Saving the World One Grid Square at a Time

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Part I

INTRODUCTION



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W E S

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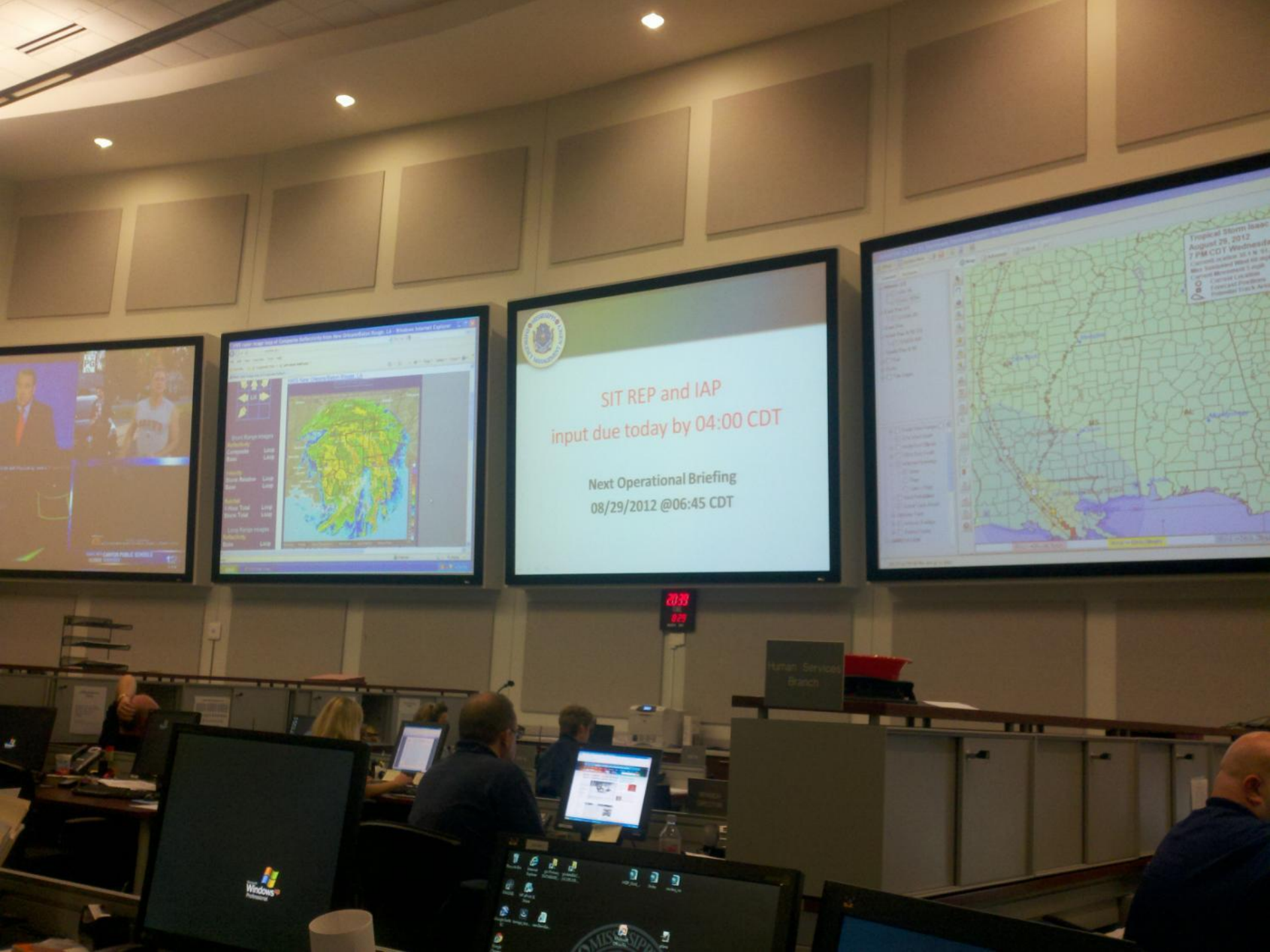








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SIT REP and IAP
input due today by 04:00 CDT
Next Operational Briefing
08/29/2012 @06:45 CDT



Overview

- The importance of standards and the lost art of cartography
- Understand your audience and their challenges
- Interdependencies of infrastructure: collaboration and professional networks
- New paradigms



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Background: Standards Are Important



In those days, the thread on fire hydrants and fire hoses was not standardized; each county and city had its own kind of thread. When the first out-of-town firefighters rushed from Washington to help, they could do little because hoses from their apparatus could not hook to Baltimore's hydrant system or local fire trucks…



Maryland Digital Cultural Heritage Project at http://www.mdch.org/fire/#



Fire departments learned that they needed to standardize when Baltimore burned in 1904.

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331 Years of Experience in the US



- Emergency services are standards based organizations
  - Standard of care
  - Interoperability/interchangeability
  - Organizational consistency (NIMS/ICS)
  - Scalability
  - Continuity of operations
- When the incident occurs IS NOT the time for innovation

George Washington was a volunteer firefighter with Friendship Veterans Fire Co.

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Cartographic Standards

- Colors
- Symbols
- Scale
- Coordinate system
- Projection
- Page size



Map of Australia, pet rock, or "other"?
http://www.abc.net.au/rural/content/2009/s2742168.htm

Office of Management and Budget Circular A-16 (rev. 2002) mandates the coordination of geospatial information and technologies among Federal agencies through the Federal Geographic Data Committee (FGDC).

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And More Standards…

- Data storage standards
- Data exchange standards
- Data accuracy standards
- Metadata standards
- Minimum data quality/completeness standards…



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Standards Bodies

- ISO Geospatial Standards
  - http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=54904
- Open Geospatial Consortium
  - http://www.opengeospatial.org
- ANSI and ISO for paper sizes
- Other **user-related** standards











A number of people here are not seeing this presentation as intended.

Are they seeing your maps?

Will you bet your life on it?

Approximately 10% of the male population is red/green color blind.

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Key Points for Standard Selection

- Understand your audience and their needs
  - How will they use your products/services
- Consensus driven process
- Standards selection requires education and training



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U-HAUL

“Can you do that GSI stuff?”

- On 27 August 2005 I was tasked by the Bolivar County, MS Office of Emergency Management to find 2-4 people with solid computer skills to respond to the Mississippi Emergency Management Agency’s Emergency Operations Center in Jackson to help prepare written documents in support of the Hurricane Katrina operation.
- We were soon tasked by MEMA to help provide map support using “that GSI stuff” for emergency responders and decision makers.
- One of the very first products we were tasked with making was a map for search and rescue. The specifications were that it should contain streets with a 1-mile x 1-mile grid squares that could be uniquely addressed. The extent of the map should cover the three coastal counties (Jackson, Harrison, and Hancock).

