

# A Web Application

SimEOC: A Web-Based Virtual Emergency Operations Center Simulator  
for Training and Research

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November 27, 2017

# Emergency Management Overview

SimEOC is a research tool and training tool for the field of Emergency Management

# Disaster Types - Examples

- Biological
- Chemical
- Civil Disorder
- Earthquake
- Fire
- Flood
- Heat
- Hurricane
- Landslide
- Radiation and Nuclear
- Transportation Accident
- Tornado
- Tsunami
- Volcano
- Wildfires
- Winter Storm

# What is an Emergency Operations Center (EOC)?





## Miami-Dade Emergency Operations Center Floor Plan

|                  |                   |   |                                 |                                  |                           |                  |                         |                    |               |
|------------------|-------------------|---|---------------------------------|----------------------------------|---------------------------|------------------|-------------------------|--------------------|---------------|
| Monroe County EM | Broward County EM | Palm Beach County EM<br>Martin Cnty-<br>REP | Collier County EM<br>(REP Only) | Homestead Air Reserve Base (REP) | Municipal Branch Director | MIT-Tech Support | MIT-Application Support | Miami Dade Airport | Port of Miami |
|------------------|-------------------|---|---------------------------------|----------------------------------|---------------------------|------------------|-------------------------|--------------------|---------------|

|       |      |     |                            |                            |                            |                          |                             |                        |                              |
|-------|------|-----|----------------------------|----------------------------|----------------------------|--------------------------|-----------------------------|------------------------|------------------------------|
| FDDEM | FEMA | FIU | Miami Beach Divisional EOC | North Miami Divisional EOC | N Miami Bch Divisional EOC | Homestead Divisional EOC | Coral Gables Divisional EOC | Hialeah Divisional EOC | City of Miami Divisional EOC |
|-------|------|-----|----------------------------|----------------------------|----------------------------|--------------------------|-----------------------------|------------------------|------------------------------|

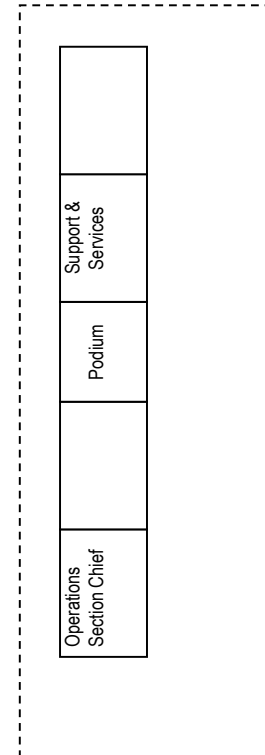
|                        |                           |                        |                  |      |                        |                        |                               |
|------------------------|---------------------------|------------------------|------------------|------|------------------------|------------------------|-------------------------------|
| Florida National Guard | National Park Service     | FWC                    | U.S. Coast Guard | DERM | Miami-Dade Fire Rescue | Miami-Dade Fire Rescue | Public Safety Branch Director |
|                        | PUBLIC SAFETY BRANCH      |                        |                  |      |                        |                        |                               |
|                        | Miami-Dade Schools Police | Miami-Dade Corrections | FDLE             | FHP  | MDPD                   | MDPD                   | Public Safety Aide            |

|                                    |                           |                                      |                |  |                              |   |                                |
|------------------------------------|---------------------------|--------------------------------------|----------------|--|------------------------------|---|--------------------------------|
| Animal Services                    | Dept. of Human Services   | Dept. of Human Services              | Salvation Army | Greater Miami Convention & Visitors Bureau | American Red Cross           | Miami-Dade Public Schools               | Human Services Branch Director |
|                                    | HUMAN SERVICES BRANCH     |                                      |                |  |                              |   |                                |
| AHCA / Bureau of Radiation Control | Miami-Dade Public Housing | Florida Dept. of Children & Families | VOAD           | MDFR- EMS                                  | MD Health Dept – Environment | Miami-Dade Health Dept – Health/Medical | Human Services Aide            |

