**SimEOC Summary**

# Abstract.

*Training is an integral part of disaster preparedness. Practice in dealing with crises improves our ability to manage emergency situations. In the current crisis management arena, most training is conducted via face-to-face paper-based scenario exercises. This means that training requires participation from many individuals, consumes a great deal of money, and cannot be conducted often. In this work, we describe a socio-technical training simulator for upper level emergency managers. This tool is important because it enables emergency managers to train for crises in a virtual arena. It also serves as a research tool for cognitive scientists to study the decision-making processes under emergency conditions.*

# Background

## Application Goals

The goal of this work is to build a virtual Emergency Operations Center for (1) training emergency personnel and (2) research into emergency management decision making.

## Ensayo

You may see the name Ensayo instead of SimEOC. SimEOC began as a grant with a project name of Ensayo. Ensayo, in Spanish, literally means rehearsal. Ensayo is the early prototype of this project.

## Application Features

There are several key features of SimEOC that make this work stand out. First, there are very few computer-based simulators for upper level emergency managers. This is one of the first simulators for Emergency Operations Centers available for training and research. Other key features include:

* **Distributed**

One limitation of current training is that players physically have to come to the EOC in order to participate. We wanted to improve this model of training. In this work, we built a distributed training simulator. This allows authorized individuals to access the simulator from any computer from any location in the world.

* **Web-based**

According to a crisis information management system design principle, modern training systems should be similar to systems with which emergency managers are familiar and which they use regularly. It also should be easy to learn on demand. In this work, we modeled our system after WebEOC, a leading web-based commercial crisis information management system with which many emergency managers are familiar. People also are familiar with the web. Having a web-based application is easy to learn and also is a smooth transition for emergency personnel. Finally, SimEOC allows world-wide access. Authorized individuals can access this system from any computer anywhere in the world.

* **Intelligent agents that can supplement and supplant human trainees**

We wanted this application to be able to have intelligent agents able to fill-in for humans when necessary (e.g. when all of the players are not available for training or if individuals want to train selective portions of the EOC (e.g. the public safety group or the infrastructure group)).

* **Advanced Learning Tutor**

We wanted this application to have an intelligent Advanced Learning Tutor to act as a tutor and give hints to players as they participate in the training.

* **Individual and Group Training**

Training can be accomplished on an individual basis or training can be accomplished for a group or organization. In SimEOC, we can accomplish both. Training on an individual basis can consist of training a single liaison. Training on a group level can consist of an entire group such as the public safety group or the infrastructure group. Finally, training can consist of training the entire organization/EOC as well. This is one of the first emergency management simulators with this capability.

* **Dashboards**

We wanted a way to give the trainees immediate feedback on their decisions. Dashboards are indicators such as lives lost, total cost of resources, lives saved, etc. These can be turned on or off as user/trainee wishes.

## Application URL

We have successfully deployed SimEOC. The application URL for the public is available at www.SimEOC.org. We have a project website as well. This website gives information about the SimEOC including background information, design documents, and publications. The project website is available at [www.nd.edu/~veoc](http://www.nd.edu/~veoc).

## Collaborators

This work is a collaborative project among several universities. We have been collaborating with Florida International University and Emory University in the development of SimEOC. Additional individuals have contributed to this work as well. These individuals include several undergraduate students immersed in a research experience program and gradate research assistants.

## Enabling Research Questions

SimEOC serves as both a training tool and a research tool. Some enabling research questions this work can address include:

1. How do individuals establish and maintain trust in other team members in collaborative virtual teams[[1]](#footnote-1)?

2. What are the impacts of leadership in virtual teams?

3. How do individuals establish and maintain trust in the technology of the vEOC in collaborative virtual teams?

4. What are the broader design implications of building virtual emergency systems?

5. How can we improve emergency management when multiple incidents are presented to the trainees at the same time?

6. What can we learn from training selective teams of the incident command system hierarchy?

7. Can we validate some of the theoretical design principles of dynamic emergency response information systems (e.g. continuous monitoring, control, and assurance, and the DERMIS design principles)?

8. How do individuals make critical decisions, and how can we improve cognitive decision-making in emergency situations?

9. How does virtualization and partial distribution of teams[[2]](#footnote-2) affect leadership roles and communication?

## Virtual Teamwork

During the development, we worked with many of our collaborators virtually. In addition to daily emails, we had weekly teleconferences. We set this up via skype. One person in the group prepared an agenda and another wrote up the what was discussed in the meeting.

## Grants

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# Terminology

## Common Operating Picture

The common operating picture is a broad view of what is happening or what has happened in the disaster. Ideally all appropriate agencies who are working on the disaster see the common operating picture. “A common operating picture is established and maintained by gathering, collating, synthesizing, and disseminating incident information to all appropriate parties. Achieving a common operating picture allows on-scene and off-scene personnel—such as those at the Incident Command Post, Emergency Operations Center, or within a Multiagency Coordination Group—to have the same information about the incident, including the availability and location of resources and the status of assistance requests.”

