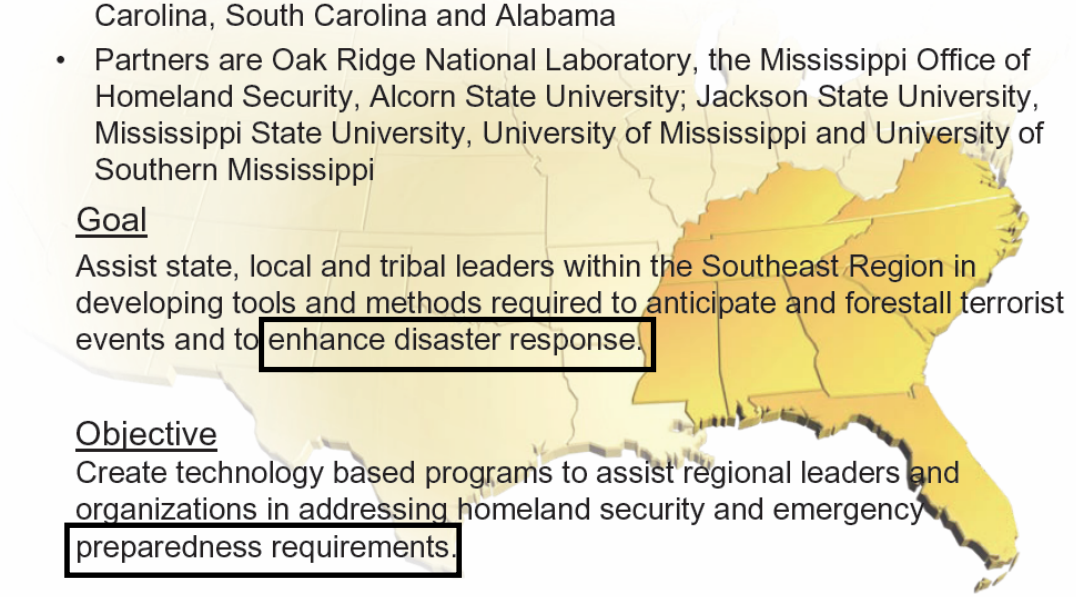
Capturing Hurricane Katrina Data for Analysis and Lessons-Learned Research

SERRI-funded Project

Southeast Regional Research Initiative

- "Regional" research, development, test and evaluation, as well as technical assistance for the states of Mississippi, Tennessee, Kentucky, North Carolina, South Carolina and Alabama
- Partners are Oak Ridge National Laboratory, the Mississippi Office of Homeland Security, Alcorn State University; Jackson State University, Mississippi State University, University of Mississippi and University of Southern Mississippi



Goal

Assist state, local and tribal leaders within the Southeast Region in developing tools and methods required to anticipate and forestall terrorist events and to enhance disaster response.

Objective

Create technology based programs to assist regional leaders and organizations in addressing homeland security and emergency preparedness requirements.

Contact: Dr. Elizabeth Matlack at matlackej@gmail.com for more information

Objective

MSU (the ORNL subcontractor) is sought to **create a national resource** for conducting **"lessons-learned" research** associated with the application of geospatial information technologies to disaster management in the aftermath of **Hurricane Katrina**. This resource will be used by MSU scientists and will also be available for other researchers nationally, to access data, geospatial analysis procedures and the social context under which the technologies were employed during the weeks following landfall of Hurricane Katrina. Knowledge gained through this project will **assist the Department of Homeland Security in understanding the intricacies of the deployment of geospatial information technologies** at local, state and federal levels during natural and terrorist-induced disasters, and in enhancing preparedness for future natural and willful disasters. The use of **geospatial information is not part of** the strategy-oriented **DHS National Incident Management System** or the underlying procedure-oriented **Incident Command System**. No geospatial standards for emergency management have been defined within the geospatial community despite the importance of location-based information to every emergency support function. **This 'national' resource** will provide a forum for the geospatial community and the emergency management community to **define best-practices** and the **role of geospatial information** in disaster preparation, response, and recovery.

Objective

Research initiatives on the applications of geospatial information technologies for disaster management can be facilitated through the development of a **national repository of data**, **procedures and products developed or generated during the search, rescue and recovery stages following Hurricane Katrina.** The virtual research center would also maintain ancillary resources (e.g., discussion forum, relevant bibliographic citations) to assist research efforts.

Key Components

- A National Resource
  - More than a data repository…a ***system*** to assess:
    - What worked, what did not work
    - What are the gaps in data, gaps in decision processes
- Aid DHS geospatial understanding
  - Geospatial technologies are not a part of:
    - Strategy…National Incident Mgt. System
    - Procedures…Incident Command system
- Define ‘Best Practices’ for geospatial technologies
  - Virtual Center
    - Data
    - Procedures
    - Products

Research Team

Collaborators

Federal

- Budhendra Bhaduri, Ph.D., GIST, ORNL
- Mark A. Tuttle, GIST, ORNL

Private

- Craig Harvey, NVision Solutions, Inc.