|                                   |                           |                          |  |                             |                                       |                              |                                      |
|-----------------------------------|---------------------------|--------------------------|--|-----------------------------|---------------------------------------|------------------------------|--------------------------------------|
| Miami-Dade<br>Public Works        | FDOT                      | MD Water &<br>Sewer      | So. FL Water<br>Management<br>District | MD Transit-<br>Regular Svs. | Miami-Dade<br>Transit -<br>Evacuation | Miami-Dade<br>Public Schools | Infrastructure<br>Branch<br>Director |
|                                   | INFRASTRUCTURE BRANCH     |                          |  |                             |                                       |                              |                                      |
| Miami-Dade<br>Solid Waste<br>Dept | Miami-Dade<br>Parks Dept. | Agriculture<br>Extension | Business &<br>Industry                 | Miami-Dade<br>ITD           | AT&T<br>305-406-9888                  | FPL<br>786-845-8277          | Infrastructure<br>Aide               |

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# Where are these EOCs?

- Large Cities
- Most Counties
- State-Level EOCs, National Guard, Department of Health
- Federal Agencies Responsible for Disaster Response
  - FEMA
  - CDC
- Universities
- Large Corporations
  - Airlines
  - Logistics

# What do EOCs do?

- Coordination of response to a disaster
  - E.g., evacuations, rescue, assistance, shelter, etc.
- Provide central secure location for representatives from agencies and organizations, which have resources under their control for disaster response
- Coordination amongst the representatives
  - Unified command & control
  - Situational awareness
  - Determine who will do what?
  - Commitment of a representative's agency or organization

# EOC Training Challenges

- In person “Functional Exercises”
  - Costly
  - Only a few per year
- Challenges
  - Representatives rarely work together
  - Communication problems
  - Turnover of the representatives
- Need for more frequent training



# EOC Research Challenges

- Research questions – examples
  - Performance analysis
  - Best organization and communication designs
- In person “Functional Exercises”
  - Only a few per year
  - Can observe, but controlled experiments difficult to arrange
- Need for detailed traces of every person’s actions
- Need for a research platform to support experiments and post-experimental analysis

# SimEOC

- Web-based EOC simulator
  - Training
  - Research
- Technology
  - Virtual machines
  - Nginx
  - MEAN
    - MongoDB
    - Express.js
    - Angular.js
    - Node.js
  - Bootstrap





A virtual Emergency Operations Center (EOC) for research and training

## Get started

Try out SimEOC or participate in research

[Try out SimEOC »](#)

Currently, SimEOC is free to try, but in the future we may charge a fee for premium services.



### Organizations

Organizations can use SimEOC to configure and conduct custom disaster response training exercises, using private space with password authenticated user access.

[Learn more](#)



### Researchers

Researchers can use SimEOC for observational research on simulated disaster events. A complete record of each exercise is logged for after-action assessment.

[Learn more](#)



### Trainees

EOC staff and students can use SimEOC, an online, web-based training tool, from dispersed locations to prepare in detail for what they will need to do in a real disaster.

[Learn more](#)