## Situational Awareness

Situational awareness is a state of awareness about your environment. Situational awareness means knowing what is going on inside your immediate environment. It also means knowing about incidental occurrences outside of your immediate environment that could affect you. For example, for an emergency manager who is dealing with a local earthquake, a situational awareness means being aware that there is a nuclear power plant in the area and that the power plant may have a meltdown if not contained. A general, widely applicable definition describes situational awareness as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the application of their status in

the near future.”

## Point of Distribution (POD)

A point of distribution is a staging area for which items can be distributed to the public. Points of distribution are usually pre-planned. However, they can be set up on demand as well. For example, if there were an influenza pandemic, local schools may be assigned as points of distribution to give vaccination shots to the public.

## Standard Operating Procedures

Standard Operating Procedures are pre-planned procedures for dealing with situations encountered. They specify a standard way to deal with a situation in accordance with the written policies of the organization.

## Incident Action Plan

An incident action plan is a plan, created by the planning section of the ICS, which specifies a strategy for how the emergency managers are going to manage the incident or crisis. An incident action plan can be oral or written.

## Incident, Disaster, Emergency, Crisis

An incident, disaster, emergency, or crisis is “any event that threatens to, or actually does, inflict damage to property or people.” Emergencies can be small or large, and we often call large emergencies disasters. Disasters can include hurricanes and floods, explosions and toxic chemical releases, major transportation accidents, and national security events.

## Crisis Information Management Systems (CIMS)

A crisis information management system is a “crisis response system [that] support[s] communications, data gathering and analysis, and decision-making.”

## Crisis Management

Crisis management is defined as “a systematic attempt by organizational members to identify and detect possible crises, take actions and measures to prevent them, contain their effects or disruption, and finally recover.”

## Small scale versus large scale crises (sometimes called routine verses non-routine)

Crises can be small or large. A small scale or routine crisis is one which may be predictable, and for which there are training exercises. Emergency managers usually are familiar with the situation and there are standard operating procedures and policies in place for dealing with them. There also usually are adequate resources available to deal with these. An example of a routine crisis is a house fire. A non-routine or large scale crisis, on the other hand, is one in which is beyond the scope of our resources. In large scale crises, there is a significant probability of extreme danger. There also usually is political and media involvement. They generally have highly unpredictable outcomes. They are rare and beyond our normal experiences. An example of a large scale crises is a tsunami or a pandemic.

## First Responders versus Emergency Managers

SimEOC is a training tool for emergency managers rather than for first responders. First responders are those that are on the scene of an incident and take command of the immediate threat. These typically include firefighters, emergency medical services, and police officers. They can be volunteer or full time staff. Emergency managers are full time staff who are removed from the immediate incident and who operate at the managerial level of the incident to coordinate the response. Their role is not to contain the immediate incident, (e.g. put out the fire, clean up the spill), but rather to coordinate resources for the first responders and to manage public relations. In effect, they are coordinators: “the emergency manager is responsible for coordinating the plans of the various components of the emergency management system—fire and police, emergency medical services, public works, volunteers, and other groups contributing to the community’s management of emergencies.“

## Hot Wash

A hot wash is “ a facilitated discussion held immediately following an exercise among exercise players from each functional area. It is designed to capture feedback about any issues, concerns, or proposed improvements players may have about the exercise. The hot wash is an opportunity for players to voice their opinions on the exercise and their own performance. This facilitated meeting allows players to participate in a self-assessment of the exercise play and provides a general assessment of how the jurisdiction performed in the exercise. The hot wash should last no more than 30 minutes.”

## SimCell

The Simulation Cell (SimCell) is the coordination center for an exercise. Controllers and other authorized personnel in the SimCell control the pace of the exercise, issue injects, and simulate outside communication and responses for the players.

## Inject

An inject is an input, usually in the form or a status update, from one agency to another during an exercise. An example inject is.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Time**  | **Inject Number**  | **Receiving Agency**  | **Sender** | **Message Type**  | **Message Text**  | **Expected Action**  | **ExPlan Obj\*** |
| 0010 | 1 | M Beach Divisional  | Simulation – M Beach EOC  | Info Request  | City Mayor and commissioners want to confirm when topical storm force winds will arrive and which shelters will be open.  | Access IAP or contact Municipal Director for information  | 4 |

\*ExPlan Obj = Exercise Plan Objective

## Script

A script is a series of injects that are given to the players in the form of an exercise.

## Emergency Operations Center (EOC)

An Emergency Operations Center is a secure location where upper-level emergency officials gather to prepare for, manage, and coordinate the response to an incident (e.g. tsunami, earthquake, hurricane, pandemic).

1. A virtual team is defined as a team of interdependent members working on a common task who use electronic media as a primary means of communication; at least some of whom are dispersed in geographic and/or temporal dimensions." [↑](#footnote-ref-1)
2. A partially distributed team is defined as a hybrid, such that a given sub-group of members is physically collocated and collaborates primarily via face-to-face interaction; however, multiple sub-groups within the team are geographically dispersed." [↑](#footnote-ref-2)