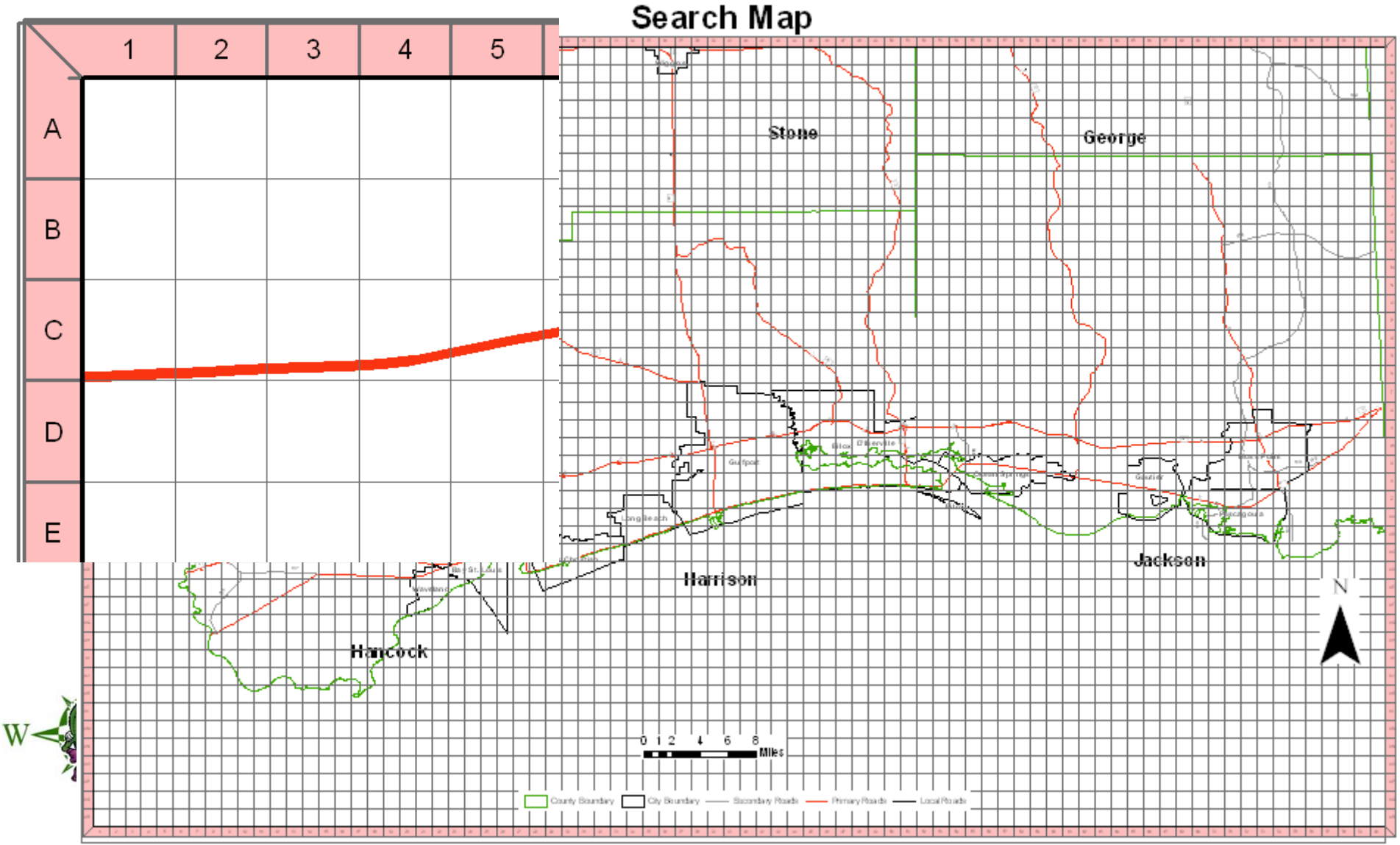


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So we made 250 of these and had them laminated and sent to the field…



Two days later…

- Katrina had made landfall and the devastation exceeded most expectations
- The search area was expanded to include Stone, Lincoln, George, and Pearl River counties.
- I realized very quickly that I had screwed up. How was I to expand the map to encompass the new search area without altering the grid ID's being used already?

