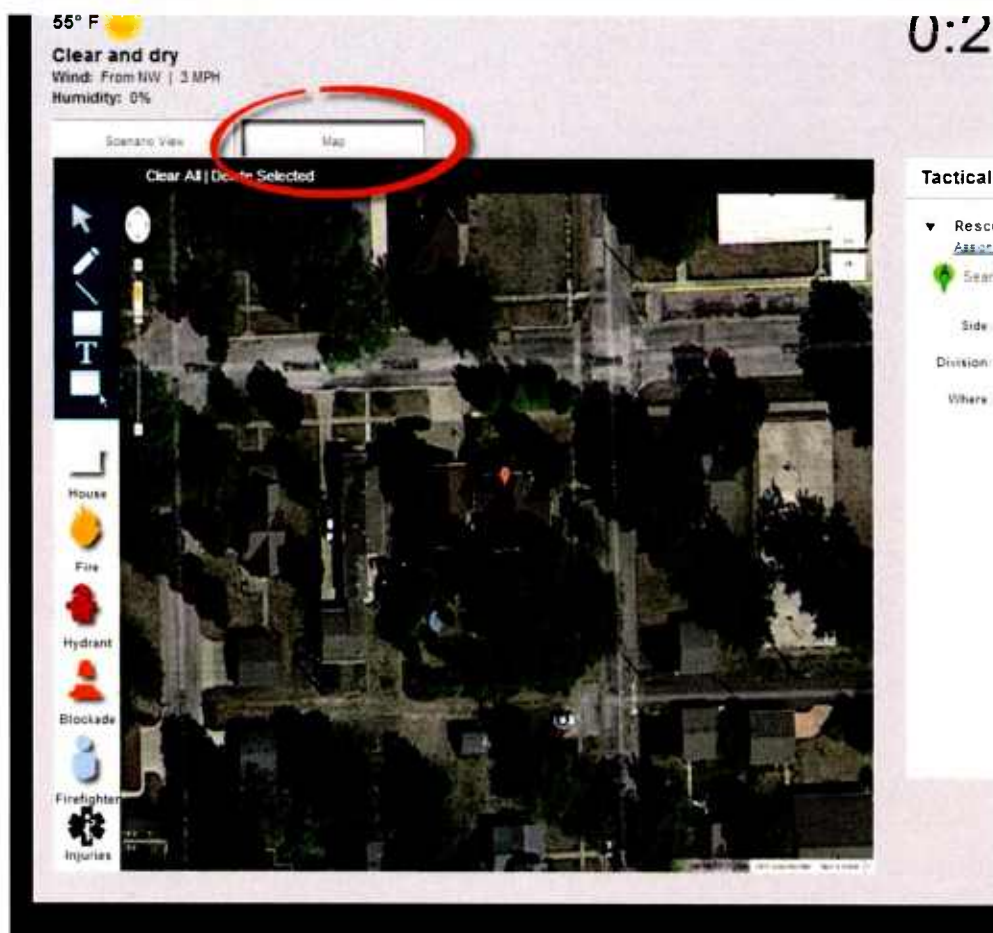
Figure 44   Event scene map and graphics tool palette

5.1   Adding Icons and Shapes

To add an icon to the map:

1. Click the icon of your choice on the toolbar.

   The icon will appear on the map.

2. Click the icon to select it, then drag and drop it into position.

5.2 Adding Lines

To add a straight line to the map:

1. Click the diagonal line icon on the toolbar.

2. Place the mouse on the map where you wish to begin, then click and drag it to the end point and release.

To draw a freeform line:

1. Click the pencil icon on the toolbar to select it.

2. Place the mouse on the map where you wish to begin, then click and hold it as you move the mouse.

   Having selected the freeform drawing function, you can stop and start lines as needed.

5.3 Adding Captions and Notes

To add a caption or note to the map:

1. Click the text tool (the capital T) on the toolbar.

   A text entry box appears.

Figure 45   Entering captions and notes on the map

2. Enter the text to appear on the map and click OK.

   The text appears on the map.

3. Click the text to select it, then drag the text box into position.

4. To:

   - Rotate the text: Click and move the handle of the blue box.
   - Change the size of the text: Click and drag the corners of the text box.

5.4   Moving and Manipulating Objects

The graphical objects you place on a map—straight lines, freeform lines, text boxes, and icons—can be moved and manipulated once placed on the map.

To reposition or manipulate an object on the map:

1. Click the selection tool (the arrowhead icon) on the toolbar.

2. Click the object to select it.

   A blue box appears around the object. It includes a handle emerging from one side and control points at the corners and the midpoint of each segment.

3. To:

   - Move an object: Drag it into its new position.
   - Lengthen or shorten a line or change the size of an object: Click and drag the control point at one corner of the object to stretch or compress it as needed.
   - Alter the slant of an object: Click and hold the end of the handle on the blue box and then move the mouse until you change the slant as needed.

5.5   Deleting Objects

To delete an object you've added:

1. Click the selection tool (the arrowhead icon) on the toolbar.

2. Click the object to select it.

3. Click Delete Selected.

   A box appears asking you to confirm your decision.

4. Click OK.

To delete all objects you added to the map:

1. Click Clear All.

   A box appears asking you to confirm your decision.

2. Click OK.

6 TRACKING PERFORMANCE

AlphaACT FIRE tracks your training and summarizes it in a personal training record that also lets you compare your performance against the performance of others in the community.

The training record does not include scenarios that you started but did not complete (completion being measured by your arrival on the Feedback page).

To view your training record, click Training Record on the Start page.
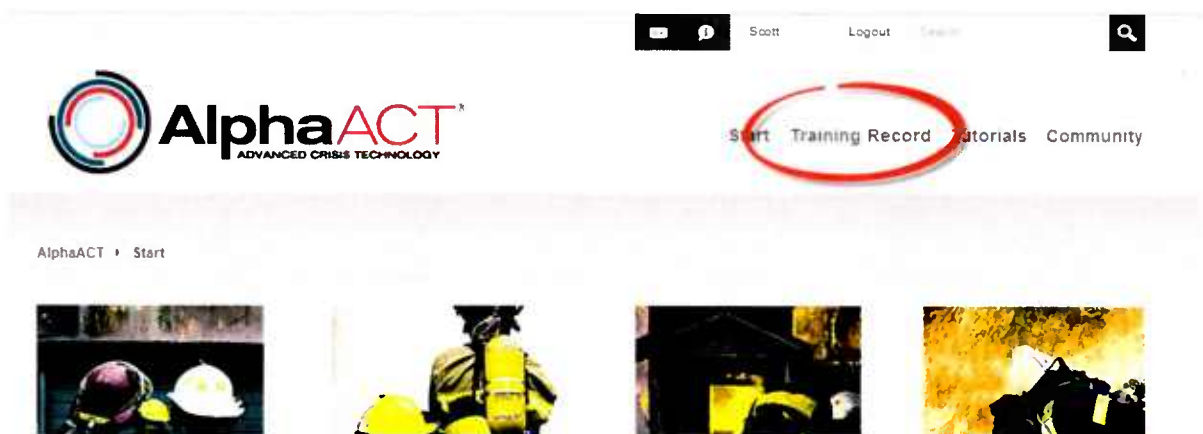
Figure 46   Opening your training record

The system shows trends and statistics of your use of AlphaACT FIRE and compares them to system usage by other members of the AlphaACT FIRE community to give you a feel for how your performance compares.
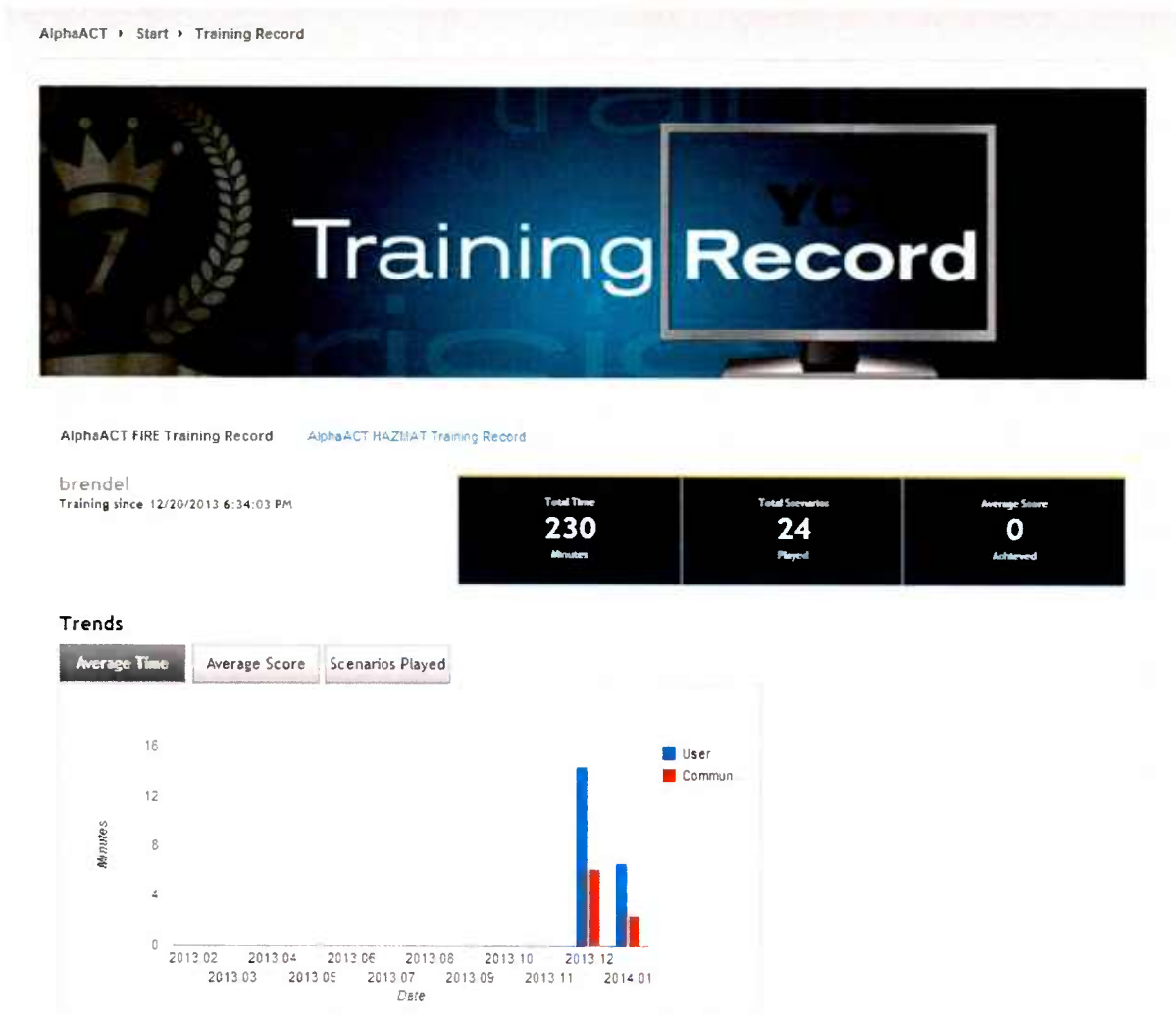
Figure 47   Training record trends

Statistics

	Summary	Best Plays	All Plays
Different Scenarios Played	3 of 28
Total Number of Plays	24
Current Status	Unranked
Best Score	0
Most Improved Scenario	Watson Street Residential Fire Part 1
Average Score this Month	0
Community Average this Month	3

Figure 48   Training record statistics

7 COMMUNITY FORUMS

The Community lets AlphaACT FIRE users discuss topics of interest and share information.   It is an email-like approach to information sharing that you'll find very familiar.