- David Shaw, Ph.D., Director GRI, MSU
- Scott Samson, Ph.D., GRI, MSU
- Bill Cooke, Ph.D., GRI, MSU

- David R. Parrish M.S., MSU
- Dallas Breen, RA 1, SSRC, MSU

Concepts

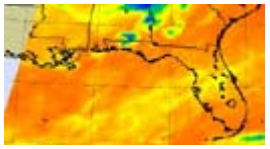
Existing Data
Spatial
Tabular

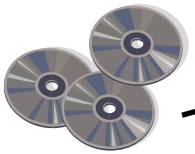
Screening
QA/QC
Resolution
Temporality
Uncertainty
Confidentiality

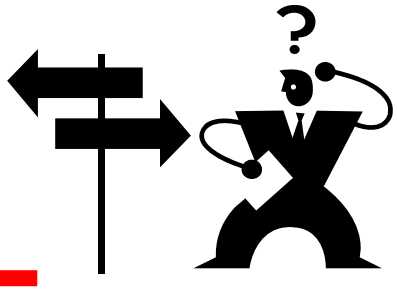
Database
An Enterprise Database is implemented in a distributed manner, exhibiting consistent semantics (rules of meaning and usage) with maximum local control and ownership.

Screening
User Feedback
Format
Usefulness

Decision
Information
Users







Enterprise

Rules-based

Virtual Database

Basic Analysis

Incident-Dependent Data Acquisition Needs

Tasks

Task 1	**Develop Computational Infrastructure**
Task 2	**Data and Procedures Compilation**
Task 3	**Analysis of Lessons-Learned**
Task 4	**Validate Best Case Solution Processes**
Task 5	**Dissemination of Research Products**

Timeline

Task 1

Develop computational infrastructure

1.1 Define requirements for data collection

- ***1.1.1 Define target subjects for focus groups, including local, state and federal decision makers, as well as some first responders (Bhaduri)***
- ***1.1.2 Conduct discussion sessions with focus groups (SSRC lead, all others support) (Breen)***
- ***1.1.3 Define requirements for data collection (Team) (Samson)***

1.2 Database design, configuration, and deployment

- ***1.2.1 Define requirements for database (Samson)***
- ***1.2.2 Develop specifications for database architecture (Samson)***
- ***1.2.3 Procure and configure software needed (Samson)***

1.3 Design hardware and IT infrastructure in response to the earlier tasks

- ***1.3.1 Define hardware requirements (Samson)***
- ***1.3.2 Define IT requirements (Samson)***
- ***1.3.3 Procure hardware and IT infrastructure (Samson)***

Task 2

Data and procedures compilation

2.1 Compile Hancock County data and procedures (Harvey)

2.2 Compile JFO (TRO, LTRO..trans. rec. off.) data and procedures (Shaw)

2.3 Analyze prioritization of needs behind data (Samson, Harvey)

2.4 Analyze breakout of data in discrete groups for further analyses (Tuttle)

2.5 Compile classified or sensitive data through DHS and ORNL (Bhaduri)

2.6 Develop survey instrument (Parrish)

2.7 Interview data and map product requestors to determine need, context, and resulting usefulness (Harvey, Samson)

2.8 Populate database with extensive and complete metadata, ensuring standards and interoperability are guaranteed (Cooke)

Task 3

Analysis of lessons-learned

3.1 Analyze impact of standards and interoperability (Bhaduri)

3.2 Analyze data quality requirements and resulting impact on decisions made (Cooke) …Probability basis vs. fuzzy logic

3.3 Conduct sensitivity analysis of the uncertainty that can be associated with particular classes of decisions (Cooke)

3.4 Analyze the impact of true and perceived liability on decision making (Tuttle)

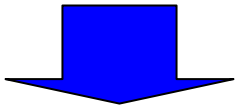
3.5 Analyze techniques that are used for the flow of data and information (Bhaduri)

3.6 Identify technologies that could have been used to provide better support (Bhaduri)

3.7 Define requirements for connectivity in disaster response, and changes in need over time (Harvey)

3.8 Analyze how GIS support could have been more effective in decision making (Samson)

3.9 Categorize each lesson learned, from minor inconvenience to major impediment (Samson)



Task 3 cont.

Analysis of lessons-learned

3.10 Collect information on how GIS/RS is used in other countries, e.g. Japan and China, for disaster response (Bhaduri)

3.11 Explore how geospatial context can provide useful information for response development, e.g. employee location for work reporting. We need to show how geospatial data can be used in daily operations (they won't start using an unknown in an emergency). Show how gaps can be filled with geospatial data. Heavy on the training context. (Samson)

3.12 Analyze improvements made because of implementation of each recommendation to determine relative impact of each one. What will give the best bang for the buck. (Samson, Cooke, Bhaduri)

3.13 Prepare final report for lessons learned exercise (Shaw)

Task 4

Validate best case solution processes

4.1 Develop prototype demonstration system with dynamic interlinking of datasets and contextual visualization of data products. Limitation of data available based on security and access requirements to be a strong factor considered. (Harvey)

4.2 Define target audiences for validation exercises (Bhaduri, Shaw)

4.3 Define contextual reporting requirements for each focus group (Parrish)

4.4 Critique methods and define acceptability requirements for focus group discussions (Parrish)

4.5 Focus groups evaluate initial products to determine acceptance and usability (Parrish)

4.6 Present results to key decision maker leadership at federal and state level (Shaw)

4.7 Collect feedback from these decision makers, ultimately for definition of national dynamic interoperable database architecture and implementation of lessons learned (Shaw)

Task 5

Dissemination of research products

5.1 Present results at selected national forums for academia, practitioners, and policy-makers (Team)

5.2 Collect feedback from all three sectors for further validation (Team)

5.3 Prepare final report for project (Shaw)

Timeline

Critical Initial Timelines:

Summary of Project written – January 1

Develop List for Focus Groups – mid-January

Design Software and Hardware – mid-February

Focus Group Meetings – mid-March