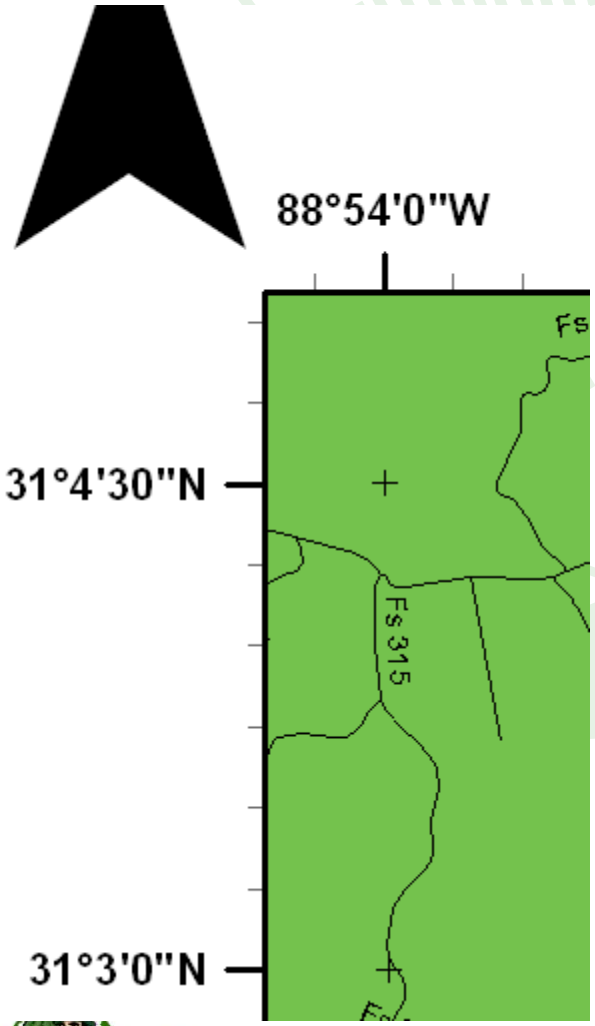


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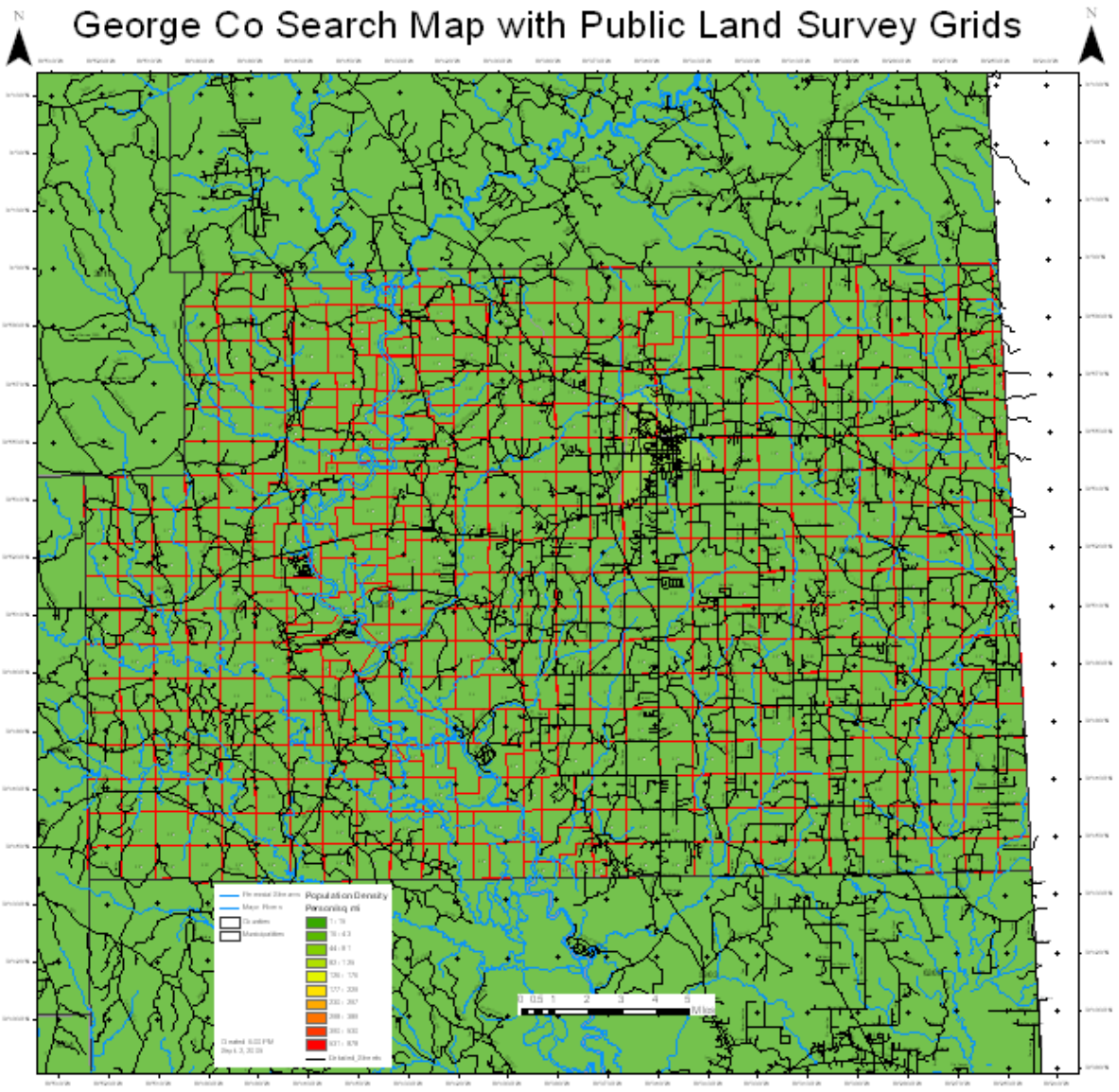
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We'll use PLSS – what genius! (NOT!)







There is a better way…

- It's called the US National Grid and it would have greatly facilitated the solution to a lot of other problems:
  - Reporting of locations for evac, SAR activities, recoveries, etc…
  - It was already being used by 70,000 emergency responders – we call them the MILITARY (USNG is equivalent for most purposes to the Military Grid Reference System)
  - Comes complete with ready made grid boxes
  - Solves many other problems for emergency managers by allowing them to manage an event using maps to provide a **common, spatially-based, operational framework.**