# Severe Weather Alert!

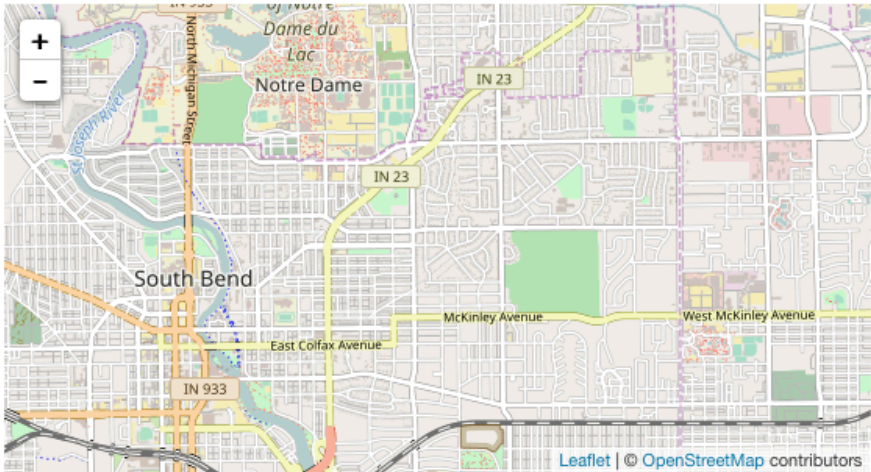
playing

There is a chance for some severe weather this evening including thunderstorms with the possibility of hail and tornadoes. NOTE: -- Try to get into your role as much as possible. Think what sorts of actions your role might need to take. Keep in mind that this is a small exercise and some roles have responsibilities that are beyond the scope of that role in the real world. -- Any request that involves money or resources needs to be coordinated through the Business & Logistics role.

## Players

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| American Red Cross                | Demo1 CRC<br>[demo.crc.1]            |
| Building Services & Public Safety | Demo12 CRC<br>[demo.crc.12]          |
| Business & Logistics              | Demo8 CRC<br>[demo.crc.8]            |
| Citizen                           | Beth Caldwell<br>[beth.caldwell.crc] |
| Fire Chief                        | Demo3 CRC<br>[demo.crc.3]            |
| Firefighter                       | Demo6 CRC<br>[demo.crc.6]            |
| Mayor                             | Demo7 CRC<br>[demo.crc.7]            |
| Memorial Hospital                 | Demo2 CRC<br>[demo.crc.2]            |

▶ Enter Exercise



NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 1m 6s

- CURRENT EXERCISE STATUS >
- PLAYERS >
- MEDIA >
- MISSION/TASKS >
- RESOURCE REQUESTS >
- DISASTER MAP >

- STATUS BOARD >
- ACTIVITY LOG >
- SPREADSHEET >

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 2m 12s



🕒 CURRENT EXERCISE STATUS

24d 21h 2m 14s

playing



👤 PLAYERS



📺 MEDIA



📋 MISSION/TASKS



≡ RESOURCE REQUESTS



📍 DISASTER MAP



📡 STATUS BOARD



🕒 ACTIVITY LOG



📊 SPREADSHEET



NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 2m 48s

🕒 CURRENT EXERCISE STATUS >

👤 PLAYERS

|  |         |
|--|---------|
| Exercise Controller Sam Njoroge              | offline |
| American Red Cross Demo1 CRC                 | offline |
| Building Services & Public Safety Demo12 CRC | offline |
| Business & Logistics Demo8 CRC               | offline |
| Citizen Beth Caldwell                        | offline |
| Fire Chief Demo3 CRC                         | offline |
| Firefighter Demo6 CRC                        | offline |
| Mayor Demo7 CRC                              | offline |
| Memorial Hospital Demo2 CRC                  | offline |
| Police Chief Demo10 CRC                      | offline |
| Police Officer Demo9 CRC                     | offline |

📡 STATUS BOARD >

🕒 ACTIVITY LOG >

📊 SPREADSHEET >



NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 3m 36s

🕒 CURRENT EXERCISE STATUS >

👤 PLAYERS >

📺 MEDIA

External   Internal   Social

01:21:38 important  
Press release: The American Red Cross just opened a 2nd disaster relief shelter.

00:58:10 normal  
Press release: Two fires at Mishawaka Grill have been put out by our firefighters and there were no casualties from either fire.

00:53:25 important  
Press release: Local hospitals (St. Joseph and Memorial) and the Red Cross disaster relief center are accepting any citizens that are hurt due to the extreme weather

00:49:09 important  
Photo from citizen for the Mishawaka Grill on fire. We learned from the Fire Chief that the fire at the Mishawaka Grill and adjacent building has been put out. At this time, we have found no casualties.

