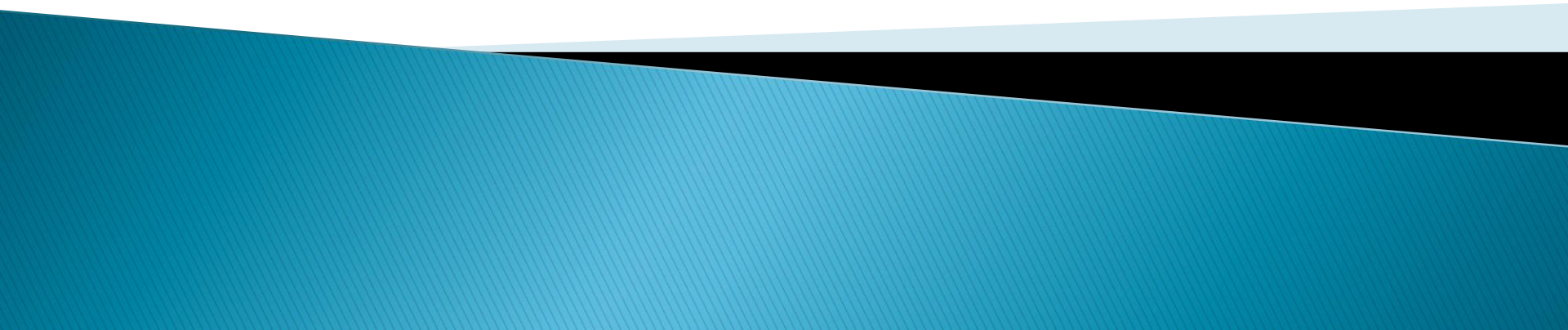


# A Serious GIS Game for Quantifying Disaster Response Spatial Thinking

Rochester Institute of Technology  
Brian Tomaszewski and Alyssa Mathews



# Introductions:

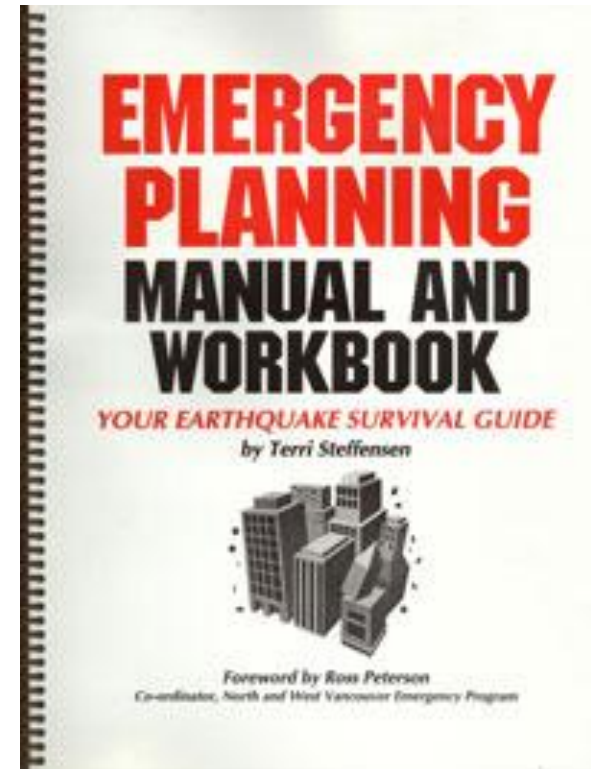
- ▶ Spatial Modeling and Visualization class at Rochester Institute of Technology
- ▶ Partnered with UN University in Bonn, Germany
- ▶ Goal was to create a serious GIS game to be used for training purposes



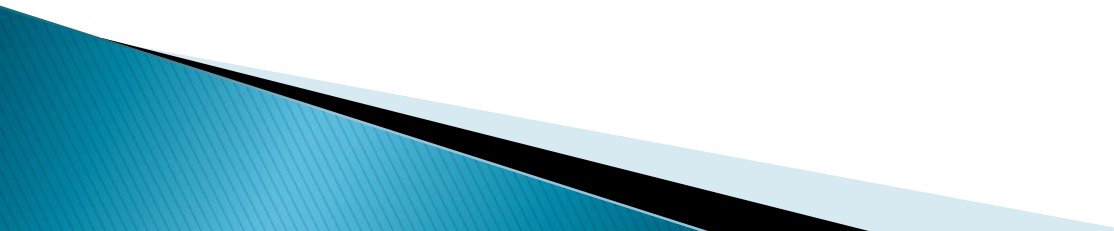
UNITED NATIONS  
UNIVERSITY

# Current Handling of Major Incidents

- ▶ Training
  - By the book
  - Hands on
- ▶ Using realistic scenarios
  - Drills
  - Tabletop exercises