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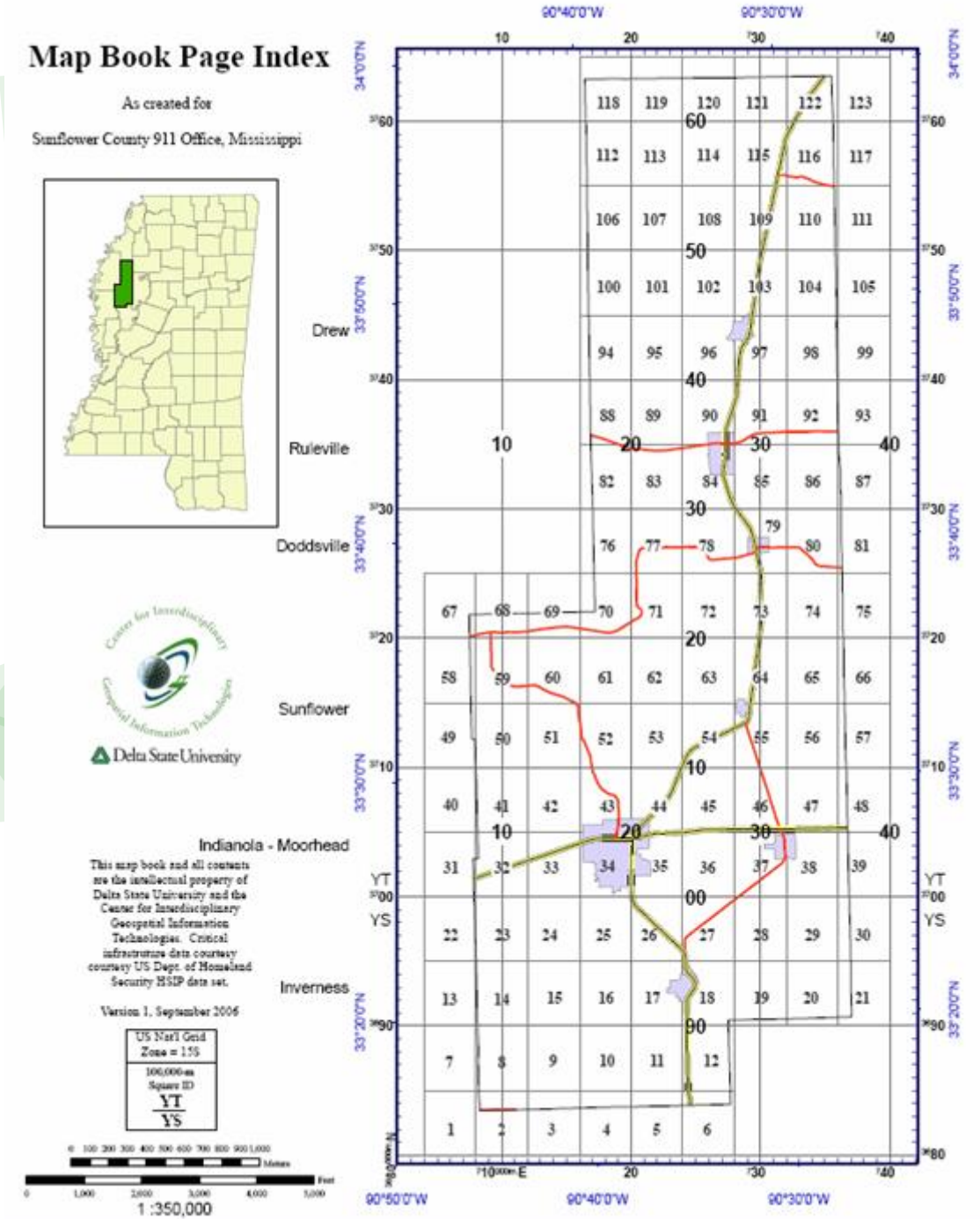
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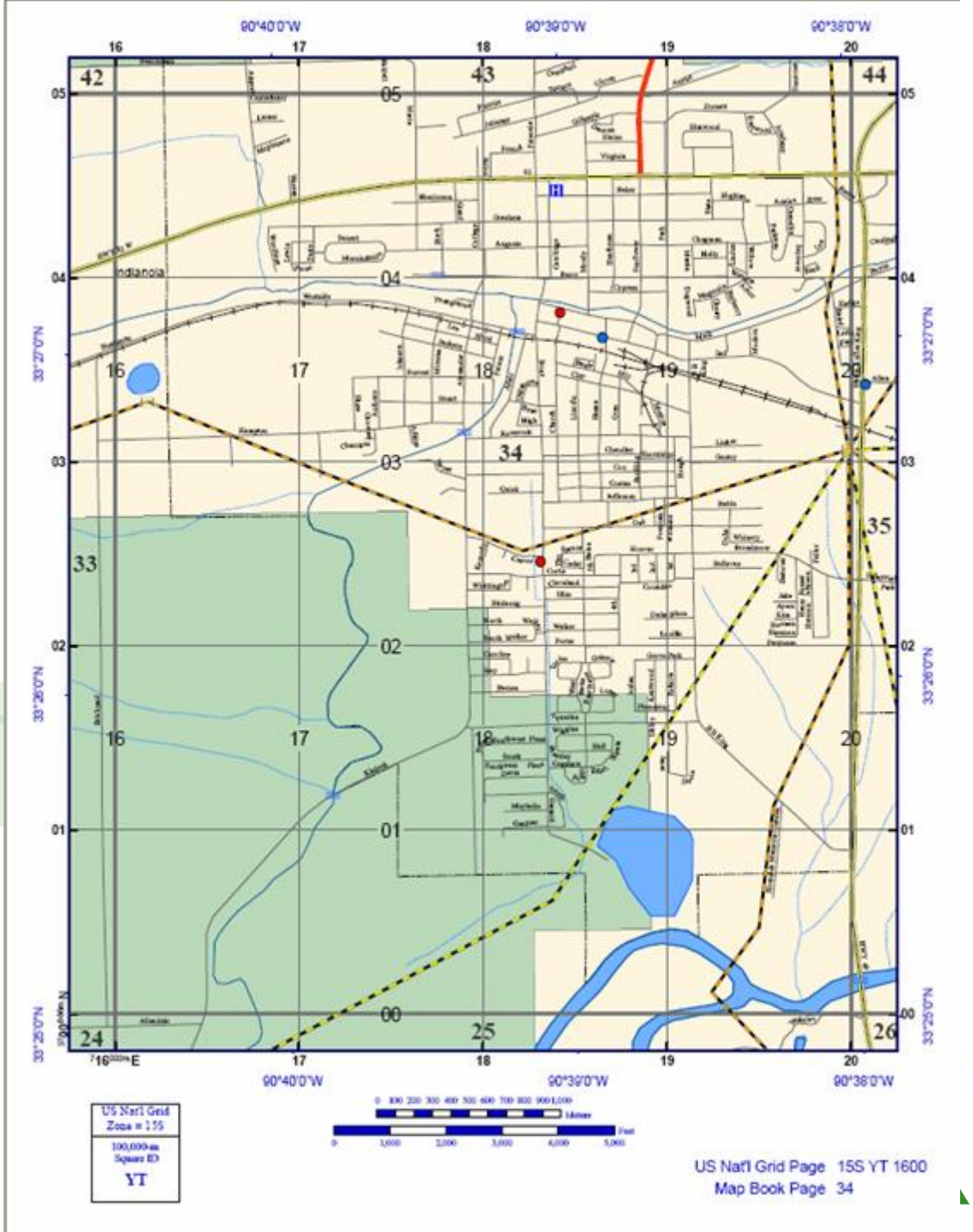
Recommended solution using US National Grid to create 1km x 1km grid squares (contact DSU for procedure as it is involved and not straight forward – especially when working at zone junctions, but still preferable to any other lat/long or other grid system.

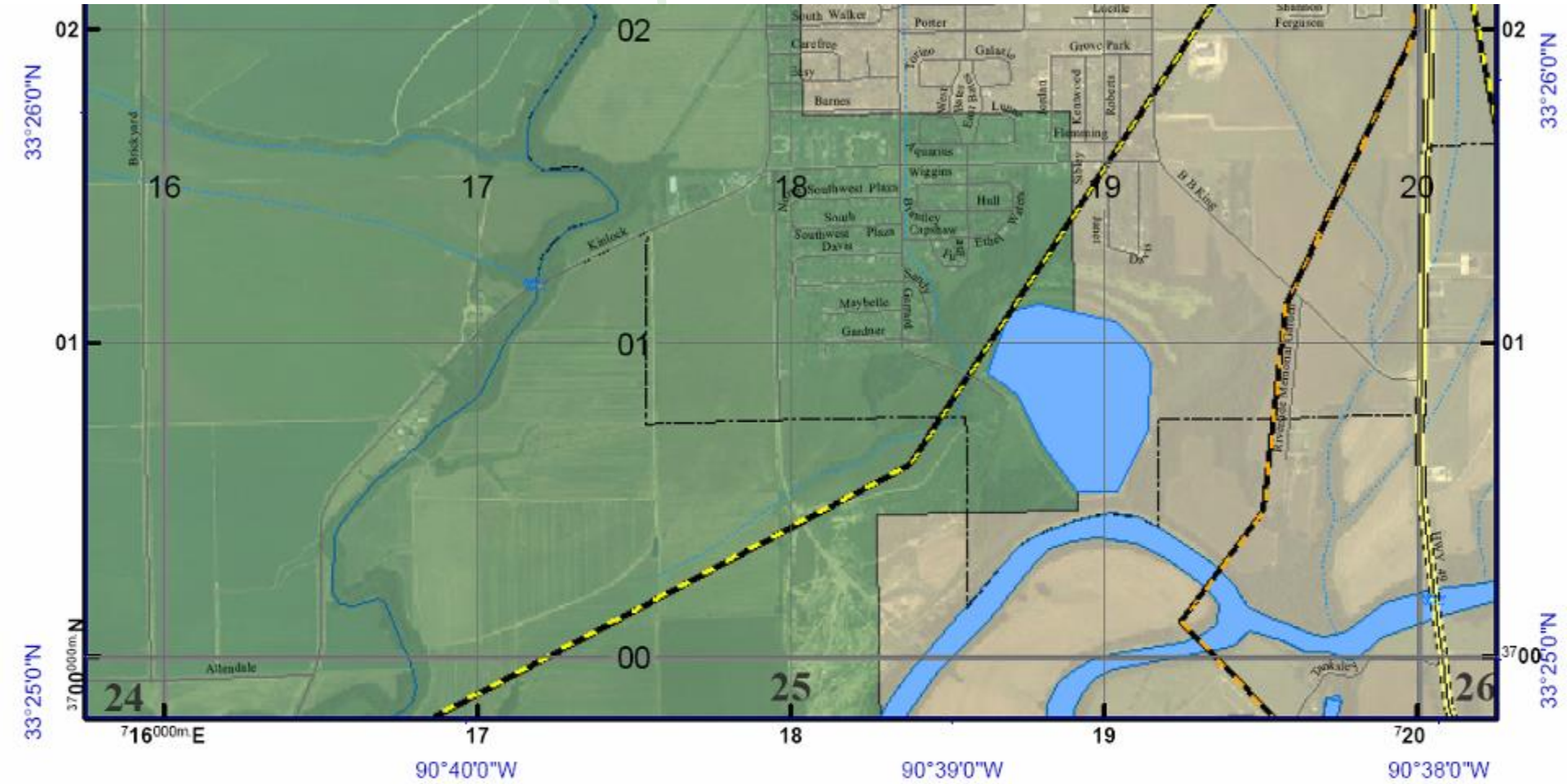
The 1km x 1km grids may be used as the basis for 4km x 5km map pages (ideal for 8.5” x 11” printing). Because each page is based on USNG, each page may be assigned both a local page number and a universally unique and standardized USNG page number.





