

Simulating Emergency Management Situations using Computer-Aided Tabletop Exercises

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KEYWORDS

Law enforcement, simulation, emergency management, software

- the design of a software package to facilitate the simulation exercises
- the benefits of using the software

ABSTRACT

The Federal Emergency Management Agency encourages state and local jurisdictions to conduct periodic exercises to test and evaluate emergency functions. The exercises range from orientation discussions with a single agency to full-scale deployments from multiple jurisdictions. A common exercise utilized to evaluate plans and procedures is a tabletop drill in which several agencies sit around a table and step through an emergency situation and verbally, or in writing, respond to the events as they occur. The traditional method of performing the exercise includes a facilitator who hands out pieces of paper with predefined events that unroll the emergency situation. Appropriate agencies will respond to each event and a designated scribe record the responses as they occur. Difficulties in conducting such an exercise include getting the events out of sequence and not capturing much of the discussion that can lead to improvements in the plans and procedures. This paper discusses the need for and development of a web-based tabletop exercise software package that facilitates the distribution of events and the recording of responses. Specific topics to be addressed include:

- an overview of conventional tabletop exercises with specific examples

INTRODUCTION

The Federal Emergency Management Agency expects funded jurisdictions to meet certain exercise requirements to test and evaluate their emergency functions and procedures. The funded agencies are encouraged to conduct exercises ranging from a simple orientation to tabletop exercises to full-scale events. The focus of this project is on tabletop exercises in which emergency events are discussed for the purpose of evaluating plans and procedures and resolving issues regarding coordination, communication and responsibility.

In a typical tabletop exercise, a group of representatives from participating agencies gather around a table. Events are presented to the group and each responds with the actions they would take. The responses are often accompanied with discussions of who is responsible for what and what resources are available. Often, however, attention can be diverted from these discussions due to inefficiencies in the manner in which the events are presented and the responses are recorded. These tasks are often done by hand and can be time consuming. To address these problems, a software package was developed to facilitate such tabletop exercises by storing and managing events and responses electronically.

SAMPLE EXERCISES AND OBSERVATIONS

Two tabletop exercises were observed and used for the development of the Emergency Management Exercise Simulation Software. The first included a fire in a school that quickly became complicated by more events. The second included an emergency landing of a commercial aircraft.

SCHOOL FIRE

The first exercise consisted of a group of representatives from local fire and police departments, emergency medical services, teachers, principals and school board officials. In addition to the departmental representatives, there was an evaluator for each representative, a controller who announced the events as they occurred and a recorder who documented the events and responses/actions. The entire exercise was very "manual" with each event written on separate pieces of paper and the recorder documenting by hand the responses.

Several observations were made during the event:

- It was difficult for some observers to hear the conversations taking place regarding the events and responsive actions
- The description of events were distributed manually, requiring paper copies and physically handing them to the participants
- The sequence of events was easily shuffled, possibly caused by several people responsible for distributing them and having to maintain the stack of papers in a particular order
- Capturing the majority of discussion is difficult for recorders and evaluators via handwriting

EMERGENCY LANDING

The second exercise was larger and involved representatives from local fire departments, local and state police departments, airport authority, emergency

medical services, FBI, and state and county emergency management agencies. Again, the group was gathered around a table. Events were presented via projected slides and responses were recorded by hand on an overhead transparency. In this case, photographs were used to enhance the written events.

Several observations were made during the event:

- Approximately 10-12 departments/agencies were represented (23-25 people + observers).
- One recorder was writing down all responses from all agencies on an overhead transparency
- Different agencies have different definitions of Alert 1, 2 and 3 (or the same name for different conditions).
- There was a lot of discussion (as would be expected with the number of participants).
- Some small issues did not get sufficient attention... such as how 3rd parties (police for example) would ID people for entrance to a secure area of the airport (they may not recognize the employee, etc.) and how to get a manifest of passengers on an airline that does not typically serve the airport.
- Pictures/video should be shown before the scenario text description during the exercise (or not at all).

Some of the disadvantages to the way the tabletop exercises are conducted were present in both cases. For example, the recorder had a difficult time documenting all the responses and actions for review later. Also, much of the discussion of important topics is lost. Finally, the presentation of events can become disorganized and non-descriptive when only text is used. Based on these observations, a preliminary software tool was developed to facilitate tabletop drills by managing the events and responses.