📊 STATUS BOARD >

🕒 ACTIVITY LOG >

📄 SPREADSHEET >

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 47m 18s

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🕒 CURRENT EXERCISE STATUS >

👤 PLAYERS >


📺 MEDIA ▾

External   Internal   Social

00:44:43

they finally put out that fire #aboutTime #whattooksolong #needBetterFireFighters

hide media



00:38:45

📡 STATUS BOARD >

🕒 ACTIVITY LOG >

📊 SPREADSHEET >

🗨️

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📊

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 4m 6s

🕒 CURRENT EXERCISE STATUS >

📊 STATUS BOARD >

👤 PLAYERS >

📜 ACTIVITY LOG >

📺 MEDIA >

📄 SPREADSHEET >

☰ MISSION/TASKS

Received    Created

01:01:03    high    **accepted**

ASSIGNED BY: Mayor

The American Red Cross just opened a 2nd disaster relief shelter. Please let WNDU know so they can release the info.

**Response: OK**

00:52:30    high    **accepted**

ASSIGNED BY: Mayor

Make a Press Release stating the outcome of the two fires: They were put out by our firefighters and there were no casualties from either fire.

**Response: OK**



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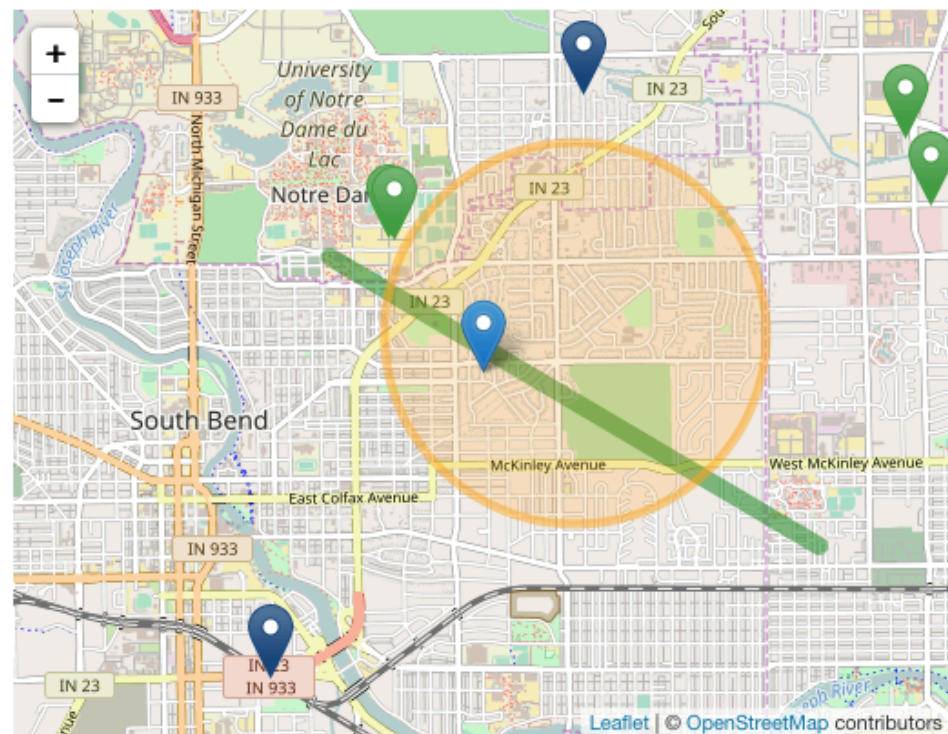
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NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 11m 18s