Sample USNG-based map Book page created using 4km x 5km assemblies of 1km x 1km USNG grids with layers for critical infra-structure. Background polygon layer is Electric utility Service Areas. Note that both a local page number and USNG page number are provided.





US Nat'l Grid
Zone = 15S

100,000-m
Square ID

YT

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 1,000 2,000 3,000 4,000 5,000 Feet

US Nat'l Grid Page 15S YT 1600

Map Book Page 34

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Federal Emergency Management Agency

Washington, D.C. 20472

APR 26 2001

Julie Binder Maitra
Standards Coordinator
US Geological Survey
590 National Center
Reston, Virginia 20192

Subject: FEMA's Recommendation on the Proposed US National Grid Standard

Dear Ms. Binder Maitra:

The Federal Emergency Management Agency (FEMA) supports the adoption of the US National Grid (USNG) as a standard for horizontal reference mapping in the United States. The FEMA program offices anticipate that use of this system for identifying locations among emergency management personnel and agencies will help save lives, reduce the costs of disaster, and enhance preparedness, response, recovery, and mitigation efforts. Particularly valuable is its compatibility with the system used by the National Guard and others, the Military Grid Reference System (MGRS). The USNG standard also appears reasonably compatible with current capabilities of the Global Positioning System (GPS), and has the potential to be quite effective as a locational tool if future GPS devices adopt the standard. FEMA recommends that the FGDC adopt the USNG system as the horizontal reference system for all general-purpose mapping.

Sincerely,

Michael K. Buckley, P.E., Director
Technical Services Division
Mitigation Directorate



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Appendix I: National SAR Committee (NSARC) Georeferencing Policy - Catastrophic Incident Search and Rescue.

Georeference System User	USNG	Latitude/Longitude (DD-MM.mmm) (Note 1)	GARS-compatible
Land SAR Responder (Note 2)	Primary	Secondary	N/A
Aeronautical SAR Responders (Note 3)	Secondary	Primary	Tertiary
Airspace Deconfliction (Note 4)	N/A	Primary	N/A
Land SAR Responder/ Aeronautical SAR Responder Interface (Note 5)	Primary	Secondary	N/A
Incident Command: Air SAR Coordination Land SAR Coordination	 Secondary Primary	 Primary Secondary	 N/A N/A
Geospatial information aggregation/dissemination (Note 6)	Tertiary	Secondary	Primary

What This Really Means

- Understanding audiences
  - Policy makers
  - Geospatial professionals and practitioners
  - Emergency response and management community
- Knowing how to make the standard work
  - How to implement within software
  - How to teach the end users (NOT GIS PEOPLE)
  - Ability to influence policy in a meaningful way
- Relevancy (Why should this be used?)



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Part II

INTERDEPENDENCIES OF INFRASTRUCTURE



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Baltimore's Howard Street Tunnel Train Derailment, July 19, 2001





Baltimore's Howard Street Tunnel Train Derailment, July 19, 2001

- 62 car freight train carrying hazardous chemicals derailed in Baltimore's Howard Street Tunnel
- Caused a cascading degradation of infrastructure components not previously anticipated
  - Tunnel fire caused a water main to break above the tunnel
  - The water caused flooding in the area and knocked out power to large area of downtown Baltimore
  - Fiber optic cables running through the tunnel were destroyed, resulting in major disruptions of communications (voice and data)
  - Rail service was also disrupted for weeks effecting manufacturing along the Middle Atlantic states



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Collaboration: A GECCo Is Born

- In 2002 GITA initiated the GECCo Program to respond to Presidential Directive 7, *"…reduce and/or eliminate the vulnerability of the infrastructures of society's complex technology systems that increase the difficulty for attacks on US systems…"*



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GECCo Overview

- Contributing to the GECCo approach:
  - Japan's ROADIC Program
  - 911 attacks
- 85% of critical infrastructure privately owned and operated
- User driven, bottom-up versus top down
- Intended to support ongoing F-S-L emergency management and infrastructure protection
- Ongoing coordination with the Department of Homeland Security and the Federal Geographic Data Committee



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Underground Infrastructure at Wall St. and Williams St., NYC, 1917



Source: Consolidated Edison Company of New York, Inc.

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GECCo Objectives

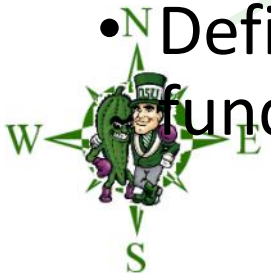
- To provide a framework by which public and private organizations can better collaborate and share information to **protect critical infrastructure and relate interdependencies** and **respond to emergencies**
- To assist infrastructure owners with:
  - Identifying and accessing the interdependencies of critical infrastructure
  - Building an actionable plan for mitigating and protecting those critical infrastructures
  - Establishing procedures and standards



