



Thinking Teams

# Simulation for Disaster Preparedness

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APRIL 9, 2015

JEDDAH, SAUDI ARABIA

# Outline



Thinking Teams

- What does it mean for a person to be well-prepared for disaster?
  - Professional responders
  - General public
- Generally, what are simulations and what can they do?
- How can simulations benefit disaster preparation?
- Examples of simulations used for disaster preparation
- Challenges in adopting simulation
- Conclusion

# Emergency Readiness Needs of the Professional Responder



Thinking Teams

- Comprehensive and specialized emergency knowledge
- Can use special equipment and procedures
- Prepared for stress of emergencies
- Can handle complex coordination and teamwork
- Can adapt to special public situations
  - Special vulnerabilities
  - Social attitudes and context
  - Participatory governance



# Emergency Readiness Needs of the Public



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- Motivated to prepare for local risks
- Have kits and plans
- Prepared for the stress of real emergencies
- Establish community collaboration
- Know what to expect from/  
how to access professionals



# Preparedness Challenges



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## Professional Responder



- Large knowledge base and special skills to master
- Limited experience with equipment
- Limited experience in disasters
- Complex coordination and teamwork

## Citizen



- Insufficient interest
- Insufficient knowledge
- Lack of plans and kits
- Lack of practice
- Easily overwhelmed

# What is a Simulation?



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## Representation of Reality

- Objects
- Words
- Actions
- Visualizations



## With Specific Properties

- Scope/Boundary
- Completeness
- Granularity
- Medium
- Purpose

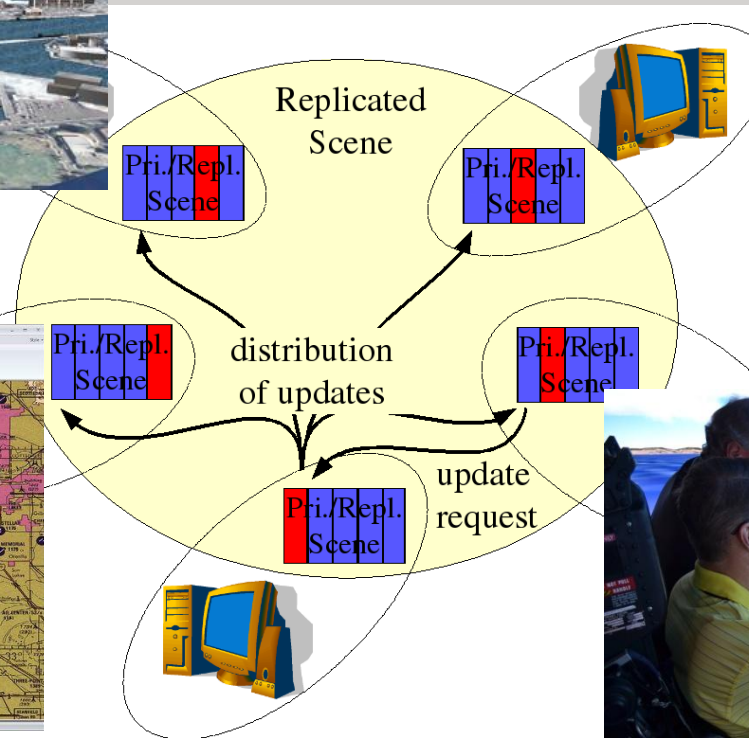
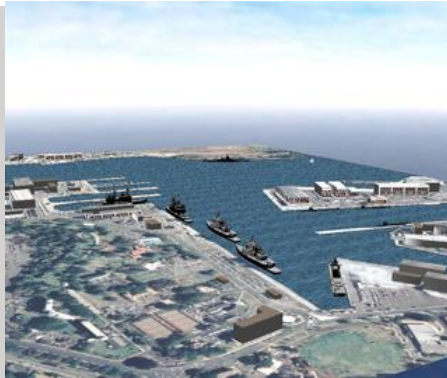