Forums are established around major topics of interest; threads are created within a forum to address sub-topics. Contributions are made to a thread as a post. The capability also allows you to send private emails to individuals within the community (much like Facebook).

Forums are moderated by members of the community to ensure that the discussions remain focused, civil, and free of spam and inappropriate submissions.

After you log in, the Community link at the top of the Start page allows you to enter and navigate the forums.   You can then contribute to the discussions by either replying to a post or creating a new thread to begin a discussion of a new sub-topic.

Figure 49   The Community

7.1 Basic Options

From any point within the Community, you can:

➤ Adjust settings for how you interact with the forums
➤ View only the posts and threads you have created
➤ Search the forums
➤ Return to the Community home page

These options are available using the links at the top of the Community pages.

7.2 Navigating the Forums

To navigate the forums:

1. After logging in, click the Community link at the top of the page.
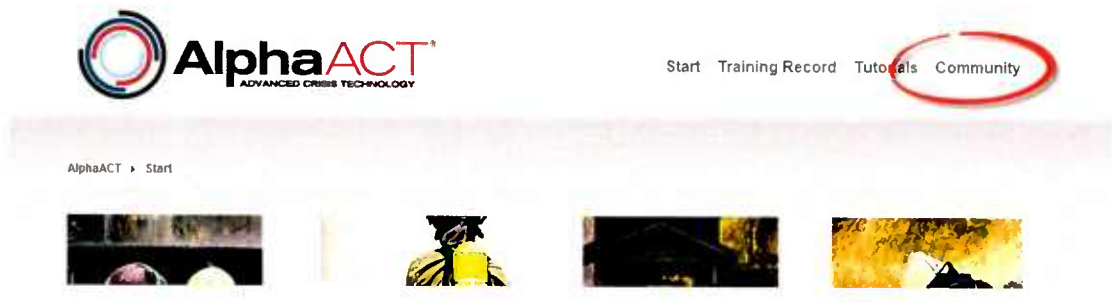
Figure 50   The Community link

The system lists the forums (the major topics) within your community, along with information regarding their activity.
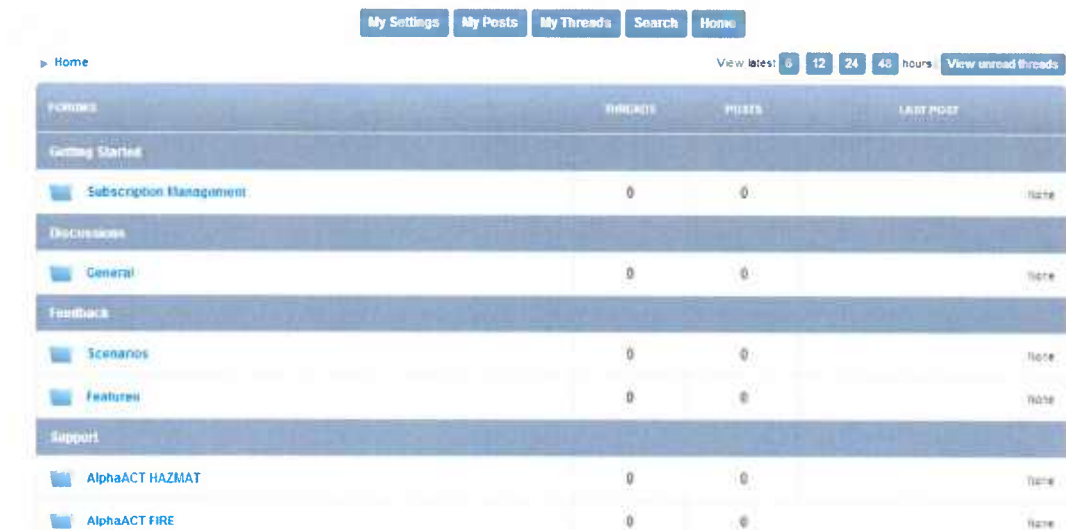
Figure 51   The Community forums

At this point, you can:

▪ Enter a forum or thread

- View the most recent posts made to the forums
- View unread threads

To enter a forum:

1. Click the name of a forum.

   The system lists the threads (the sub-topics) within the forum and shows information regarding their activity.

Figure 52   Threads in the Emergency Response Community forum

To enter a thread:

1. Click the name of a thread.

   The system lists the posts in the thread.

Figure 53   Posts in a thread

Postings and replies are handled as emails and sent to the forum moderator before being posted to the thread.

7.3   Replying to a Post

When replying to a post, you can include the text of the post you're replying to or you can reply without it.

To reply to a post *and include the original post*:

1.   From the post you wish to reply to, click Quote.

Figure 54   Replying to a post using Quote

The system presents an email template showing the original post in the top part of the email's body.
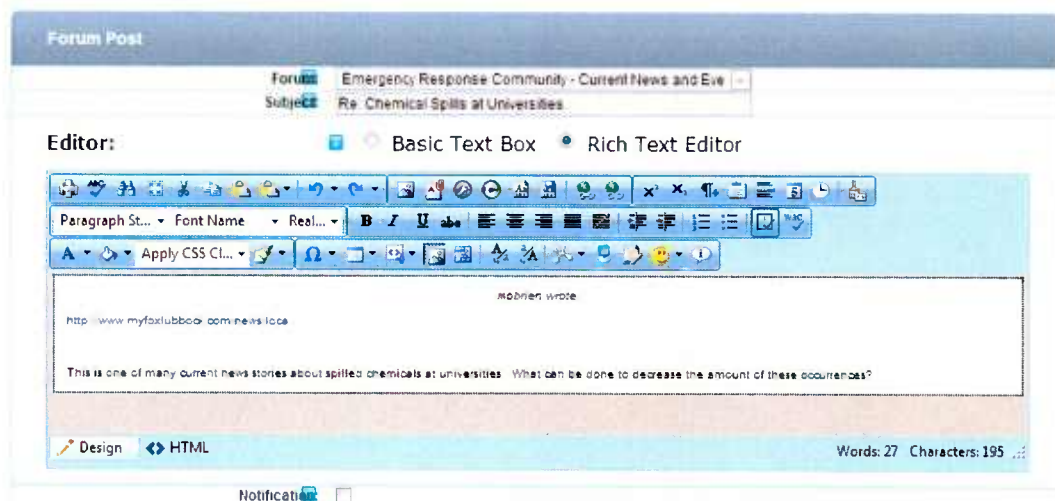
Figure 55   The email template for replies

2. Place the cursor within the body of the email—either above or below the original text—and add your remarks.

3. Click Submit.

To reply to a post *without* including the original post:

1. On the post you wish to reply to, click Reply.

Figure 56   Replying to a post using Reply

The system presents an email template.

2. Place the cursor within the body of the email and add your remarks.

3. Click Submit.

7.4   Creating a New Discussion Thread

To create a new thread:

1. From a thread page, click New Thread.
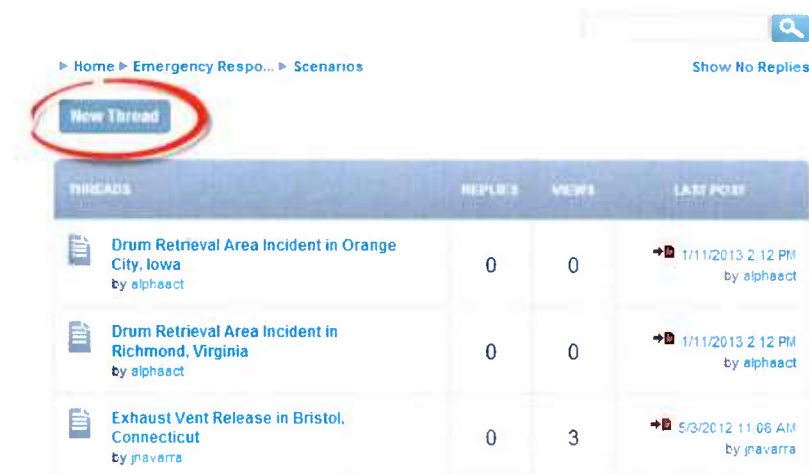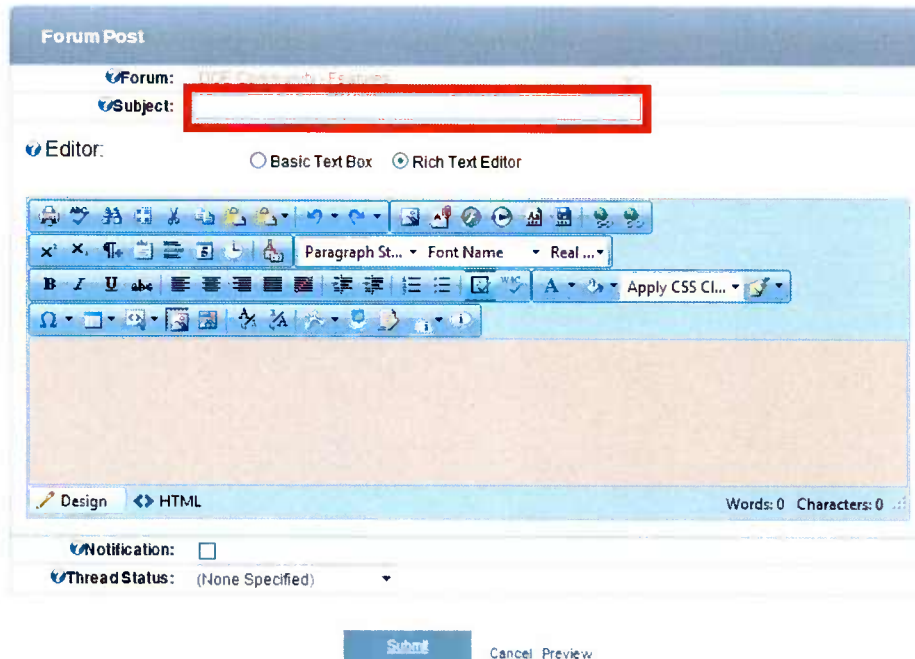
Figure 57   Creating a new thread

The system presents a forum post email which you'll complete to set up the new thread.

2. Enter the name of the thread in the Subject line.

   Make it as brief and descriptive as a heading in a document (for example, no more than three to five words). You'll be able to explain the purpose of the thread in the next step.

Figure 58   Naming the thread using the Subject line

3. Enter an explanation of the purpose of the thread in the body of the forum post email.

   Keep it brief and to the point (for example, no more than one sentence).

4. Select the Thread Status using the dropdown at the bottom of the forum post email if appropriate.

5. Click Submit.

   The system sends the email to the forum moderator, who will review it and add it to the forum if appropriate.

7.5 Viewing the Posts and Threads You Created

To view only the posts you made:

1. Click My Posts.

   The system shows your posts and identifies the forums they appeared in.

To view only the threads you created:

1. Click My Threads.

   The system shows the threads you created along with information about the activity in them.

7.6 Searching the Forum

To search the forum:

1. Click Search.

   The system shows the Search Forum page.

2. Enter the search parameters, then click Search.

   The system displays a page summarizing the posts that meet the search criteria you have specified.

7.7 Adjusting Settings

To adjust the settings for the Community pages:

1. Click My Settings.

   The system shows the User Settings page.

2. Click Forum Settings, then Edit Settings.

   The system shows the settings you can adjust.

3. To put the changes into effect, click Update.

8 MODIFYING YOUR USER PROFILE

Through your user profile, you can:

- ➤ Send messages to and receive messages from other AlphaACT FIRE users
- ➤ Review notifications
- ➤ Modify your system settings

8.1 Opening the User Profile

To open your user profile:

1. Log into the system and click your display name.

Figure 59   Accessing user profile information

This takes you to the user profile page.