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GECCo Process

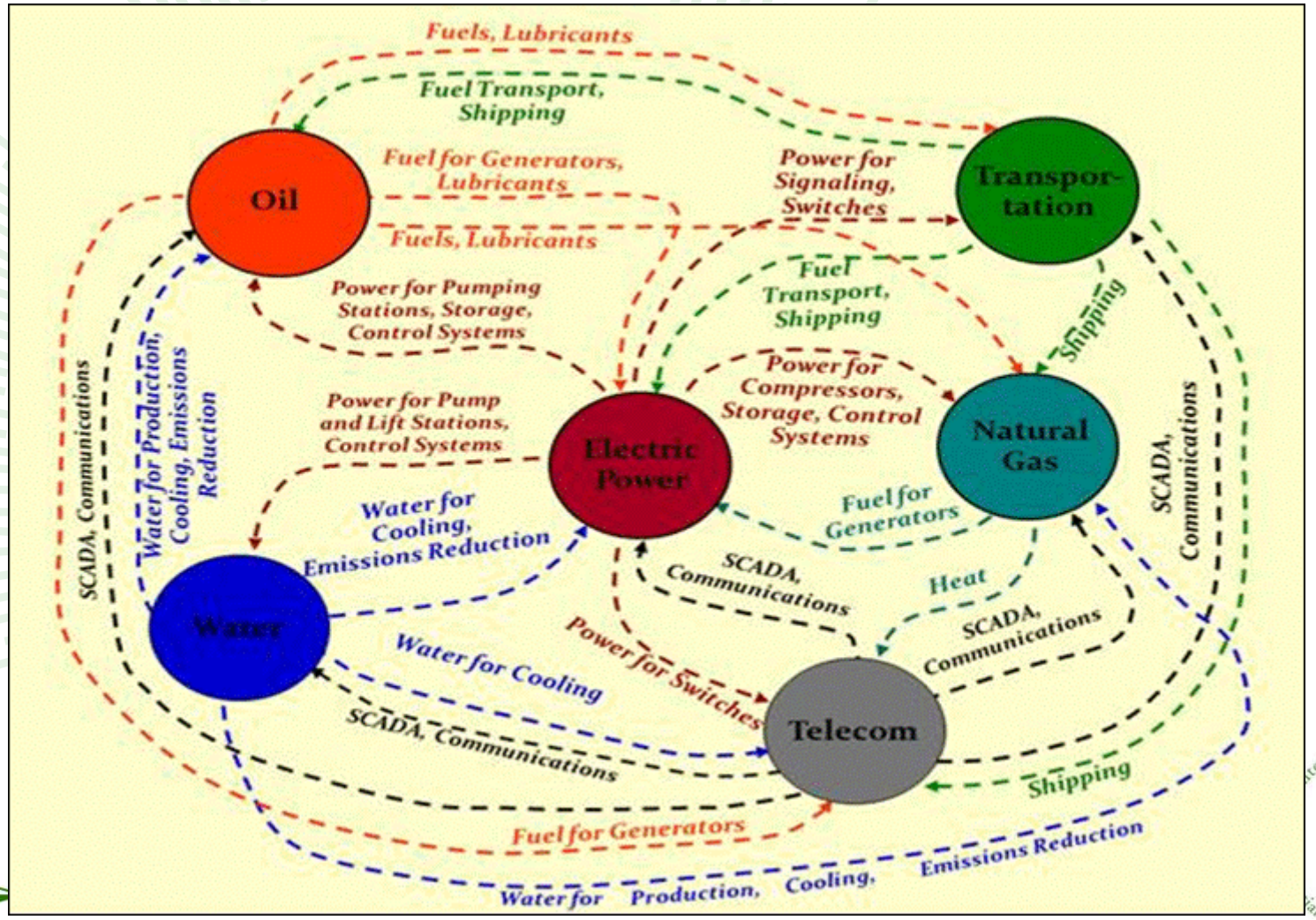
- Find communities and organizations willing to take on leadership role to bring stakeholders together to support critical infrastructure protection and emergency response
- Hold interactive regional workshops to raise awareness and facilitate networking
- Design and conduct a tabletop exercise to identify coordination and data sharing issues and opportunities
- Identify gaps and recommend solutions
- Develop a prioritized action plan of activities
- Define project requirements, assist with securing funding and technical assistance for implementation



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Infrastructure Interdependencies



Heller, M (2001). Interdependencies of Civil Infrastructure Systems. The Bridge, a publication of the Nation Academy of Engineering. V., #31, 2001

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Part III

NEW IDEAS



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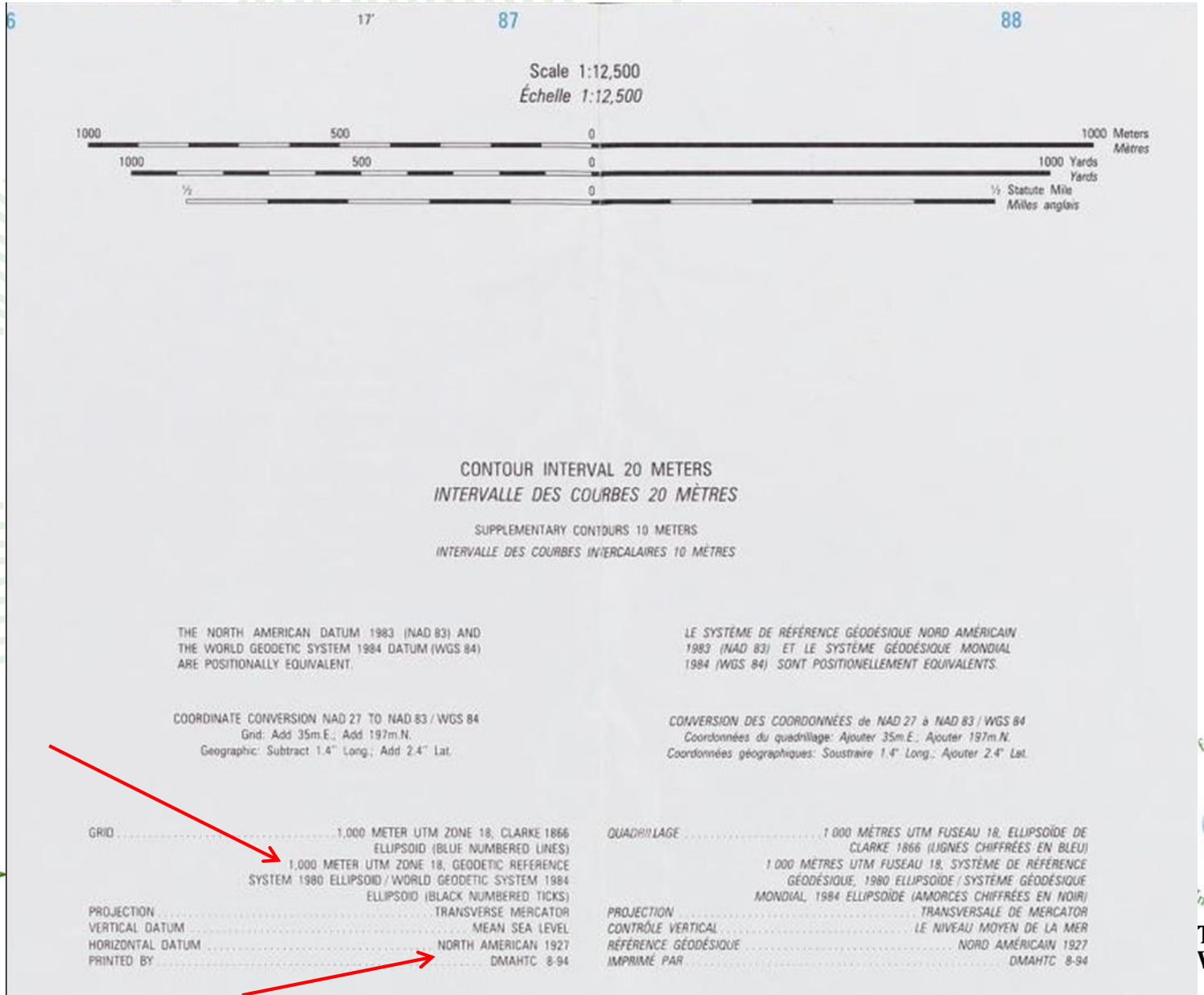
New Paradigms: Haiti Earthquake

- At 15:53 CST on 12 January 2010 a 7.0 magnitude earthquake rocked the island nation of Haiti near the town of Léogâne while I was enroute from conducting a search and rescue mapping workshop with Maryland State Police
- Joe Toland, a senior GIS Analyst for FEMA, contacted me as I landed in Memphis and requested mapping support which included the provision of USNG/MGRS data and map products
- US-based assets were en-route and would arrive in less than 18 hours. Our challenge: Create large-scale standardized map products for an area the size of Connecticut in a third world country for which little geospatial data existed.