- CURRENT EXERCISE STATUS
- PLAYERS
- MEDIA
- MISSION/TASKS
- RESOURCE REQUESTS
- DISASTER MAP

STATUS BOARD

MEDICAL SERVICES

| Hospitals   |                                 |        |
|-------------|---------------------------------|--------|
| NAME        | USED/CAPACITY                   | STATUS |
| Memorial    | <div><div></div></div> 42 / 250 | open ↺ |
| St. Josephs | <div><div></div></div> 3 / 150  | open ↺ |

PUBLIC SAFETY

| Shelters                    |                                  |          |
|-----------------------------|----------------------------------|----------|
| NAME                        | USED/CAPACITY                    | STATUS   |
| 2nd Disaster Relief Shelter | <div><div></div></div> 25 / 250  | open ↺   |
| Disaster relief shelter     | <div><div></div></div> 250 / 250 | closed ↺ |

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 11m 48s

- CLOCK CURRENT EXERCISE STATUS >
- ID PLAYERS >
- MEDIA >
- MISSION/TASKS >
- RESOURCE REQUESTS >
- DISASTER MAP >

STATUS BOARD >

ACTIVITY LOG

--All widgets--

| App          | Role             | Activity               | Time     |
|--------------|------------------|------------------------|----------|
| chat         | Public Relations | Chat ended!            | 01:21:56 |
| chat         | Public Relations | Email sent!            | 01:21:13 |
| chat         | Public Relations | Email sent!            | 01:20:57 |
| mission-task | Public Relations | Mission task accepted! | 01:20:16 |
| media        | Public Relations | Media added!           | 00:56:19 |
| chat         | Public           | Email sent!            | 00:55:40 |

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 13m 12s

INJECTS



STATUS BOARD

PLAYERS

ACTIVITY LOG

MEDIA

SPREADSHEET

MISSION/TASKS

RESOURCE REQUESTS

DISASTER MAP



NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 29m 42s

CURRENT EXERCISE STATUS >

PLAYERS >

MEDIA >

STATUS BOARD >

ACTIVITY LOG >

SPREADSHEET >

LOGS

Position Log

Significant Events

Note

Save

Clear

00:28:14

The spreadsheet doesn't seem to work? I drop the window but don't see anything new

00:09:42

OK ... just observed that the Significant Events are merged from all positions!

00:04:20

Also ... was not able to save first entry until the exercise was paused? Not sure if this is critical?

00:00:22

Wondering how the second tap should be used. Will there be two logs for the position: Position Log and Significant Events? Maybe a question for Cindy?

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 14m 12s



- CURRENT EXERCISE STATUS
- PLAYERS
- MEDIA
- MISSION/TASKS
- RESOURCE REQUESTS
- DISASTER MAP

COMMUNICATION

- EOC Rep
- Mayor
  - Police Chief
  - Police Officer
  - Fire Chief
  - Firefighter
  - Business & Logistics
  - Building Services & Public Safety

Email    Text    Face to Face    Mobile    Landline

Reply...

NAME: Demo5 CRC

ROLE: Public Relations

SCRIPT: Severe Weather Alert!

ELAPSED TIME: 24d 21h 14m 54s



🕒 CURRENT EXERCISE STATUS

👤 PLAYERS

📰 MEDIA

📋 MISSION/TASKS

📋 RESOURCE REQUESTS

📍 DISASTER MAP

GROUP CHAT

Current

List

Group Chat Name

Create New Group Chat



# Acknowledgments

- Collaborators
  - Troy Johnson, Miami-Dade Office of Emergency Management, Miami
  - Mike Prietula, Emory University, Miami
  - Irma Beccerra-Fernandez, St. Thomas University, Atlanta
  - Center for Research Computing, University of Notre Dame
- National Science Foundation
  - Award #0855164 – University of Notre Dame
  - Award #0855078 – Florida International University
  - Award #0855193 – Emory University
  - Award #1405912 – University of Notre Dame
  - Award #1550535 – University of Notre Dame
- Project web site
  - <https://www3.nd.edu/~veoc/index.html>

# Thank you

Questions?