8.2 Viewing Messages and Notifications

To view messages and notifications:

1. Log into the system and click your display name.

Figure 60   Clicking your display name

This takes you to the user profile page, where you can view messages you may have received from other system users and notifications from system administrators.
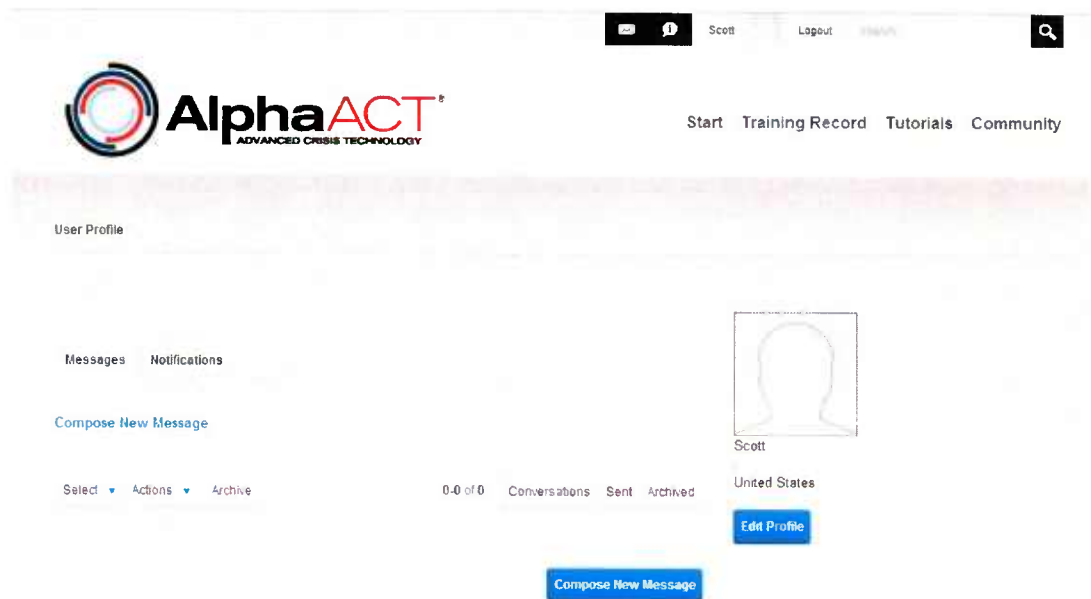
Figure 61   The user profile page

2. Click Messages or Notifications.

    This displays the messages you may have received from other system users or notifications from system administrators. It also gives you tools to compose and send messages, as well as manage the messages and notifications you have received.

8.3   Reviewing Your Subscription

The Manage Services page provides information about your current subscription, including the date it expires.

If you purchased subscriptions for your department in bulk, you will also see information about the redemption of those subscriptions by the people you provided them to.

8.4   Changing Your Password

AlphaACT FIRE lets you change your password as often as you need.

Under the Manage Account tab of the user profile:

1. Click Manage Password.
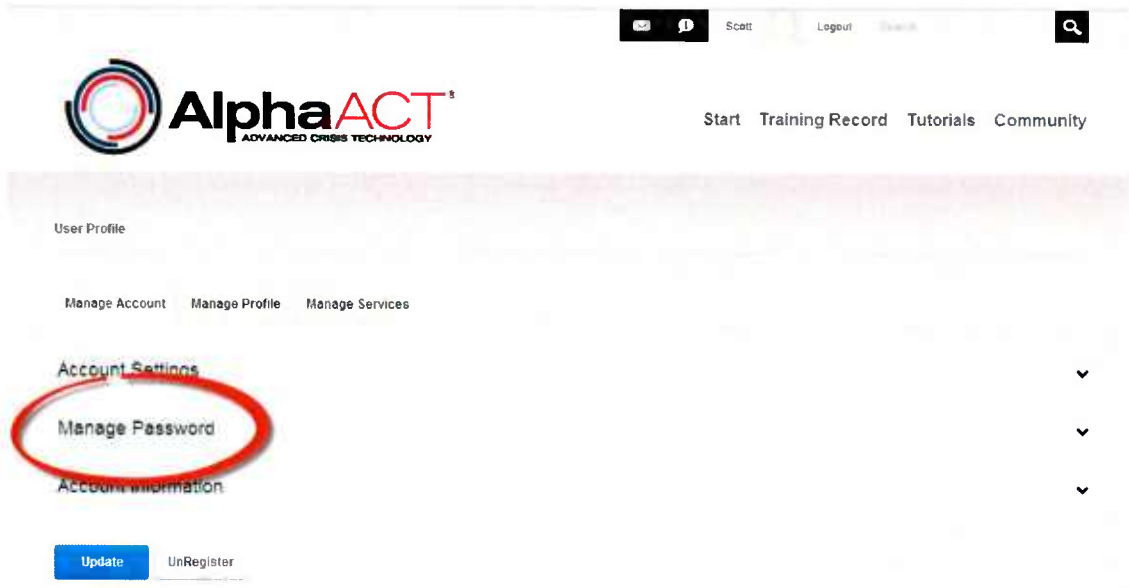
Figure 62   Accessing the Manage Password panel

This opens the page to provide the fields you'll need to make the change to your password.

Figure 63   Changing a password

2. Enter the requested information and click Change Password.

9 REPORTING PROBLEMS

If you have questions or comments about AlphaACT FIRE, don't hesitate to contact our team.

Customer support is available Monday through Friday from 9:00 a.m. to 5:00 p.m. Mountain Time by:

➤ Calling (303) 428-5670
➤ Emailing support@alphatrac.com

AlphaACT FIRE Decision Space:
Research Report

AlphaTRAC®
CRISIS SOLUTIONS THAT SAVE LIVES

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Table of Contents

1   INTRODUCTION

AlphaTRAC is developing AlphaACT® FIRE, a web-based training system that will use engaging scenario-based instruction to teach rapid, case-based decision-making for the fireground.

This document summarizes the research conducted by AlphaTRAC to determine the decision space for the AlphaACT FIRE prototype system.

This document includes the following sections:

- Section 2, Westminster Citizen Fire Academy
- Section 3, Interviews with Westminster Fire Department
- Section 4, Fire Rescue International 2012
- Section 5, Internet Research
- Section 6, Textbooks and Other Publications
- Section 7, Conclusion
- Section 8, Abbreviations and Acronyms
- Section 9, References

The appendices contain supplementary information of interest.

2   WESTMINSTER CITIZEN FIRE ACADEMY

In March 2012, two members of the AlphaTRAC team enrolled in a citizen fire academy sponsored by the Westminster Fire Department in Westminster, Colorado. The 4-hour class met once a week for 13 weeks. Students also participated in an 8-hour ride-along.

Each class covered tasks that different firefighters conducted, based on their department roles.

- The first half of the course consisted of basic firefighting terminology, apparatus and station tours, fireground operations, and fire behavior.
- The second half branched into more specialized operations (such as emergency management and water rescue), hands-on fire operations (such as technical rescue), and job-specific performance assessment.

After each class, the AlphaTRAC team members posted a blog entry that discussed the topics from the course.

In addition to establishing a basic foundation for further research on firefighting practices, the AlphaTRAC team members benefited greatly from their extended exposure to firefighter culture. They learned a lot about firefighter responsibilities, terminology, standard operating procedures (SOPs), standard operating guidelines (SOGs), and tools, equipment, and resources. Some specific questions that arose at the beginning of the decision space research were answered at the academy.

The citizen fire academy course syllabus appears in Appendix A.

3 INTERVIEWS WITH WESTMINSTER FIRE DEPARTMENT

AlphaTRAC invited firefighters from the Westminster Fire Department in Colorado to take part in a series of interviews. During the interviews, firefighters were asked to share their expertise and provide advice on various aspects of the XCapture and AlphaACT FIRE systems. The participants discussed the critical decisions made during a structure fire; they also helped identify the important indicators for sizing up and predicting the progression of events. The focus was on the tough decisions that have to be made upon arrival at the scene of a working fire.

The participants confirmed that the assessment of victim viability and structural integrity, the prediction of impending events, and the selection of a strategy and tactics were potential decision points. They also considered other decisions, such as when it's time to declare "mayday" and activate the Rapid Intervention Crew (RIC)/Rapid Intervention Team (RIT). They provided the research team with many structural collapse indicators. The interviews also included a thorough review of the questions constructed for the scenario gathering tool (XCapture FIRE), feedback on designs, clarification of terms, and the filling in of gaps in knowledge.

Six interviews took place, each ranging from two to four hours in length. Between one and four fire personnel participated in each interview. Detailed summaries and notes from the interviews are available on request.

Interview participants included the following members of the Westminster Fire Department:

- Bob Hose
- Mike Rosado
- Dennis Bishop
- Jesse Molinar
- Brian Timmens
- Shawn Caswell

Other interviewees included:

- Jake Pelk, from Central County Fire Department, California
- Brandon Parker, from Denver Fire Department

4 FIRE RESCUE INTERNATIONAL 2012

Three members of the research team attended the Fire Rescue International (FRI) conference held in Denver in August 2012. A list of education sessions attended by AlphaTRAC team members can be found in Appendix B.

Information from these presentations informed the definition of the decision space, the decision points, and the targeted end user. Additional end user needs and requirements (i.e., user stories) were generated based on the material presented at FRI.

The following summarizes key themes from the presentations:

- The importance of building construction
  - Relatively little training time is spent on construction and fire behavior
  - Gear and equipment is better today, but firefighter deaths are not decreasing
  - Today's environment is very different; lightweight construction (LWC) and plastics provide fuel load and mass, leading to faster fire escalation
  - The outward appearance of homes can be misleading; homes can still be LWC
  - Open floor plans, high ceilings, new growth lumber, etc., contribute to fire behavior

- The International Association of Fire Chiefs (IAFC) Rules of Engagement (ROE) for firefighter safety
  - There are 11 points for the firefighter and 14 for the Incident Commander (IC) (Morris 2009)
  - Developed by Safety, Survival and Health section to provide "recommended best practices model procedures" for use in the design and adoption of SOPs and SOGs
  - The ROE supports the balance between safety and aggressive engagement, as well as the assessment of risks and benefits
  - Firefighters should assess victim viability and what's savable: an analysis of National Institute for Occupational Safety and Health (NIOSH) structure fires shows that firefighters are dying even when there are no occupants inside (Boston Globe 2005)
  - Firefighters should seriously consider the defensive attack strategy

- Not conducting a 360-degree size-up and other improper size-ups
  - Not every IC asks for a 360-degree size-up at a structure fire
  - Sometimes firefighters just go through the motions without sizing up—or looking up

- The need to conduct and even repeat a 360-degree size-up should be reinforced

- Concerns about unsafe acts
  - Most unsafe acts are witnessed but not reported
  - Unsafe acts can become habit; the habit forms because nothing bad happens—until it does

- Special fires, such as the wind-driven fire (NIST 2009)
  - A structure fire involving high winds leads to fire behavior that indicates consideration of different strategy and tactics and response
  - Homes with 4000+ square feet, green construction
  - More training is needed on fire behavior in general

These and other key takeaways from the FRI conference guided our determination of the decision space and end user requirements.

5 INTERNET RESEARCH

The research team used the internet to find articles, materials, resources, and other information related to the potential decision space. Scenarios from several sources were considered for populating the initial system database. Here is a partial list of websites that were used.

- www.Firefighterclosecalls.com
- www.Firefighternearmiss.com
- www.Fireengineering.com
- www.Lrc.fema.gov
- www.usfa.fema.gov/pocs
- www.nfpa.org
- www.netc.worldcat.org
- www.cdc.gov/niosh/fire
- www.firegroundsizeup.com
- www.iafc.org
- www.ul.com/fireservice

6 TEXTBOOKS AND OTHER PUBLICATIONS

Textbooks and other trade publications, recommended by members of the Westminster and Thornton Fire Departments, were referenced during the research.

