

An Information Paper on Crisis Decision-Making Training Technology

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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.

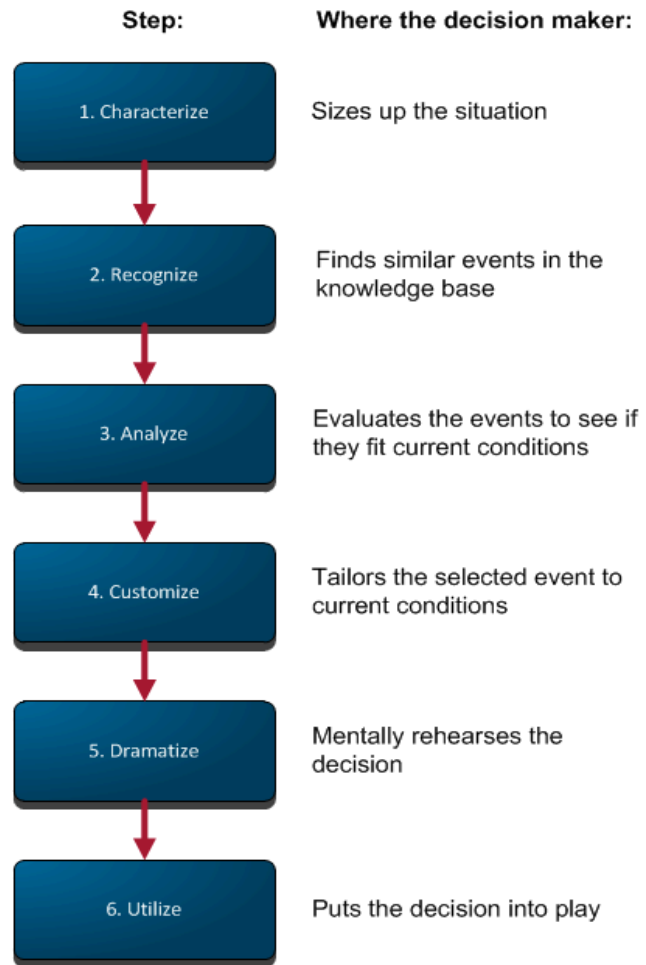


Figure 1 The AlphaACT decision process

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.

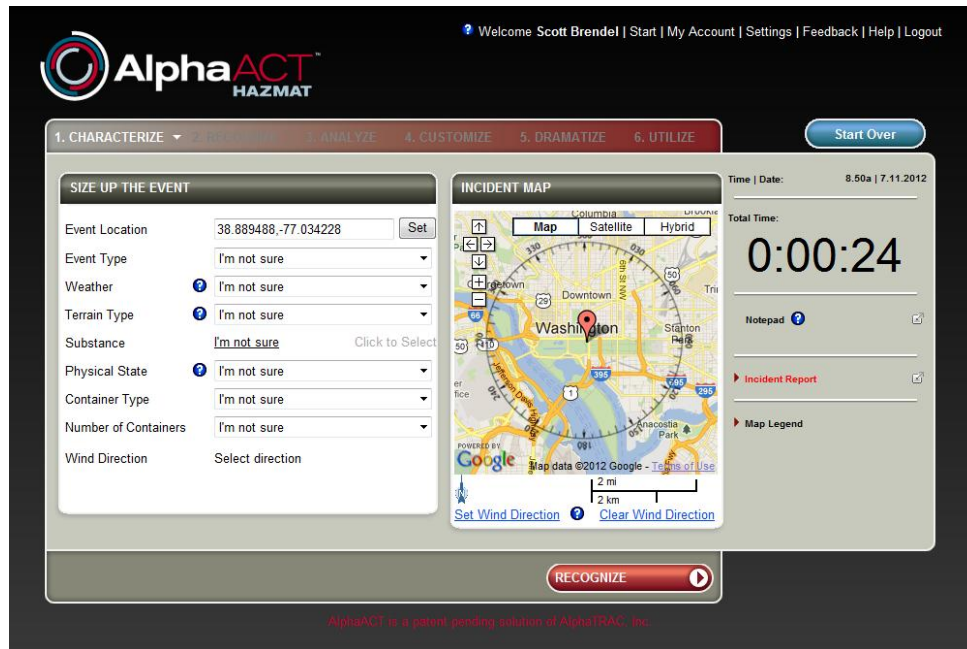


Figure 2 The Characterize page

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.

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