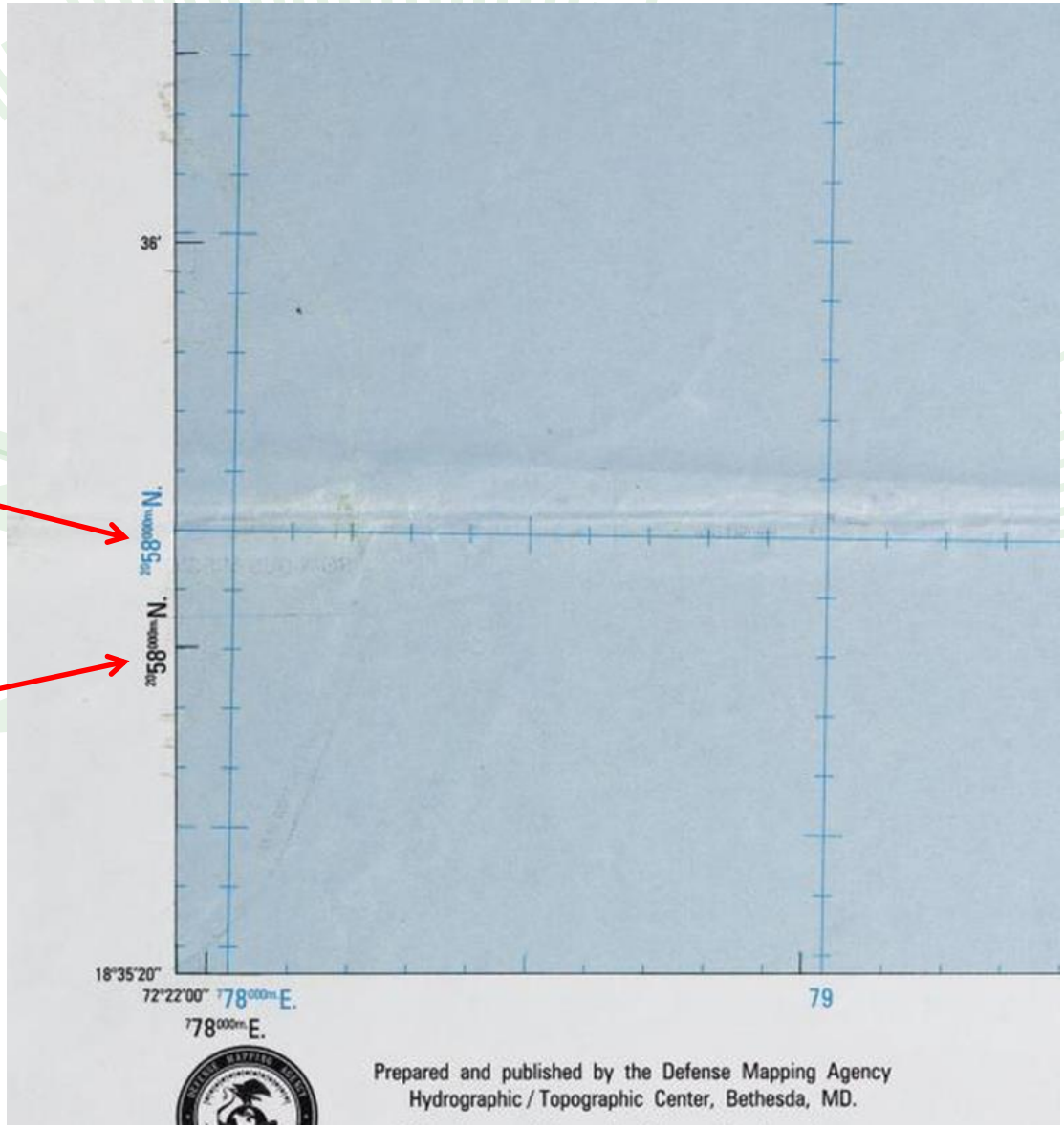



PORT-AU-PRINCE





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The Data Scramble

- The earthquake did not completely disrupt cell phone services, though local emergency numbers did fail. As a result, survivors trapped in debris called and/or sent text messages to relatives in cities such as New York, posted to Facebook or Twitter, which were in turn, forwarded to assistance agencies.
- CrisisMappers.Net stood up a listening service that permitted the geo-coding of such messages – it was called USHAHIDI



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- While the USHAHADI team worked, GeoEye had satellites in the “right place” at the “right time” to capture post-event imagery. This imagery was processed near-real time and handed to Google.
- Google published the imagery for download and as a kml that could be loaded as a map service
- Open Street Map (http://www.osm.org) pushed the imagery to its constituents who vectorized features
- The result: the known street map of Haiti went from 9,000 named street segments to 72,000 in a period of about 3 days.



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OpenStreetMap

The Free Wiki World Map

Search Where am I?

port-au-prince Go

examples: 'Alkmaar', 'Regent Street, Cambridge', 'CB2 5AQ', or 'post offices near Lünen' more examples...

OpenStreetMap is a free editable map of the whole world. It is made by people like you.