# Virtual Simulation



Thinking Teams



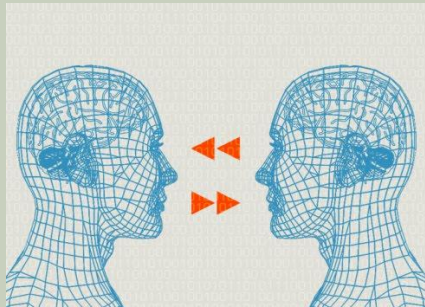
# Simulation Advantages



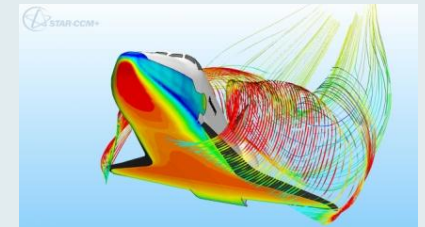
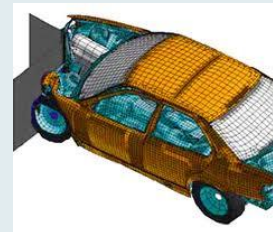
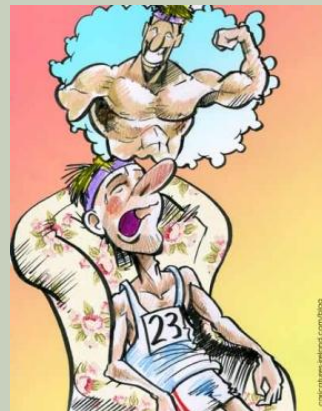
Thinking Teams



**Practice with  
reduced  
cost and danger**



**Predict and plan**



**Observe complex interactions**





# What Does Simulation Enable?



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- Automated book learning (explicit knowledge)
- Experiential learning (tacit knowledge)
- Psychological acclimation
- Team building
- Working in complex situations

# How Can Simulation Benefit Professional Responders?



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- Less expensive and disruptive than real-life drills
- A much wider range of experiences can be provided
- Training can be fine-tuned; exercises repeatable, with controlled variation
- Instant trainee assessment and feedback
- Adapt to trainee work schedule
- Coordinate across multiple locations
- Post-exercise analysis can improve training and emergency response

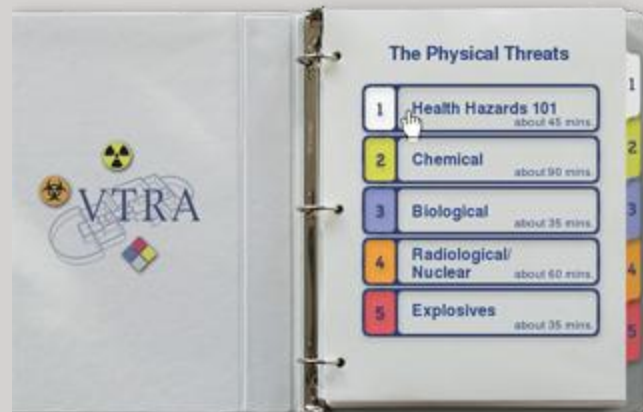
# Training with Specialized Instruments



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Dartmouth College Virtual  
Terrorism Response Academy  
(<http://www.vtra-hazmat.org/index.php>)



# Driving Simulator



Thinking Teams



DORON Precision Systems  
Fire and EMS Simulator System  
(<http://www.doronprecision.com/>)

# Virtual Life Saver



Thinking Teams



## Sandia National Laboratories **Bioterrorism Simulated Medical Emergency Response**

- Patient exhibits realistic symptoms
- If not properly treated patient will die



# Hydra Immersive Training\*



Thinking Teams



## Scenario:

Aircraft collides with Satellite building at Stansted Airport.

## Possible Causalities:

150 persons on board the plane

Unknown persons in the Satellite building.