- Smith, J. P. (2008) *Strategic and tactical considerations on the fireground* (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

    Most of the research on command sequence, operational modes, and the incident command system were taken from this textbook. Topics were explained in detail and the material from this text informed the preliminary stages of technical content development for XCapture FIRE and AlphaACT FIRE. Help text information and ideas were supported by this textbook, as well.

- Bush, G. & Linstrom, J. (2002) *Fire attack: strategy and tactics of initial company response* (2nd ed.). Loveland, CO: WORLD Response, LLC.

    The student handbook supplemented the strategic and tactical considerations textbook. It contained light information on initial tactics and strategy while the textbook provided greater detail on strategy and tactics on the fireground.

- National Fire Protection Association (2009) *Fundamentals of firefighting skills* (2nd ed.). Sudbury, MA: Jones and Bartlett Publishers, LLC.

    A lot of incident command system terms, response and size-up actions, and fire behavior indicators were taken from this book. Help text information and ideas were supported by this textbook, as well.

- http://webtools.delmarlearning.com/sample_chapters/1401835821_13.pdf

    Information about building construction as it pertains to firefighting was found in this book chapter.

7 CONCLUSION: THE ALPHAACT FIRE PROTOTYPE DECISION SPACE

The objective was to select a decision space that was narrow enough for a feasible, deep, and meaningful application—yet broad enough so that it included several consequential, time-urgent, and difficult decisions and situations that require critical situation assessment.

Based on the research, AlphaTRAC decided that:

- All cases in the database will involve single family residential structure fires
- The training scenarios in the prototype system will involve single family residential structure fires with a potential life safety issue

The proposed primary decision points will be determination of life safety, victim viability, strategic and operational mode, and the strategy and tactics associated with the returned case(s). Prediction of significant events is also emphasized.

The size-up characteristics and decision points supported by the system will include:

- Whether there is a life safety issue
- Whether the life can be saved
- Choice of strategy and operational mode
    - Offensive, defensive, or something in between
    - Whether to switch strategy (transition)
- Selection of a strategy and tactics
- Situational awareness (e.g., 360-degree size-up)
- Assessment of structural integrity
- Possibility of impending events (backdraft and flashover) and associated strategy and tactics
- Consideration of resources

Cues and indicators that are useful for predicting all of the above will be in the database and training scenarios. The bulk of initial cases will come from the NIOSH database, the nearmiss.com database, and firefighter interviews. The case material will be entered into the AlphaACT FIRE database via XCapture FIRE, the scenario-gathering tool. An example list of interview questions that pertain to the decision space can be found in Appendix C.

The end user perspective in the training scenarios will be that of the company officer of the first-in engine. This position involves a lot of critical situation assessment and decision-making that affects how the rest of the incident unfolds. Although AlphaACT FIRE will be designed to provide useful training for all echelons in the fire service, the targeted end users are company officers (e.g., captains) and aspiring company officers.

The time frame for the training scenarios will be the first 10-20 minutes of an incident. This time period is characteristic of crisis decision-making conditions (e.g., extreme time pressure, uncertainty, dynamically changing events, chaos and stress, potentially severe consequences for failure, etc.).

Some elements of the ROE produced by the IAFC (2011) will contribute to the design and development of various features of the training system.

The main objective of the training system will be to improve the size-up and decision-making abilities of the end user to support firefighter safety. AlphaTRAC feels that this decision space is

representative of crisis decision-making for which a decision training system would be relevant and valuable to the targeted end users.

8 ABBREVIATIONS AND ACRONYMS

FRI	Fire Rescue International
IAFC	International Association of Fire Chiefs
IC	Incident Commander
LWC	Lightweight construction
NIOSH	National Institute for Occupational Safety and Health
RIC	Rapid Intervention Crew
RIT	Rapid Intervention Team
ROE	Rules of engagement
SOG	Standard operating guidelines
SOP	Standard operating procedures

9 REFERENCES

Morris, G. (2009). Rules of engagement for structural firefighting. IAFC on scene, 23(11), 7-9.

Safety, Health and Survival Section of the International Association of Fire Chiefs (2011). Rules of engagement for structural firefighting: Increasing firefighter survival, Technical Report, February.

National Institute of Standards and Technology, Fire Fighting Tactics Under Wind Driven Conditions, Final Report, Fire Protection Research Foundation, January 2009.

Smith, J. P. (2008) Strategic and tactical considerations on the fireground (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Bush, G. & Linstrom, J. (2002) Fire attack: strategy and tactics of initial company response (2nd ed.). Loveland, CO: WORLD Response, LLC.

National Fire Protection Association. (2009) Fundamentals of firefighting skills (2nd Ed.). Sudbury, MA: Jones and Bartlett Publishers, LLC.

http://webtools.delmarlearning.com/sample_chapters/1401835821_13.pdf

Dedman, B. (2005). Fewer resources, greater risk for firefighters. Boston Globe.com. Retrieved August 29, 2012, 1-7 from
www.boston.com/news/specials/fires/fewer_resources_greater_risk_for_firefighters

APPENDIX A.   WESTMINSTER CITIZEN FIRE ACADEMY SYLLABUS

WESTMINSTER FIRE DEPARTMENT
CITIZEN ACADEMY
CLASS SCHEDULE MARCH-MAY 2012

Fire Department Facilities:
Public Safety Center (PSC) - 9110 Yates St.
Station 1 - 3948 W. 73rd Ave.   **Station 2** - 9150 Lowell Blvd.
Station 3 - 7702 W. 90th Ave.   **Station 4** - 4580 W. 112th
Station 5 - 10100 Garland St.   **Station 6** - 999 W. 124th Ave.

CLASS 1-PSC, THURSDAY, MARCH 1, C SHIFT

- Welcome – Chief Doug Hall   1800 – 1815
- Student standard, waiver, course schedule – PEO Sherrie Leeka   1815 – 1830
- Break   1830 – 1845
- Fire Department Overview/Organization – BC Ron McCustion   1845 – 1945
- Introduction – Participants   1945 – 2030
- History of the Fire Service & Westminster Fire Department -   2030 – 2200
  Fire Engineer Jeff Heineman

CLASS 2 – STATION 2, THURSDAY, MARCH 8, C SHIFT

- HIPAA Training – Captain Rick Spahn   1800 – 1815
- Performance Measures –Deputy Chief Kassen   1815 – 1915
- Station 2 tour – Battalion Chief Ron McCuiston   Hose Wagon   1915 – 2015
- Break   2015 – 2030
- Tour of Fire Engine, tools and equipment, mobile data computer (MDC)   2030 – 2200
  demo – Station Engineer's

CLASS 3 – STATION 2, THURSDAY, MARCH 15, B SHIFT

- Protective equipment, turnout gear, wild-land gear, hazmat gear –   1800 – 1900
  Firefighter Brian Clark
- Break   1900 – 1915
- Self Contained Breathing Apparatus (SCBA) and Maze –   1915 – 2200
  Paramedic Mike Rosado, Lt. Joel Sherry & Firefighter Brett Miller

CLASS 4 – STATION 2, THURSDAY, MARCH 22, B SHIFT

- CPR Certification class & Automated External Defibrillator (AED) –   1800 - 2200
  EMS Field Coordinator Harrison Davis

CLASS 5 – STATION 2, THURSDAY, MARCH 29, B SHIFT

- Westy MED – EMS Field Coord. Tina Takahashi   1800 – 1815
- File of Life – Public Education Officer – Sherrie Leeka   1815 – 1830
- Emergency Medical Service – EMS Field Coord. Tina Takahashi   1830 – 1930
- Break   1930 – 1945
- Tour of Ambulance, demo, scenario, mock alarm – B Shift   1945 – 2200

CLASS 6 – PSC, THURSDAY, APRIL 5, A SHIFT

- Bus tour of Fire Stations 1, 3, 4, 5 and 6 – Deputy Chief Bill Work   1800 – 2200

CLASS 7 – STATION 2, THURSDAY, APRIL 12, A SHIFT

- Fire Behavior – Lieutenant Joel Sherry   1800 – 1900
- Fire Investigations – Lieutenant Joel Sherry   1900 – 2000
- Break   2000 – 2015
- HazMat in your home – Lieutenant Joel Sherry and Engine 5   2015 – 2200

CLASS 8 –PSC, THURSDAY, APRIL 19, A SHIFT

- Emergency Communication – Dispatch Supervisor Missy Saggau   1800 – 1930
- Break   1930 – 1945
- Emergency Management – Captain Mike Reddy   1945 - 2030
- Break   2030 – 2045
- Overview of Fire Prevention – Fire Marshal Gary Pedigo   2045 – 2130

CLASS 9 – CITY PARK REC CENTER, THURSDAY, APRIL 26, C SHIFT

- Water Rescue – Captain Rick Barker & Paramedic Brian Timmens   1800 – 1900
- Break   1900 – 1915
- Rescue Demo   1915 – 2200

CLASS 10 – TOWER TRAINING GROUND, THURSDAY, MAY 3, C SHIFT

- Extrication – Firefighter Brian Clark & Engineer Devin Weadon   1800 – 1930
- Technical Rescue – Captain Rick Barker & Paramedic Tom Turk   1930 – 2015
- Break   2015 – 2030
- Rescue demo   2030 – 2200

CLASS 11 – TOWER TRAINING GROUND, THURSDAY, MAY 10, C SHIFT

- Physical requirements for firefighters – Deputy Chief Bill Work   1800 – 1900
- Demo of Job Specific Performance Assessment (JSPA)   1900 – 2100
  Test & practice JSPA Test – Engineer Mark Schmidt
- Fire stream demo & aerial ladder climb – C Shift   2100 – 2200

CLASS 12 – PSC, THURSDAY, MAY 17, B SHIFT

- Plan Review – Lt. Mike Schafer   1800 – 1845
- Fire Extinguisher Training – Public Education Officer Sherrie Leeka   1845 – 1945
- Break   1945 – 2000
- Public Education – Public Education Officer Sherrie Leeka   2000 – 2100

CLASS 13 – CITY PARK REC CENTER, THURSDAY, MAY 24, B SHIFT
- Graduation   1800 - 2200

Westminster Fire Department has three rotating shifts, color-coded in the schedule:
- **A Shift   B Shift   C Shift**

APPENDIX B.   FRI 2012 SESSIONS ATTENDED

Educational sessions attended by the AlphaTRAC research team at FRI 2012:

- Rules of Engagement
- We Got Burned: Lessons from the Wind-driven Dwelling Fire
- Fire Ground Mistakes and Best Practices
- Basement Fires: Understanding Collapse Hazards and Fire Dynamics to Increase Firefighter Safety
- Residential Fires: What's Changing
- Defeating the Deviation in Normalcy
- Leveraging Online Training Technology for Success: Why, Effectiveness, and How Much
- Near Miss: A Proactive Approach to Fire Services Risk Management
- The Top Ten Near Miss Reports Your Firefighters are Reporting
- Saving Our Own: Command Competencies for a Safer Fireground

APPENDIX C.   INTERVIEW QUESTIONS FROM XCAPTURE FIRE

An excerpt of interview questions from XCapture FIRE, a scenario gathering tool, used to size-up building construction characteristics.