# Virtual vs. Acted Scenarios

- ▶ Convenience
    - Virtual simulation does not affect day to day operations
  - ▶ Accuracy
    - Utilization of additional situations that an acted scenario cannot safely recreate
  - ▶ Flexibility
    - A virtual simulation provides a dynamic testing environment versus a static situation
  - ▶ Improved Outcome
    - A virtual simulation provides a multitude of possible outcomes, rather than a single, expected outcome
- 

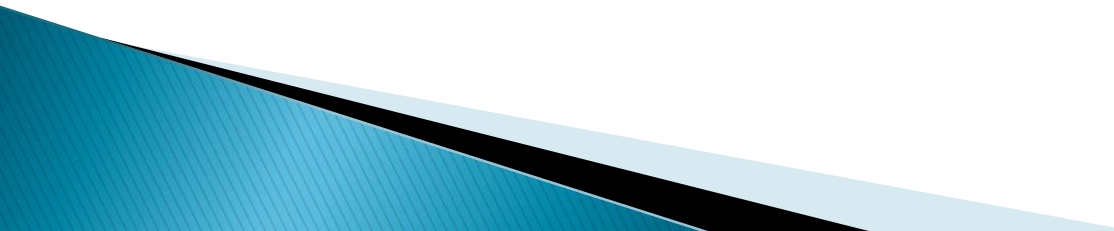
# Serious Game Environment

- ▶ Training purposes
- ▶ Spatial thinking improvement and testing
- ▶ Development of GIS thought processes
  - Application to real world scenarios





# Objectives

- ▶ Develop a “serious” GIS-based game for learning application of GIS for disaster management
  - ▶ Use of actual ArcGIS tools within visual interface
- 

# Gaming Framework Implementation

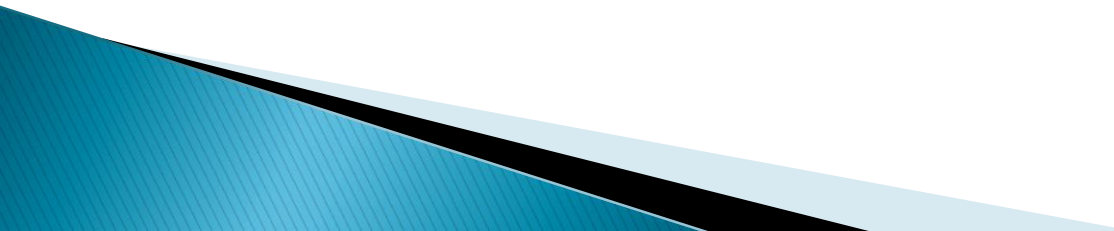
- ▶ Scenarios in JSON
- ▶ Gaming “engine” in Python
  - Model builder
  - Boolean logic for decision path