SOFTWARE DEVELOPMENT

A web-based interactive software program was designed and is being developed to facilitate emergency management tabletop simulation exercises. The objectives of the software are to:

- present events to the participants in the correct sequence and at the correct time
- provide a method for responses to be submitted for the events
- maintain an organized list of events and each response
- store the events and responses for an indefinite period of time for later evaluation

The above objectives are accomplished via a network of computers/input devices connected through the World Wide Web or a local area network. The system consists of a server terminal that projects the events and responses, an administrator terminal that submits events and recorder terminals for each participating organization for inputting responses to the events. All terminals operate through a web browser, allowing the use of devices such as hand-held computers and multi-platform computers.

EVENT	RESPONSE
1 Fire in cafeteria at West Madison School	MFD: Dispatch stations 1 and 2 MPD: Dispatch 2 units EMS: Standby WMS: Evacuate school
2 teacher and students not accounted for	MFD: Dispatch station 3 MPD: Send information to media EMS: Dispatch 1 ambulance
3 hostile parent takes police officer hostage at gunpoint	

Figure 1. Server terminal

Figure 1 shows the information on the server terminal that can be projected onto a

screen for viewing by all participants and observers. The responses are color-coded for the type of participating agency (blue – police, red – fire, orange – medical, etc.) and display the agency’s initials in case there are multiple organizations of the same type. Figure 2 shows the interface for the administrator terminal where pre-entered events are selected and submitted. Figure 3 shows the interface for a recorder terminal where submitted events are chosen and a response is submitted. Any time an event or response is submitted, the server screen automatically updates. Furthermore, all the events and responses are stored in a database for future access.

EVENT	
1	Fire in cafeteria at West Madison School
2	teacher and students not accounted for
3	hostile parent takes police officer hostage at gunpoint

SUBMIT

Figure 2. Administrator terminal

EVENT	RESPONSE
1 Fire in cafeteria at West Madison School	Dispatch station 3. If necessary, call in Monrovia and/or Huntsville to man Station 1 and 2.
2 teacher and students not accounted for	
3 hostile parent takes police officer hostage at gunpoint	

Madison Fire Dept. **SUBMIT**

Figure 3. Recorder terminal

A typical exercise would involve the following steps:

1. Events are entered into the database prior to the exercise
2. During the exercise, the administrator chooses the appropriate event (typically the next in the list) and submits it.
3. The event pops up on the server terminal.
4. Participants choose that event and submit a response.
5. Steps 2 through 4 are repeated until the end of the exercise.

There are also additional features designed into the software.

- Being web-based, it is possible to conduct this type of exercise without being physically co-located. This could be beneficial if local, county, state and federal agencies need to participate but travel is not possible. Each organization can participate from their home locations.
- A login screen is available for participating agencies to enter their department name and initials for appropriate display on the server screen. See Figure 4.
- The participating agencies are not able to see events until they are posted by the administrator. Furthermore, the events to which each has responded turns gray, but can be modified.
- When entering events prior to the exercise, the administrator can also enter a "best response". These can be used later for evaluation purposes. See Figure 5.
- Each exercise is stored in a database and can be deleted individually.
- Reports can be generated after the exercise for use in the evaluation. For example, all responses by a particular agency can be filtered.

Figure 4. Login screen

Figure 5. Event log screen

CONCLUSIONS

In summary, emergency management tabletop exercises help organizations verify their procedures for a variety of situations. However, the exercises can often lose focus due to the logistics of conducting the tasks by hand. For example, disrupting the sequence of events and not recording the full responses by participating agencies can reduce the effectiveness of the exercise. A software package was designed and is being developed to overcome these problems by facilitating the exercise itself. It brings organization to the event and provides many capabilities that are not currently available. For example,

organizations from multiple locations can participate remotely, data is stored indefinitely for future evaluation and exercise tasks can be conducted more effectively by allowing the software to keep everything organized.

AREAS FOR FURTHER DEVELOPMENT

Some areas for future development include:

- Improving the web interface so the various terminals can receive updates efficiently. Currently, web page refreshes are programmed into the code.
- Incorporating graphics and/or sounds into the events to help convey the urgency and importance.
- Investigating the ability to add video conferencing for remote participants.

ACKNOWLEDGEMENTS

This project was funded in part by the U.S. Department of Transportation.