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1. Looking at the structure, what year was it constructed?
   - Pre-1919
   - 1920-1949
   - 1950-1979
   - 1980-present

2. What information or indicators did you use to determine the age of the structure?

3. What construction category did the building fall into?
   - Type I: Fire-resistive
   - Type II: Non-combustible
   - Type III: Ordinary
   - Type IV: Heavy timber
   - Type V: Wood frame

4. What style of framing was used in the structure?
   - Balloon
   - Platform
   - Other

5. What information or indicators did you use to determine the framing?
   - Windows
   - Age
   - Vegetation
   - Color
   - Other

6. What was the building made of?
   - Steel
   - Wood
   - Concrete
   - Brick
   - Other

7. What was the roof type?
   - Gable
   - Hip
   - Intersecting
   - Gambrel
   - Mansard
   - Butterfly
   - Shed

8. What type(s) of truss systems were in place?
   - Wood
   - Steel
   - Bowstring
   - Other

9. What was the truss system?
   - Lightweight
   - Dimensional

10. Describe the void space.

11. Did you have a layout of the structure? Yes/No

12. Would you consider the structure to be lightweight construction? Yes/No

An excerpt of questions from XCapture FIRE regarding lessons learned.

1. What were the contributing factors to the event? (Select no more than 3)
   - Accountability
   - Command
   - Communication
   - Decision-making
   - Equipment
   - Fatigue
   - Human error
   - Individual action
   - Procedure
   - Situational awareness
   - SOP/SOG
   - Teamwork
   - Training issue
   - Weather
   - Other

2. In your opinion, was the unit(s) action effective overall? Yes/No

3. Rate the overall effectiveness of the unit on the following scale:
   - 1: Very ineffective
   - 2
   - 3
   - 4
   - 5: Very Effective

4. Additional comment:

For each lesson learned:

1. Give the lesson learned a brief title:

2. Which priority is this lesson related to?
   - Life safety

    – Incident stabilization
    – Property conservation
    – Other

3. Is this about something that went well, or something that didn't work?
    – Worked
    – Didn't work

4. Discuss what happened.

5. List recommendations: what could be done differently next time, and why?

For each indicator:

1. In hindsight, did anyone sense or notice any indicators that you haven't mentioned so far—maybe something unusual—that could have indicated what was about to happen, or helped with assessment of the situation?
    – Describe:
    – Please explain how the indicator(s) might have been important.

For each decision:

1. What were the tough or important decisions that needed to be made?
    – Describe:
    – How much time was there to make the decisions?

![AlphaACT — ADVANCED CRISIS TECHNOLOGY logo]

The AlphaACT Fire Application

A Recognition-based Crisis Decision-making Application for Firefighting

AlphaTRAC™
CRISIS SOLUTIONS THAT SAVE LIVES

INTRODUCTION

AlphaTRAC, Inc., through a Defense Advanced Research Projects Agency (DARPA)–sponsored Small Business Innovation Research (SBIR) project, is developing a decision support application for training firefighters in fire risk assessment and response. This software application:

- Aligns with the way that successful decision makers think
- Rigorously addresses the needs and requirements of decision makers *as defined by the decision makers themselves*
- Innovatively combines database technology with self-learning pattern recognition algorithms in ways not previously attempted
- Induces the user to gain facility with the tools and learn through fun and competitive game-like practice
- Automatically grows a knowledge base of operational and training decision scenarios from subject matter experts using the tool

The AlphaACT Fire application is a web-based application that will operate on most computers, tablets, and personal digital assistants. The application helps firefighters improve their crisis decision-making skills by training them to recognize fire risk, then rehearse for and respond to life-threatening situations.

THE FIRE THREAT

Fire can severely damage the environment and destroy property and lives in a matter of seconds. The smoke and heat caused by fire can suffocate, poison, or burn victims. Further risk of injury or death is caused when fire spreads quickly and weakens the structural integrity of buildings, causing them to collapse on or under civilians and firefighters.

Civilian Deaths, Civilian Injuries, and Property Damage

In 2008, there were 1,451,500 fires reported in the United States. These fires caused 3,320 civilian deaths, 16,705 civilian injuries, and $15.5 billion in property damage (NFPA 2009a).

According to the 2008 U.S. fire loss "clock":

- A fire department responded to a fire every 22 seconds
- A structure fire was reported every 61 seconds
- A home structure fire was reported every 82 seconds
- A civilian fire injury was reported every 31 minutes
- A civilian fire death occurred every 2 hours and 38 minutes
- An outside fire was reported every 45 seconds
- A vehicle fire was reported every 134 seconds

Firefighter Deaths and Injuries

Firefighters' goals are to save lives, property, and the environment. They risk their lives to protect civilians endangered by fire.

Each year approximately 100 firefighters are killed while on duty and tens of thousands are injured.

Each year in the United States and its protectorates, approximately 100 firefighters are killed while on duty and tens of thousands are injured (NFPA 2009b). Although the number of firefighter fatalities has steadily decreased over the past 20 years, the incidence of firefighter fatalities per 100,000 incidents has actually risen. Despite a downward dip in the early 1990s, the level of firefighter fatalities is back up to the same levels experienced in the 1980s.

A significant problem contributing to the number of firefighter deaths is the construction material used in newer homes and buildings. Buildings that contain lightweight wood truss construction are susceptible to collapse from exposure to fire in a very short amount of time. Furthermore, fires in structures with lightweight wood truss construction burn faster, burn

hotter, and release many toxins, resulting in a serious threat to firefighter safety.

DECISION-MAKING: A CRITICAL ELEMENT OF FIREFIGHTER AND CIVILIAN SAFETY

Crisis—a chaotic, high-stress, data-poor decision environment

Successful decision-making, including life safety and incident stabilization decisions, are crucial to decreasing the number of firefighter deaths in the field. Although technology and traditional training help firefighters save lives and extinguish fires, numerous injuries and deaths occur from a failure to recognize important risk indicators that are critical in deciding when a burning building is safe to enter. Firefighters often have little time to search for and rescue victims or extinguish fires before they become victims themselves.

Crisis and emergency decisions, including the critical decisions made on the fireground, share a common set of characteristics:

- Time urgency
- Complex event or decision characteristics
- Rapidly changing event or decision conditions

- A chaotic surrounding environment
- High physical and emotional stress
- Severe consequences for decision failure
- Poor data availability and quality
- Competing demands for decision maker attention
- Frequent interruptions during the decision-making process

The AlphaACT system is based on the recognition-primed decision model

In recent years, decision researchers have identified the recognition-primed decision model as an approach often used by successful crisis decision makers (Klein 1993, 1998). It is considered to be the most appropriate framework for describing how proficient decision makers operate, especially under conditions of time pressure and uncertainty (Lipshitz et al. 2001), and is the decision-making method prescribed for use on the fireground.

The essential process of the recognition-primed decision model is to "recognize and apply" past experiences to find a solution for the problem at hand. The AlphaACT Fire application is based on an adaptation of the recognition-primed decision model and is dependent upon the experience and training level of the decision maker.

AlphaACT helps firefighters "recognize and apply" past experiences to find a solution for the problem at hand

Civilian safety depends on firefighter safety. The safer firefighters are on the job, the better able they are to locate and rescue victims and the safer civilians will be. Because rapid and effective decision-making is a key to improving firefighter safety, training decision makers to think like experts and recognize indicators of fire danger could save a significant number of lives and help avert catastrophic injuries and property damage.

The key decision makers in firefighter safety are Incident Commanders at the scene (battalion chiefs, captains, lieutenants) and firefighters. Inexperienced and newly promoted officers will especially benefit from learning about past cases and what successful decisions were made in similar situations. Furthermore, any firefighter who experiences an uncommon type of fire (i.e., high-rise fire in a predominantly one or two-story home suburb) can benefit by training with the

Key questions must be answered quickly and efficiently to improve firefighter safety in the field

AlphaACT Fire application and learning what others did under similar circumstances.

For Incident Commanders, key questions must be answered quickly and efficiently in the field:

- What is the nature and extent of the fire event?
- Should firefighters enter the building or not?
- Should firefighters stay with the current strategy or should they change it (for example, remain in the building or exit)?

Being able to rapidly assess the situation — including the type, location and fuel load of the fire, the structural integrity of the building, the amount and availability of resources, the possibility of an impending event, and whether there are victims inside that can be saved — is critical in determining what subsequent actions to take that will ensure the safety of both firefighters and civilians.

One key question during a response to a structure fire is whether or not to enter the building — especially if the back-up crew has not yet arrived. For example, if evidence suggests that a victim is trapped inside the burning building, search and rescue measures should always be taken.

Another critical question for firefighters has to do with the relative safety of continuing with their initial strategy or adjusting it. For example, should the crew inside a burning building exit? The evolution of gear and equipment has provided firefighters with more protection, but it has also instilled a false sense of safety as they feel less heat and go deeper into buildings for longer periods of time.

The more information that is known about the nature of an emergency event — and how others have successfully responded in the past — the more likely firefighters will be able to safely remove themselves and civilians from harm's way.

AlphaACT TECHNOLOGY: A TRAINING SYSTEM FOR THE FIREGROUND

The AlphaACT Fire application will help train users to rapidly reach appropriate decisions in high-stress, multiple-distraction environments

The AlphaACT Fire application will help train users to rapidly reach appropriate decisions in high-stress, multiple-distraction environments. It will not make decisions for users, but will help them develop decision-making skills and provide supplemental information that will aid in the decision-making process.

At the heart of the AlphaACT Fire application is an extensive knowledge base of decision scenarios — combinations of events, observable indicators, and resulting decisions. A graphical user interface employing a pattern recognition algorithm will quickly lead the decision maker through a limited set of questions to a scenario that adequately matches the limited information available about the event. The AlphaACT Fire application will allow the user to adapt the base scenario to actual event conditions and then identify additional information that can help further refine the decision.

The AlphaACT Fire application adapts the recognition-primed decision process into six steps.

Step 1: Characterize

The decision maker gathers information and sizes up the situation. The AlphaACT Fire application prompts the decision maker to provide known event information that is important for the retrieval of an appropriate case in the database. Over time, the relative utility of each piece of information will be learned as the system's search algorithm recognizes patterns and takes into account the collective experience and input of a community of users.

A pattern recognition capability will interview the user and "recognize" similar decision cases in the knowledge base

Step 2: Recognize

The decision maker answers key questions that will lead to the efficient retrieval of possible matching cases, based on currently known information. The AlphaACT Fire application asks for event information — in an efficient order — that is

likely to help further refine the list of options. It supports the recognition and retrieval of appropriate cases by:

- Providing an extensive community knowledge base of past cases, thereby increasing the amount of "experience" from which the user draws
- Quickly and accurately weighting and combining cues for the recognition of cases from multiple databases

Step 3: Analyze

The decision maker compares the case selected from the database to the conditions of the present emergency to determine if it's good enough to work from. If it isn't, the decision maker can return to the previous step and gather more information to further diagnose the situation.

Step 4: Customize

The AlphaACT Fire application allows the user to modify the selected case or decision to align more precisely with the characteristics of the current decision situation. The decision problem is often dynamic and information can quickly change, but the AlphaACT Fire application has the capability to recommend modified decision actions based on new or more precise information.

Step 5: Dramatize

The decision maker plays out the decision in his or her mind (or with the team) to make sure every step is feasible. The AlphaACT Fire application provides structured checklists that outline the procedure for implementing the decision. The decision maker uses the checklists and visual displays to conduct a mental rehearsal of the recommended decision, and evaluates the decision's appropriateness and feasibility for the present circumstances.

Step 6: Utilize

The decision maker puts the decision into action. Resources and features (such as the ability to share, print, and email maps, reports, and forms) will support execution. Afterwards, the

new case and cues that prompted recognition, as well as the actual decision and its outcome, are all entered into the database of cases, allowing it to grow and adjust the system's search algorithm to improve subsequent case recognitions and decisions.