15 baggage handlers and ground staff working in the immediate area



\* <http://www.hydra-minerva.com/index.htm>

# Handling Urban Complexity



Thinking Teams

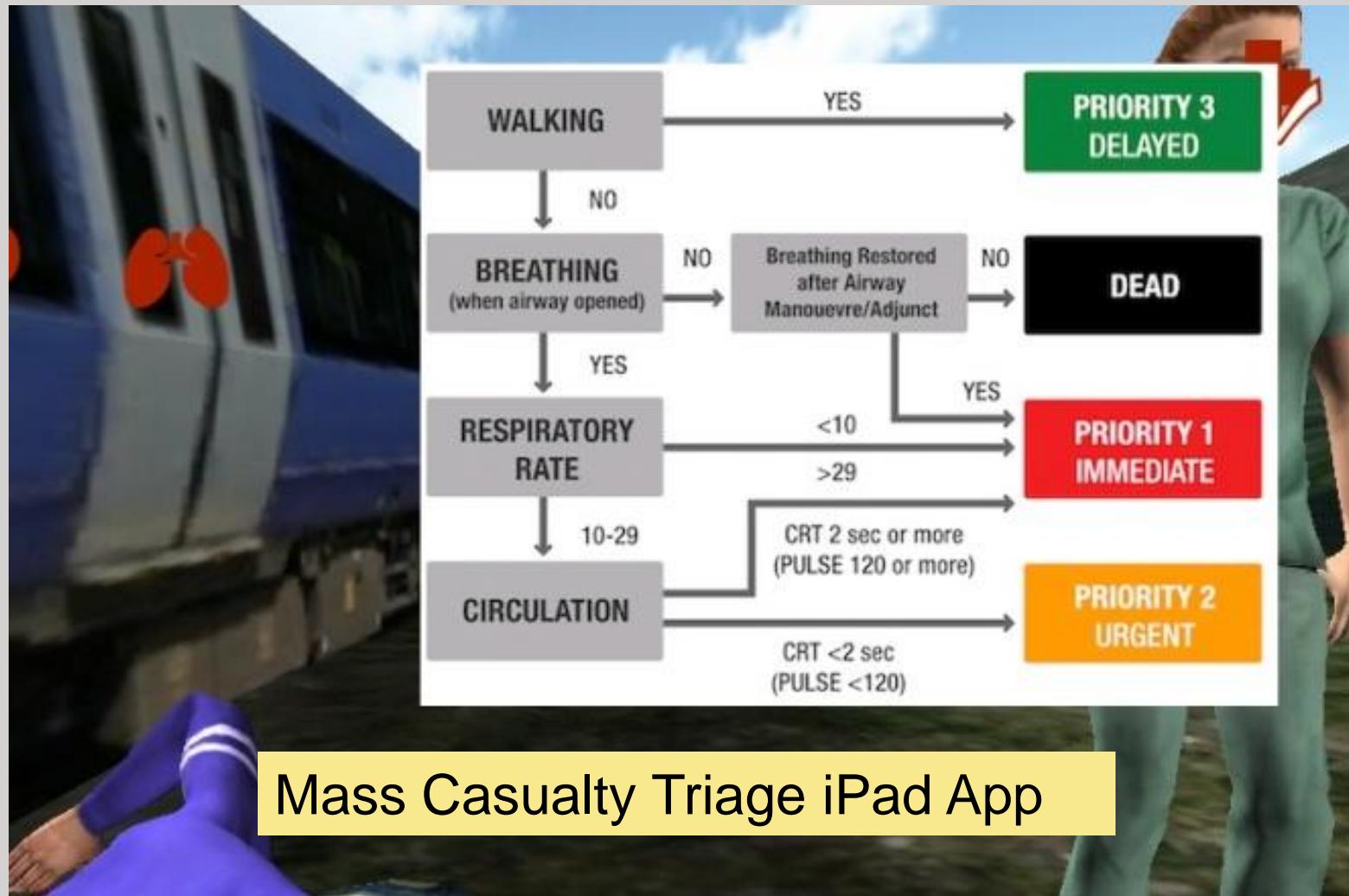
New York City Office of Emergency Management  
**Advanced Disaster Management Simulator**  
(<http://www.trainingfordisastermanagement.com/>)