# Our Game

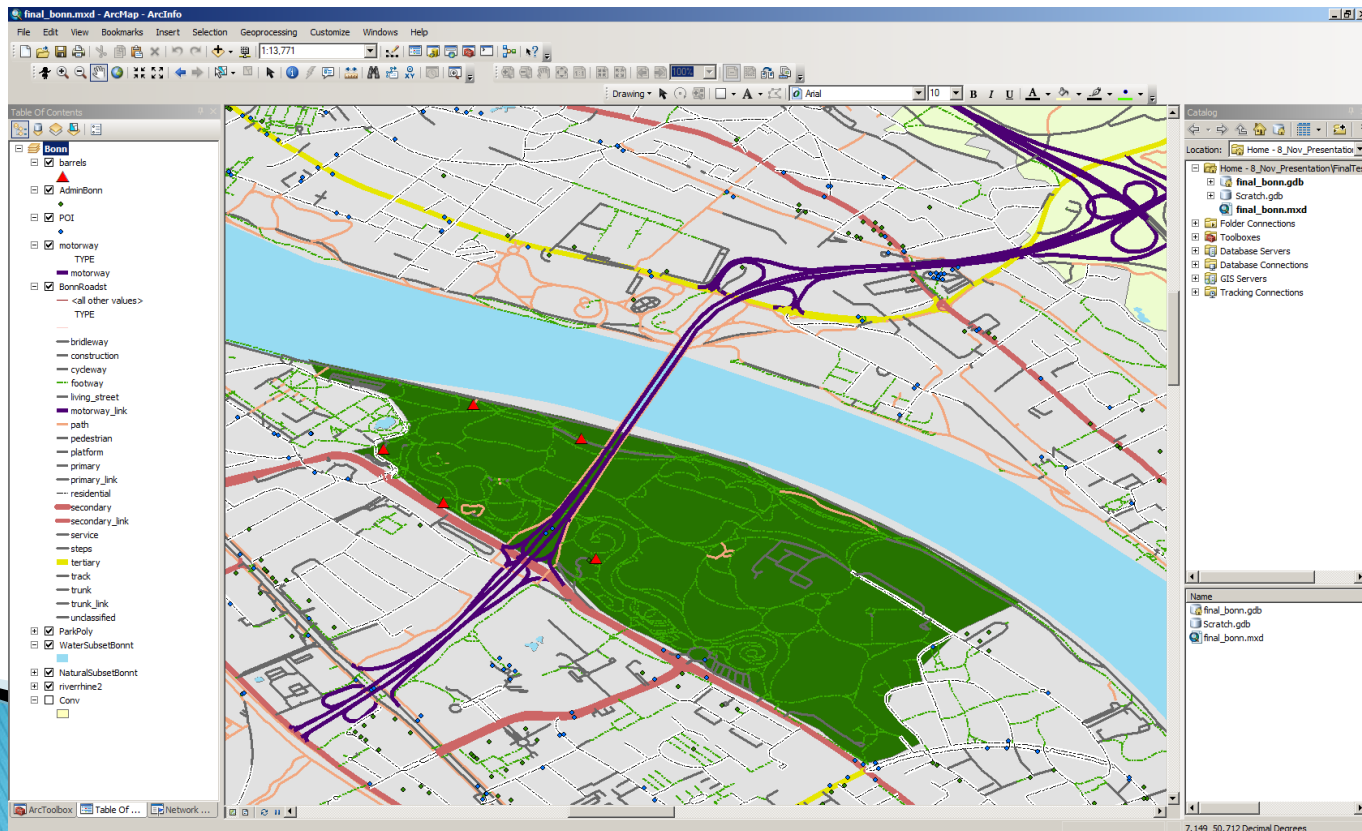
- ▶ Conceptual and Virtual Game Development
  - Real-world interface
  - Test/training data
  - Multiple questions and responses with varied score potentials
  - Score being kept as well as feedback given

# Game Scoring and Summary

- ▶ Current scenario consisting of 3 questions
  - ▶ Each question has 3 responses
  - ▶ Responses scored from 1 (most incorrect) to 3 (most correct)
  - ▶ Score and selected options summarized at end of play
- 

# Original Game Scenario

*During the strong flood that occurred during the last days affecting numerous areas of the City of Bonn a container ship carrying hazardous chemicals had an accident at the Rheinaue Park Area in Bonn. Barrels with dangerous chemicals were washed away by the waters and distributed at different locations at the Rheinaue Park. After the flood moved back, a helicopter flew over the area conducting a first assessment and measurement of the potential areas of contamination. – excerpt from UNU-EHS Block course description).*



# Game Video

The screenshot displays the ArcGIS Desktop interface. The main map area shows a geographic area with a river (Rhine River) and a network of roads. A purple line is drawn across the map, representing a path or route. The left sidebar contains a 'Table Of Contents' with a list of layers: Bonn, Toxic Barrels, Administrative Point, Points of Interest, Bonn Roads, Bonn Bridge, Parks, Water, and Rhine River. The top menu bar includes File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, and Help. The bottom status bar shows the coordinates 7.129 50.707 Decimal Degrees. A Python console window is open on the right side, displaying the prompt >>> and a list of keyboard shortcuts: F1 show help for current cursor location, F2 check the syntax of the current line (or code block if in multiple line mode), ESC cancels the current operation, Shift or Control Return will enter multiple line mode. To exit multiple line mode (execute the code block) enter Return on the last line, and a partially visible line: Access the history of commands.

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:14.014

Table Of Contents

- Bonn
  - Toxic Barrels
  - Administrative Point
  - Points of Interest
  - Bonn Roads
  - Bonn Bridge
  - Parks
  - Water
  - Rhine River