THE AlphaACT FIRE APPLICATION: EXAMPLE

The following example illustrates how the AlphaACT Fire application might be applied to a particular training scenario and used to train firefighters in assessing the nature of a fire, determining whether it is safe to enter the building, and deciding whether the current tactical approach should be modified.

Characterize

In this scenario, it is 10 a.m. on a Wednesday and firefighters are responding to a fire in a two-story residential structure. Bystanders report that people are still in the house. Firefighters quickly get a visual confirmation from the front side of the building of two people trapped on the side of the second floor. They also observe brown smoke coming out of the second floor of the house.

The Incident Commander enters this information into the AlphaACT Fire application, along with information about the resources available to him (such as the number of firefighters, engines, equipment) and other relevant conditions (e.g., temperature and wind).

Recognize

The AlphaACT Fire application prompts the firefighters with the "next best questions" based on what information has been entered so far, including questions like:

- Do the windows appear to be stained brown?
- Is the smoke dense and turbulent?
- How old is the building?

AlphaACT can train firefighters to recognize and deal with the dangers associated with a particular fire scenario

Questions pertaining to the points that firefighters typically size up — water, area, life hazard, location, apparatus, construction, exposures, weather, auxiliary appliances, special matters, height, occupancy, and time (WALLACE WAS HOT) — might also be asked.

Based on the answers, AlphaACT presents appropriate matching cases to the firefighters.

Analyze

The firefighters read brief descriptions of what happened in similar past cases, and compare them to the circumstances of the current situation.

They select a case to work with and decide that it is safe to enter (no indicators of a potential backdraft or flashover) and to begin an offensive attack. They split the firefighters into two teams: one crew to rescue the trapped civilians and one crew to attack the fire.

Customize

The firefighters continue to size up the situation. The Incident Commander enters incoming information and modifies the selected past case to more closely match the current situation as it progresses. Firefighters successfully rescue the trapped victims, and the other team inside the building reports that they have vented the heat and smoke and are about five minutes from extinguishing the fire.

The Incident Commander then receives a report that a firefighter observing the back side of the building sees a lot of flames coming out of the windows and a balcony starting to crack. The AlphaACT Fire application shows that in a similar past case, this evidence of weakening structural integrity led to a collapse of the upper level of the house within minutes, causing injury to two firefighters who fell through the floor.

Dramatize

With the help of the AlphaACT Fire application, the Incident Commander mentally rehearses the steps and actions required

for the firefighters inside the building to extinguish the fire and exit the building. He decides that there isn't enough time and orders the firefighters out of the building, then prepares for a defensive attack on the fire.

Utilize

The Incident Commander executes his decision actions. The AlphaACT Fire application provides him with supplemental information to help implement the decision actions, such as checklists to support his switch to a defensive mode of attack, work aids to support rescue, exposure, confine, extinguish, overhaul, ventilate, and salvage (RECEO VS) tactics, a map showing a 360-degree visual of the house from the outside, or a map indicating points of egress within the building.

He sends information to his Rapid Intervention Crew, to better prepare them should anything go wrong. In this training scenario, two minutes after the firefighters get out of the building, the second floor collapses.

BRINGING THE VISION TO REALITY

Although the key decisions and example scenario involved a structure fire and life rescue situation, the AlphaACT system is able to evolve to deal with many different types of fire emergencies (e.g., vehicle fires, wildland fires, and arson) and fire decisions (e.g., extinguishment, containment, and methods of entry and egress).

Furthermore, in addition to training firefighters on fire risk assessment and response, the AlphaACT Fire application could be developed to support other relevant firefighting activities, such as pre-call planning and rehearsal, and hazardous material response.

AlphaACT Fire is one of a number of planned applications of the AlphaACT technology

The AlphaACT Fire application is one of a number of planned applications of AlphaACT technology. Integrating different knowledge bases developed from the collective expertise of subject matter experts in different fields will enable the AlphaACT system to support decision-making for a range of military and civilian crisis-like situations.

In a three-phase research and development program, AlphaTRAC has demonstrated the feasibility of the AlphaACT concept, is creating production-ready prototypes for multiple crisis applications, and will carry the solutions to market.

REFERENCES

Klein 1993. A recognition-primed decision model of rapid decision-making. G. Klein. In G.A. Klein, J. Orasanu, R. Calderwood, and C.E. Zsambok (Eds). *Decision-making in Action: Models and Methods*. Ablex Publishing, Norwood, Connecticut 1993.

Klein 1998. *Sources of Power: How People Make Decisions.* Cambridge, G. Klein. MIT Press, Cambridge, Massachusetts. 1998.

Lipshitz et al. 2001. Taking stock of naturalistic decision-making, R. Lipshitz, G. Klein, J. Orasanu, and E. Salas.

Journal of Behavioral Decision Making, 14, 331-352. 2001.

NFPA 2009a. *The U.S. Fire Problem.* National Fire Protection Association website, accessed from http://www.nfpa.org/categoryList.asp?categoryID=953&URL=Research/Fire%20statistics/The%20U.S.%20fire%20problem, National Fire Protection Association, Quincy, Massachusetts. September 29, 2009.

NFPA 2009b. *Firefighter fatalities in the United States —2008.* Rita F. Fahy, Paul R. LeBlanc, and Joseph L. Molis, Fire Analysis and Research Division, National Fire Protection Association, Quincy, Massachusetts. July 2009.

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AlphaACT FIRE Simulation Training Program

AlphaTRAC's new simulation program aims to give firefighters real-life decision-making experience

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By Jane Jerrard
Published Thursday, March 28, 2013

Imagine being able to quickly acquire years of experience in making good firefighting decisions under pressure. Thanks to some high-tech, web-based simulation training, soon firefighters will be able to do just that.

The program, named AlphaACT FIRE, is being developed by AlphaTRAC, based in Westminster, Colo., with help from the IAFC's Technology Council, and is designed to give less-experienced firefighters the decision-making skills of veterans with multiple incidents under their belts.

Note that the focus here is on decision-making—not the fire tactics used. That's because, as AlphaTRAC's Decision Psychologist Dr. An Oskarsson explains, "Good crisis decision-makers use a different process than others in the same or similar situation." Good decisions are made, in part, because the individual decision-maker can draw from their history of similar experiences, but, as Oskarsson points out, "A lot of chiefs are retiring, and younger firefighters don't have the same level of experience. There aren't as many big fires as there used to be, so it's hard to get that level of experience."

The Psychology Behind Decision-Making

AlphaTRAC trains professionals, including firefighters, soldiers and others who respond to crisis conditions, to make good decisions. In the case of fire tactics, Oskarsson explains, "Experience alone doesn't guarantee that you're a good decision-maker; how you apply that

With AlphaACT FIRE, users select from a database of "experiences" or simulations based on actual fires. They can then view photos, maps and other graphics, and see data on

experience also matters. That's why there are differences even between experienced crisis managers. We went after why some are more successful than others."

Their approach is based on the work of research psychologist Gary Klein, who developed the recognition-primed decision model or RPD. The basic principle of RPD is that a firefighter on scene will mentally process similar past experiences, apply what happened then to the current situation, and adapt their past decisions to fit the current situation. This is all done automatically, but the process can actually be broken down into six stages: characterize, recognize, analyze, customize, dramatize and utilize.

How It Works
Like AlphaTRAC's hazmat training simulation program, which launched in January 2013, their broader-based tactical fire program takes users through those RPD stages to train them in the decision-making process.

Users select from a database of "experiences" or simulations based on actual fires. They can then view photos, maps and other graphics, and see data on the incident as they are asked to make decisions at each stage. As the IAFC Technology Council explains, the six stages in AlphaACT FIRE translate to:

1. Sizing up the situation using available information.
2. Searching a database of experiences for a past event that adequately matches current conditions.
3. Evaluating the past event to see if it fits the situation at hand.
4. Tailoring the past event to reflect the current event.
5. Mentally rehearsing the decision to verify whether it's likely to work.
6. Putting the decision into play.

As users work through each simulation, they can rely on their own knowledge or that of others. "Our training is on how to apply those experiences," stresses AlphaTRAC Marketing Director Jonathan Mackintosh. "And repetition of the training reinforces the decision-making process."

At the conclusion of a simulation, the user can compare their outcome to those of other users—including their training officer or a subject matter expert. "We don't evaluate your tactics, because there may not be one right answer. What we do score users on is their decision-making process," Mackintosh explains. He also stresses that AlphaACT FIRE can train firefighters at all career levels. "Because every fire is different, even experienced firefighters can be placed in situations and can experience consequences that they rarely see."

The program will also include extensive discussion forums, where users can share feedback with firefighters across the country.

A Database of Experiences
The scenarios used in AlphaACT FIRE include detailed information on real-life incidents, including all sorts of statistics and lessons learned.

Fire trainers and others can share their department's experiences through AlphaTRAC's online database XCapture FIRE. Although not all experiences will be chosen for inclusion in AlphaACT FIRE, the database will be available free to the fire community, and can be used for "official after-action reviews, or simply to tell your stories," Mackintosh says. Departments can browse the experiences of others

the incident as they are asked to make decisions at each stage. Photo AlphaTRAC

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to learn new procedures or build their own tactics. "For example, if a small town is getting its first Wal-Mart, the fire department might need to learn how to approach a fire in a large industrial building—they can check the database," Mackintosh says.

AlphaTRAC is planning to release the free version of XCapture FIRE this month through the IAFC (www.iafc.org); a pro version with additional features and functionality will follow soon after that.

Beta Testers Wanted
AlphaACT FIRE should launch in January 2014 and will be subscription-based. In the meantime, the simulation program will be ready for beta-testing this summer, and AlphaTRAC is seeking more fire departments to try it out. If you're interested in participating, visit www.alphatrac.com to sign up.

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JANE JERRARD
Jane Jerrard lives in Chicago and writes regularly for FireRescue magazine. Read Full Bio

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Squad Leader Decision Trainer

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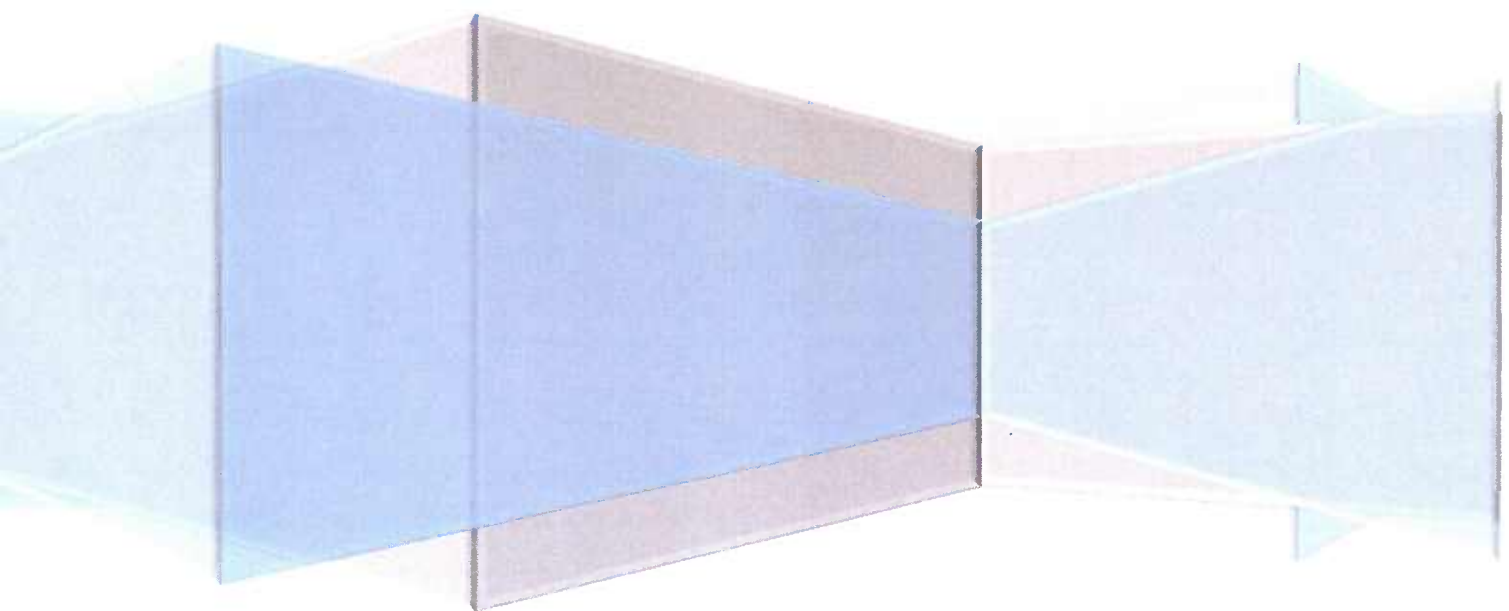
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Contents

INTRODUCTION

Squad Leader Decision Trainer (SLDT) is a training system that will help instruct small unit leaders at the crawl phase to rapidly reach effective decisions in the high-stress, chaotic environment of a squad-level mission. It integrates the Observe/Orient/Decide/Act (OODA) decision processes (the OODA loop), decision support tools, and knowledge bases needed to make urgent decisions. Working through realistic mission scenarios, small unit leaders will learn how to recognize and apply past experiences (their own and those of others) to rapidly changing situations using a decision-making process similar to the processes most often used by successful combat leaders.