# In-Place Training



Thinking Teams



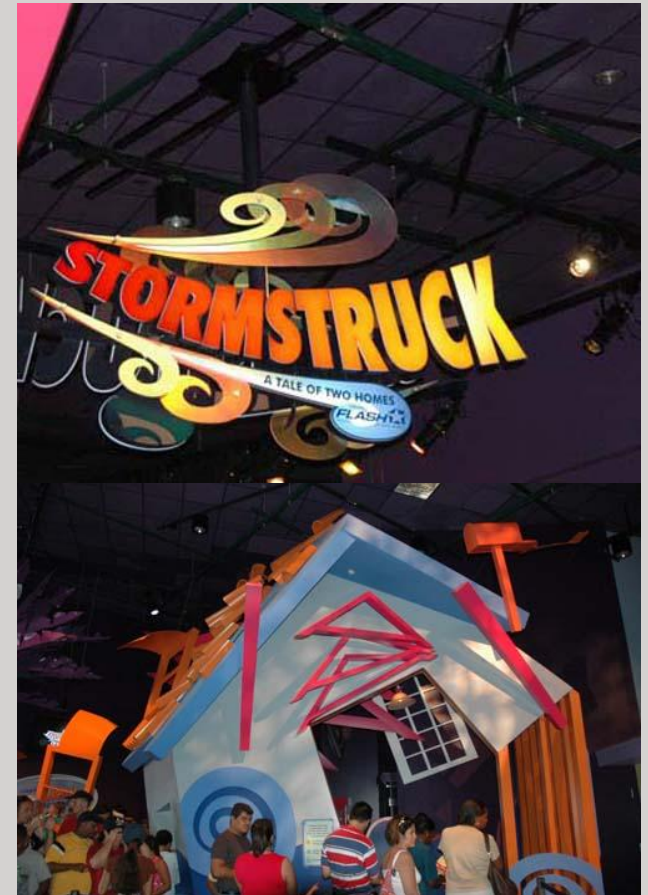


# How Can Simulation Benefit the Public?



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- Increase interest through entertainment and social interaction
- Make disaster impacts more tangible
- Efficiently increase knowledge
- Provide engaging practice
- Use game scores to motivate learning
- Memorable experience raises overall disaster awareness



# Physical Simulations



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Swiss Federal Institute of  
Technology Zurich  
**Earthquake Simulator**

<http://www.focusterra.ethz.ch/museum/simulator/>





# Immersive Audio Visual



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StormStruck is a simulation of a severe weather event that takes place in a dark theater and includes loud and unexpected noises.

! This attraction may be frightening for children.

Supervise children at all times.

Wheelchair access

Disney Epcot Center

<http://innoventions.disney.com/exhibits/stormstruck/>



# Online Games



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**UN/ISDR Stop Disasters! Game\***

MISSION INTRODUCTION

This is a village in a coastal area in Asia. The village has 213 people who live mostly on fishing products and tourism. You have to protect as many people, buildings and livelihoods as you can against a possible tsunami...

NEXT

BUDGET	\$35,000	POPULATION	400	MAP	SHOW RISK	DIFFICULTY	MEDIUM
REMAINING	\$35,000	UNHOUSED	187			DISASTER	TSUNAMI
HOUSING	\$0	HOUSED	213				
DEFENCES	\$0	SHELTERED	0				
						PROBABILITY	
						SCORE	0000000

<http://www.disasterhero.com/>

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\*UN/ISDR <http://www.stopdisastersgame.org/en/home.html>

# Challenges in Adopting Simulation



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- Simulation technology is unfamiliar to many EM organizations and leaders
  - Will it be effective, worth the effort/cost?
  - Can my organization figure out how to make it useful?
  - Will playing video games really make my people better?
- Limited data on comparative training effectiveness
- Up-front investment required, and for maintenance as well
- Will never fully replace real-life exercises

# Conclusion



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- Simulation can help both professionals and the public become better prepared for disasters
- Professionals can efficiently learn specialized skills and teamwork for a variety of disaster situations
- The public can become more interested, engaged, knowledgeable, and practiced through simulation
- Physical, audio/visual, and online game simulations are being used to increase public preparedness