Python

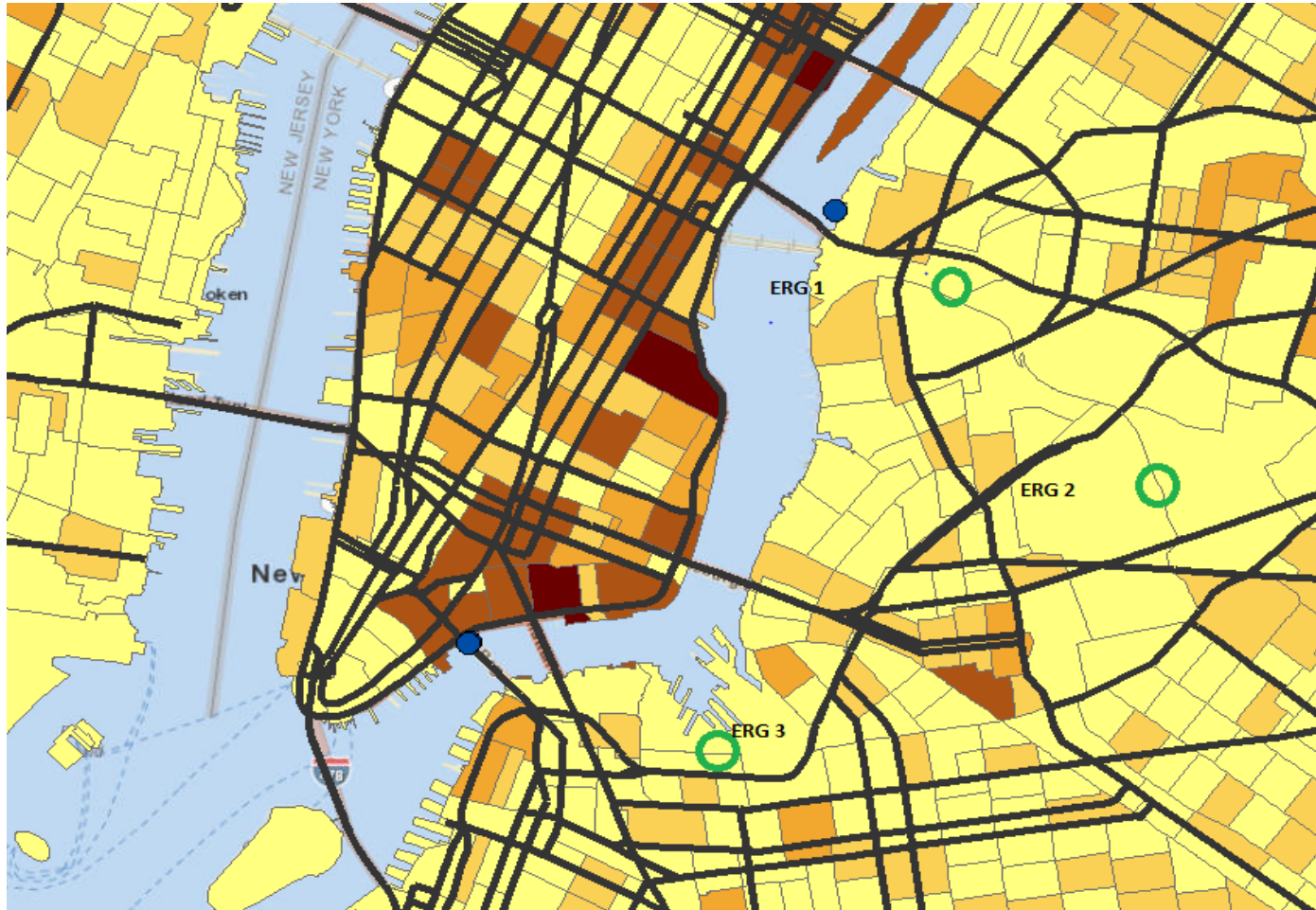
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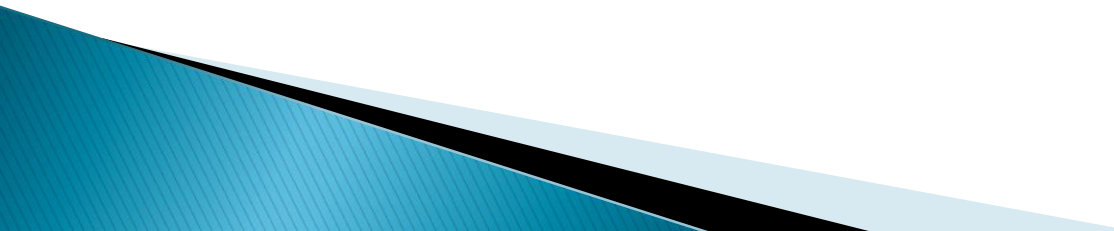
7.129 50.707 Decimal Degrees

Screencast-O-Matic.com

# In Progress Game Scenario



# Future Work

- ▶ Improved Gaming Interface
  - ▶ Ideally, web-based collaborative environment using ArcGIS server
  - ▶ Eventual library of scenarios
  - ▶ Eventual library of selected locations
    - Reference data
- 

# Want to Help?

We need study participants to evaluate the game!

If interested, please contact:

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- ▶ Alyssa Mathews
  - [aam9631@rit.edu](mailto:aam9631@rit.edu)

# Questions?