The project is being funded by the Technology Insertion for Program Savings (TIPS) program, a rapid fielding program. The two-year project is in its final quarter, which is product evaluation.

On May 13, 2014, an evaluation of SLDT was conducted using Deployable Virtual Training Environment (DVTE) computers at The Basic School (TBS). This report summarizes the results of that evaluation.

BACKGROUND

SLDT allows learners to practice decision-making using scenarios that simulate the kind of situations they might experience during a mission.

While on a mission, experienced warfighters size up situations as quickly as they can, using the sensory and environmental clues they're presented—the things they see, smell, hear, and feel. Then they use that information to recall a similar event to help them jumpstart their decision-making. This kind of decision-making depends on good situational judgment about whether the indicators they see are valid predictors of either potential threats or conditions that may positively affect the squad's mission.

SLDT helps learners apply this approach to decision-making. It teaches them to use the observable characteristics of a situation to identify similar events from the past (drawn from a knowledge base of cases managed by the system) and then helps them use that information to determine an appropriate course of action specific to the situation.

This structured approach to decision-making is based on the (OODA process, and the SLDT interface is designed around this approach.

Using scenarios, SLDT presents a mission simulation that can include audio and visual cues to heighten the sense of immersion. The scenarios are divided into several segments, reflecting the scale and complexity of missions and the possibility that conditions may suddenly change, requiring learners to rapidly adapt mission strategy and tactics.

The breaks in the scenarios come at key decision points, where learners are led to deal with some aspect of the situation that requires rapid judgment to ensure mission success (often involving them and their squad). At these "teachable moments," the system leads students to develop their own solutions and action plans, then provides recommendations from subject matter experts (SMEs). Student responses at the decision points are used to evaluate their proposed course of action.

METHODOLOGY

Objective

The objectives of the evaluation were to obtain feedback on the system's ease of use, validity, and potential usefulness to squad leader training, as well as to informally review the system's conformance to the acceptance criteria.

Participants

Five Marine squad leader SMEs (TBS instructors) with various levels of experience used SLDT during a 90-minute test session. Information about them (except for their rank, to help ensure their anonymity) is summarized in the following table.

Participant	Years of experience as squad leader	Combat tours of duty
1	6	1
2	9	3
3	5	3
4	4.5	0
5	5	2

Test Session Agenda

The test session agenda included:

- Introduce case-based decision-making (10 minutes)
- Introduce SLDT (10 minutes)
- Individual play (90 minutes)
- Feedback and discussions (30 minutes)

Materials

To complete the evaluation, each participant employed a DVTE laptop with a local area network (LAN) connection to the main server (a laptop). The main server was not used as an SLDT client but was able to do so if needed.

Minimum technical requirements of each laptop were:

- Computer processor: Windows XP or greater
- Web browser: Internet Explorer 8
- Internet connection: LAN
- Headphones

Procedure

Participants were introduced to general decision-making concepts in a short presentation. They were then given a brief demonstration of the system, which included a description of the underlying decision-making concepts. At the conclusion of the presentations, the Marines began using the system in individual play.

During the evaluation, the Marines:

1. Logged in to SLDT.
   - Each user was provided with a generic username and password.
2. Selected scenarios to play.
   - There were five scenarios to choose from. Each user was expected to play at least one scenario.
3. Conducted the selected scenario session(s).
4. Completed a questionnaire.

Questionnaire

At the end of the test session, each user was asked to complete a questionnaire (shown in Appendix A).

The first part of the questionnaire asked users to evaluate SLDT's usefulness and ease of use.

The questionnaire also solicited free-form feedback in response to the following questions:

- What would you change?
- What do you like?
- Other comments?

RESULTS

The five Marines were able to use the system without any assistance and with minimal pre-training. They were quickly able to grasp the concepts, and each of them successfully worked through at least one full scenario.

The average time to complete a full scenario was 20 minutes. All five of the available scenarios were played by at least one of the Marines, and on average, each Marine played three scenarios. Most of the time that the Marines spent using the system was associated with building a course of action and interacting with the map overlay tool.

Responses to the questions regarding perceived usefulness and perceived ease of use were rated on a scale from 1 (unlikely) to 7 (likely), based on five participants answering.

The results are shown in the following tables.

Perceived Usefulness	Response*		
	Average	Lowest	Highest
1. Using the system would improve an aspiring small unit leader's job knowledge	6	5	7
2. Using the system would enhance a small unit leaders decision-making effectiveness on the job	6	4	7
3. Using the system would make it easier to provide training	5.4	4	7
4. I would find the system useful in my job	5.6	4	7

*On a scale of from 1 (unlikely) to 7 (likely)

Perceived Ease Of Use	Response*		
	Average	**Lowest**	**Highest**
5. Learning to operate the system would be easy for me	5.8	5	7
6. I would find it easy to get the system to do what I want it to do	4.4	3	7
7. My interaction with the system would be clear and understandable	5.4	4	7
8. I would find the system to be flexible to interact with	5	4	6
9. It would be easy for me to become skillful at using the system	5.8	5	7
10. I would find the system easy to use	6.2	5	7

*On a scale of from 1 (unlikely) to 7 (likely)

In response to the question, *What would you change*:

- Have [cases] more similar to actual scenario
- There are pros and cons to decisions [getting SME feedback on decision options]
- Make it easier to move icons and lines on maps
- Offer the ability to make multiple choices/follow up choices [Multiple situational judgment tests (SJTs) on the Act page]
- Allow the learner to see the outcomes of other choices and why [on Outcomes page, be able to view reasoning on other options]
- Make the system more interactive [understood why we didn't let them move but wanted to control how fast the scenario was played]
- Would be great to have Marines use from their personal computers
- Would be more effective on Marine Net

In response to the question, *What do you like*:

- Actual actions on objectives
- The briefing system [FRAGO]
- Interactive, learning tool, not video game; user understands this and uses it
- Set up in a way it has to be used as intended
- Not a lot of freedom keeps it from being used as game [Keeps focus on training]
- Ease of understanding

- Light weight from an evaluation perspective so it won't scare Marines from using it

In response to *Other comments*:

- Potential to be great
- Give more presentations to get more feedback
- Great tool

Comments from general discussion, observations, and group feedback were also captured. Most of this feedback focused on additional features that would make the system better, rather than on current features that should be removed or improved. A general consensus emerged to:

- Eliminate the need to type information into the system wherever possible by allowing for multiple choice selections instead
- Minimize the need to read by using audio instead

The feedback is summarized in Appendix B.

During the evaluation, an informal initial review was also conducted of the system's conformance to the project's acceptance criteria. As shown in Appendix C, the system either fully or partially conformed to many of the acceptance criteria.

DISCUSSION

As discussed earlier, the three main objectives of the evaluation were to receive feedback on the system's ease of use, validity, and potential usefulness for squad leaders.

The only issues with ease of use were associated with the map overlay tool and the purpose of the Decide page.

One issue of early concern was related to case return, which is used in the system to teach case-based reasoning. Based on the cues in the simulation, the system presents several past cases of missions with circumstances that are similar to the scenario the user is working on. These cases are intended to help the trainee grow their personal experience "database" as well as help them internalize the process of case-based decision-making. Despite initial worries about how applicable each case might be to the scenario, each SME explored the three available options for each decision point and thought they were applicable. Once the SMEs

understood the purpose of cases, they seemed to find it interesting to read other stories and think about what applied to the situation in the scenario they were working. This point will be emphasized in system training to properly establish user expectations.

Another issue raised by the Marine SMEs was their desire to see outcomes and consequences that were directly related to the decisions they made. While the system included a page that provided outcomes related to the user's decision, the Marines wanted such outcomes to be more obvious and potentially more complex (i.e., scenarios that branch based on specific outcomes, rather than remain relatively linear).

The overall impression of the Marines was that the system would be a valuable training tool for aspiring squad leaders and should be applied at the novice level of squad leader mastery. Based on their impressions and feedback concerning FRAGO and Actions on Objective, the Marines seemed to think the tool was on point for squad leader training.

ABBREVIATIONS AND ACRONYMS

DVTE — Deployable Virtual Training Environment

LAN — Local Area Network

OODA — Observe/Orient/Decide/Act

SJT — Situational Judgment Test

SLDT — Squad Leader Decision Trainer`

SME — Subject matter expert

TBS — The Basic School

TECOM — Training and Education Command

TIPS — Technology Insertion for Program Savings

APPENDIX A.　EVALUATION QUESTIONNAIRE

Perceived Usefulness		1	2	3	4	5	6	7		NA
1. Using the system would improve an aspiring small unit leader's job knowledge	unlikely	●	●	●	●	●	●	●	likely	
2. Using the system would enhance a small unit leaders decision-making effectiveness on the job	unlikely	●	●	●	●	●	●	●	likely	
3. Using the system would make it easier to provide training	unlikely	●	●	●	●	●	●	●	likely	
4. I would find the system useful in my job	unlikely	●	●	●	●	●	●	●	likely	

Perceived Ease Of Use		1	2	3	4	5	6	7		NA
5. Learning to operate the system would be easy for me	unlikely	●	●	●	●	●	●	●	likely	
6. I would find it easy to get the system to do what I want it to do	unlikely	●	●	●	●	●	●	●	likely	
7. My interaction with the system would be clear and understandable	unlikely	●	●	●	●	●	●	●	likely	
8. I would find the system to be flexible to interact with	unlikely	●	●	●	●	●	●	●	likely	
9. It would be easy for me to become skillful at using the system	unlikely	●	●	●	●	●	●	●	likely	●
10. I would find the system easy to use	unlikely	●	●	●	●	●	●	●	likely	

APPENDIX B.   EVALUATION FEEDBACK

- Need to be able to see a cue list on each page, all the way through the decision point
- Split up videos into multiple videos; it will feel like they have more presence
- Include a digital notepad [on FRAGO]
- Ask "Are you sure…?" on Orient to warn them it's their last chance to select a case (and that they can't go back)
- Users were concerned about the point of the Decide page; they can't see direct feedback (nonsensical text brings the same score as a real answer)
- Use multiple choice on the Decide page for Actions on Objectives; offer several predefined options per action, multiple actions
- On one computer on the Decide page, the actions that were submitted showed up below the fold
- Use audio on the Outcomes page; speak the outcomes to them
- Remove the time metrics from session feedback
- Too much text in what and why on the Decide page causes problems for the map
- Need an easier way to delete map icons
- Need more map ability
- Offer a boot camp module that teaches you how to use the system
- Explain the 'how' that isn't already taught to them
- Explain how to use the system overall, using a fake scenario
- There should be multiple SJTs for each decision point
- Include more information on load out – resources, i.e. rocket launcher for Debunked Scenario
- System should be more clear on the Outcomes page as to whether or not the decision was successful
- Feedback could be summed up based on the mission instead of a decision point [only one person said this]

- Provide SME feedback for all options for comparison
- Make it clearer that the options on Act are not the only options; "these are POTENTIAL options…"
- Suggest different decision options on Act; for further review later, maybe added into the scenario

APPENDIX C.   INFORMAL REVIEW OF CONFORMANCE TO ACCEPTANCE CRITERIA

Parameter	Metric	Minimum performance	Observed?	Rationale
Hosted software system	Host software application resides on MarineNet /target system	Must be compatible with Marine Net/target system requirements, Windows XP, Vista, and Windows 7 Operating Systems (OS)	Y	System was successfully hosted on DVTE
Decision process implemented	Operational demonstration of decision process as component of functional capability residing on host system	Decision-process engine successfully demonstrated on target host system	Y	Able to go completely through OODA process in system
Pattern recognition engine (artificial intelligence) implemented	Operational demonstration of pattern recognition engine module as component of functional system	Pattern recognition engine successfully demonstrated as integrated into system	Y	Case return successfully worked using cues
Immersive scenario capability implemented	Operational demonstration of immersive simulation developed and integrated with TECOM-designated simulation engine with low response latency as component of functional capability residing on host system/network	Able to be successfully integrated into existing training simulation environments in use by the Marine Corps at the time of system delivery	Y	System successfully integrated machinima on the Observe page
Scenario authoring capability implemented	Operational demonstration of scenario authoring capability as component of system	Demonstration of scenario authoring capability successfully implemented on host system >95% over 20 attempts	Not tested	

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Parameter	Metric	Minimum performance	Observed?	Rationale
After action review (AAR) capability implemented	Operational demonstration of AAR capability as component of system	AAR capability is successfully implemented on host system	Y	System provided feedback on scenario play to Marines
User management capability implemented	Operational demonstration of user management capability as functional component of system	User management capability successfully implemented	Y	Users were able to log in with custom created log-ins; data can be tied to those log-ins
Distributed, remote operation capability implemented	Operational demonstration of remote user access and operation over defined network with defined remote computer systems	99% remote user access using the remote capability over 100 attempts	Y	Successfully demonstrated in a DVTE environment
Multiple user capability implemented	Operational demonstration of remote operation to conclusion of a training session by multiple simultaneous users	> 14 remote users are able to simultaneously use the system to conduct a training scenario	Partially	In limited test, five concurrent users successfully supported during a training session
A minimum of five immersive levels developed and implemented within system	Operational demonstration of five integrated immersive levels accessed from a remote computer system. Appropriateness of five integrated immersive levels to meet training objectives as determined by TECOM training SMEs.	Five integrated immersive levels can be successfully accessed from remote computer systems. Ten integrated immersive levels are appropriate as rated by five training SMEs.	Y / Y	Successful access of the immersive levels that were reviewed by Standards and Training and played by five SMEs during training exercise who found no credibility issues with scenario content
Hosted software operates on target system	Software boots and runs to completion on target online/computer system	99% success over 100 attempts	Partially	In limited test: system successfully booted each time
Hosted software operates reliably on target system	Mean time between failures	> 2 weeks	Partially	In limited test: the system ran for two hours of simultaneous play by five unique users
Hosted software boots quickly	Time for host software application to boot successfully	Time ≤ 60 seconds	Y	System booted up immediately upon start
System operates over MarineNet or other TECOM-designated computer network	Remote user on defined network successfully accesses system and completes training session	99% success over 100 attempts with network and remote computer fully operational	Partially	In limited test: system successfully operated in a DVTE environment

Parameter	Metric	Minimum performance	Observed?	Rationale
System operates reliably over MarineNet or other TECOM-designated computer network	Mean time between failures operating over fully operational network with fully operational remote computer over a 30-day period	> 2 weeks	Y	In limited scope test: operation over 1 day
Remote user successfully completes training session	USMC user operating over fully operational network using fully operational remote computer logs in to system and completes training session through feedback step	90% success over 10 attempts each by 10 users.	Partially	In limited test: five users made from three to five successful attempts each
Requires limited initial training to successfully use the system	Time to train users to successfully operate the system	Five users are able to successfully learn how to use the system < 2 hours	Y	Users reported high ease of use ratings and were able to learn to use the system in less than 15 minutes of instruction
Immersive scenarios implemented with low response latency to commands	Operational demonstration of low response latency of immersive scenarios developed and integrated with TECOM-designated simulation engine	Latency of response upon issuing commands in the simulation < 2 seconds.	Y	Simulation had little to no latency and was easily played over DVTE network.
Remote users successfully conduct sessions involving immersive scenarios	Remote users conduct immersive scenarios to completion over fully operational network using fully operational remote computer	95% success with five users using each of five different immersive scenarios.	Partially	In limited test: five users using five different scenarios
Remote users successfully author scenarios through system	Remote users author scenarios over fully operational network using fully operational remote computer	90% success with two scenarios generated by each of five different users	Not tested	
Remote users successfully conduct AARs	Remote users use system to conduct AARs of training sessions over fully operational network using fully operational remote computer	95% success of fully generated AARs from 20 training sessions	Partially	In limited test: 10 training sessions were completed and AARs were successfully created for each.

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Parameter	Metric	Minimum performance	Observed?	Rationale
Remote users and trainers can easily and quickly author training scenarios using the scenario authoring capability	Time to author training scenarios using the authoring capability as component of functional capability	Time to change scenario using scenario authoring capability < 1 hour	Not tested	
Relevant, appropriate AAR information provided	Appropriateness of AAR information provided by the system, as rated by TECOM training SMEs.	Appropriateness of AAR capability information provided > 90% as rated by five training SMEs	Not tested	
System successfully tracks user performance	System obtains, retains, summarizes, and presents performance information for users	95% success of collection, retention, analysis, and reporting of user session information metrics from five sessions for each of ten users	Not tested	
Multiple remote users successfully use system simultaneously	Multiple remote users simultaneously conduct training sessions over fully operational network using fully operational remote computer	90% success with five instances where five users conduct sessions simultaneously	Partially	Five Marines successfully conducted a single concurrent test of the system.
Trainee-appropriate decision-making performance is improved using the system	Trainees are able to successfully achieve training objectives using the decision-making process, as validated by TECOM SMEs	> 75% success over ten attempts by five users, validated by five SMEs	Not tested	
Trainees are able to quickly use appropriate decision-making processes	Trainees are able to improve decision-making performance by quickly identifying the appropriate decisions using the decision-making process, validated by TECOM training SMEs.	Trainees decrease time to arrive at appropriate decisions in contextually similar situations by < ten seconds after engaging in five training scenarios. Results validated by five training SMEs as appropriate decisions > 80%	Not tested	

Parameter	Metric	Minimum performance	Observed?	Rationale
Improved trainee proficiency at identifying critical cues important to the decision-making process	Trainees increase number of critical cues identified in training scenarios, validated by five TECOM training SMEs.	Five trainees increase the number of critical cues identified during the training scenario by > 20% after engaging in five training scenarios	Not tested	

July 8, 2014

Rev 4

Squad Leader Decision Training System

February 13, 2014

The Squad Leader Decision Training (SLDT) system is a **training** tool for squad leaders that uses **scenarios** to walk users through making effective **decisions** based on shared **experiences.**

Training: SLDT

Purpose

SLDT is a web-based **training** solution designed to help Marine Corps small unit leaders build their decision-making skills. Using simulation-based **scenarios**, SLDT will help warfighters learn how to recognize and apply past **experiences** to find a solution for the problem at hand.

SLDT will help users:

- ➤ Learn how to detect, recognize, and avoid complex attacks
- ➤ Reach combat **decisions** using limited and sometimes incorrect information

How It Works

SLDT is based on the recognition-primed decision model as implemented in the military process of Observe, Orient, Decide, and Act (OODA). It includes a knowledge base of experiences and employs a pattern recognition engine that quickly identifies potential matching experiences based upon the cues and characteristics of the scenario identified by the warfighter.

SLDT allows users to adapt past experiences to current engagement conditions to help further refine their decision-making skills. Using the mastery model, SLDT evaluates user performance and provides feedback for improvement.

Current Features

SLDT:

➤ Is based on the recognition-primed decision model as implemented in OODA
➤ Integrates the decision processes, support tools, and knowledge bases needed to make decisions
➤ Provides feedback using the mastery model

The **experiences** used by the pattern recognition engine in SLDT will be captured using 360Recall, the simulation-based training **scenarios** will be developed using Scenario Builder, and the scenario-specific **decisions** will be developed using SJT Builder

Scenarios: Scenario Builder

Purpose

Scenario Builder is a web-based authoring tool that helps training developers quickly and easily create multi-part training **scenarios** for use in SLDT.

With Scenario Builder, you can:

➤ Develop interactive training **scenarios** based on mission and event **experiences** and lessons learned
➤ Incorporate multimedia elements to enhance first-person, point-of-view authenticity

How It Works

Using a guided interview, you can develop training scenarios that incorporate:

➤ Video and audio simulations
➤ Maps and images
➤ Scenario quizzes
➤ Cues or indicators of potential danger
➤ Decision points and situational judgment tests (SJTs)

Current Features

Scenario Builder:

➤ Structures information and stores it in a secure database

- Lets you incorporate and overlay cues onto media assets
- Integrates with SJT Builder so you can quickly import existing SJTs or create new ones

The training **scenarios** developed using Scenario Builder are available in SLDT.

Decisions: SJT Builder

Purpose

SJT Builder is a web-based authoring tool that helps training developers quickly and easily create SJTs for use in training **scenarios** developed with Scenario Builder.

With SJT Builder, you can:

- Create, edit, and view SJTs for use in training **scenarios**
- Have subject matter experts (SMEs) review and rate SJT options
- Better leverage the effort involved in SJT development

How It Works

Through its easy to use interface, you can develop SJTs that incorporate:

- Maps
- Images
- Prompts
- Decision options

Current Features

SJT Builder:

- Structures the information of an SJT and stores it in a secure database
- Lets you create and reuse SJTs
- Includes tools to upload media
- Lets you categorize SJTs by mastery model element
- Provides a portal through which SMEs can rate options
- Automatically tallies the ratings of SMEs
- Integrates with Scenario Builder

The SJTs developed using SJT Builder serve as the basis for **decision** analysis in SLDT.

Experiences: 360Recall

Purpose

360Recall is a web-based authoring tool that helps users capture mission and event **experiences** and lessons learned in a form that is easy to document, share, and incorporate into **training**.

With 360Recall, you can:

➤ Capture the details of a mission or event
➤ Document the results of an after action review
➤ Share the information in various ways, including for use in SLDT

How It Works

Using a guided interview, users capture information about a mission (either actual or hypothetical)—things like:

➤ Operation orders
➤ Event details
➤ The decisions made
➤ The lessons learned

Current Features

360Recall:

➤ Structures information and stores it in a secure database
➤ Includes a search function you can use to locate information of interest
➤ Presents lessons learned in the context of the mission or event

The content from 360Recall is used to provide **experiences** for trainees to learn from in SLDT.