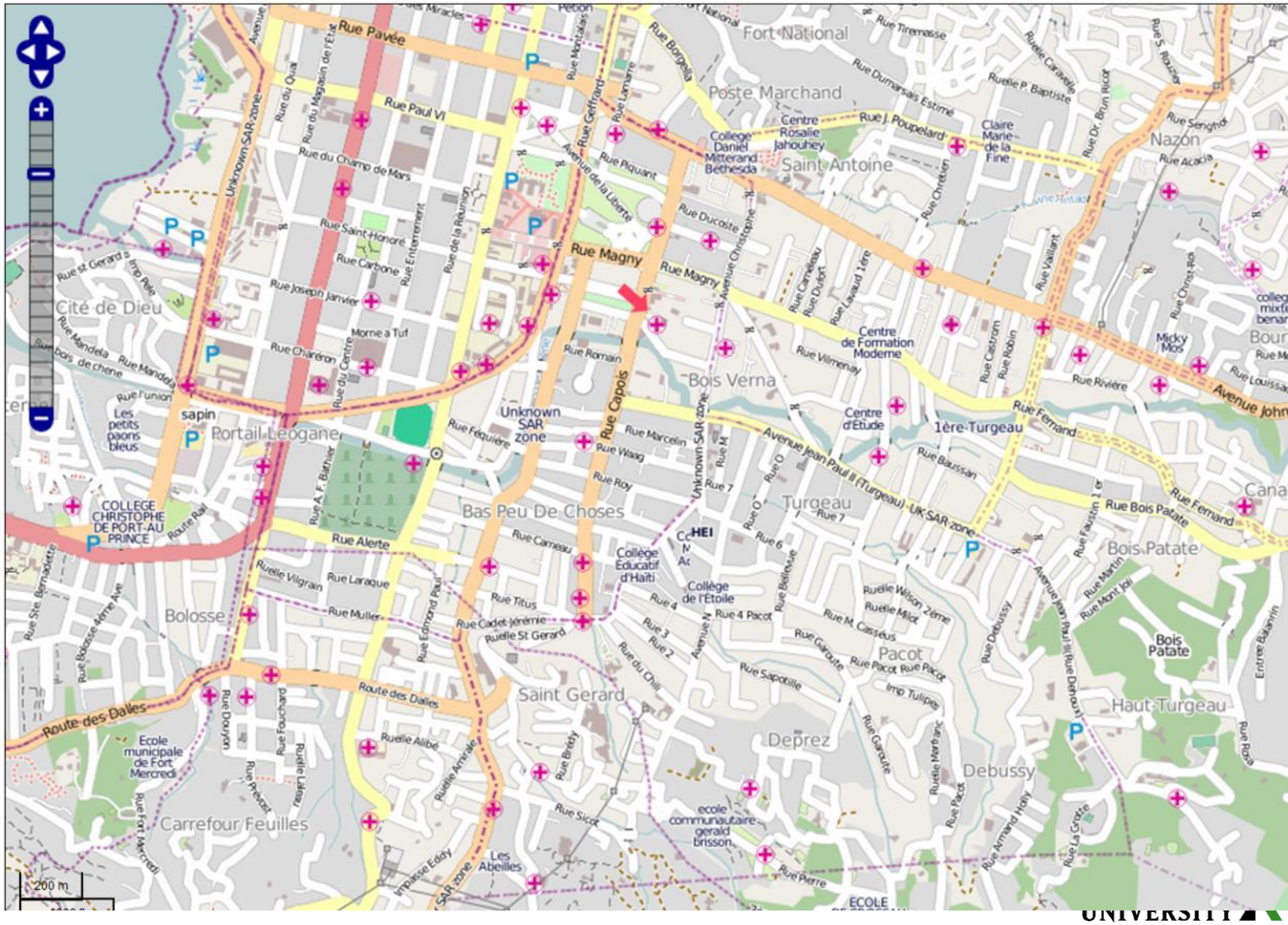
OpenStreetMap allows you to view, edit and use geographical data in a collaborative way from anywhere on Earth.

OpenStreetMap's hosting is kindly supported by the UCL VR Centre, Imperial College London and Bytemark Hosting. Other supporters of the project are listed in the wiki.

Help Centre
Documentation
Copyright & License
Community Blogs
Foundation
Map Key

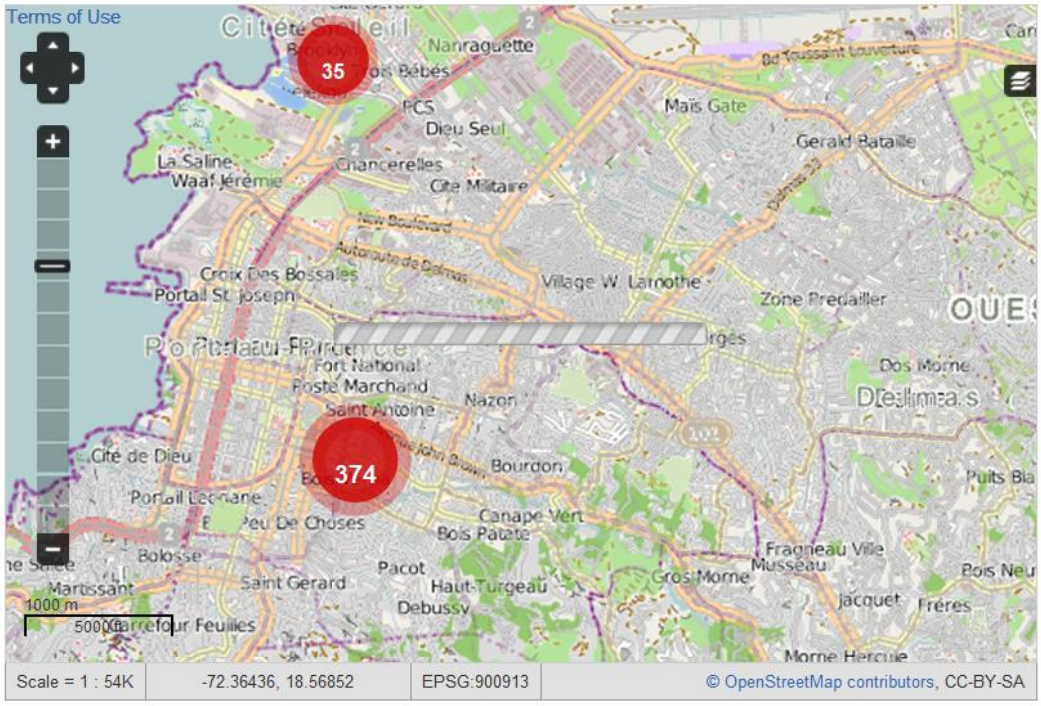
Make a Donation

View | Edit ▾ | History | Export | GPS Traces | User Diaries



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FILTERS → REPORTS NEWS PICTURES VIDEO TODO VIEWS → CLUSTERS



TIMELINE OF EVENTS

From: Jan 12 2010 To: Oct 15 2010 PLAY

Jan 12 2010	Jun 21 2010	Nov 28 2010	May 7 2010	Oct 14 2010

300
200
100
0

CATEGORY FILTER

- ALL CATEGORIES
- 1. URGENCES | EMERGENCY
- 2. URGENCES LOGISTIQUES | VITAL LINES
- 3. PUBLIC HEALTH
- 4. MENACES | SECURITY THREATS
- 5. INFRASTRUCTURE DAMAGE
- 6. NATURAL HAZARDS
- 7. SECOURS | SERVICES AVAILABLE
- 8. AUTRE | OTHER

How to Report

SMS/Text Local: 4636.
SMS/Text International: +44 762.480.2524.

Email: haiti@ushahidi.com

Web Form: Submit Report

Delta State GIS

- DSU GIS consumed data from these sources to produce printable map products that could accompany responders into the disaster zone.
- Maps are still available at http://mississippi.deltastate.edu/data/haiti - these products were created by a team of faculty and students starting with 1:25,000 scale maps (first 24 hours) and then 1:6,000 scale maps over the next 12 days.
- Map products were shared with Harvard (http://news.harvard.edu/gazette/story/2010/03/portals-into-haiti-chile/), FEMA, and USGS for distribution



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Summary

- User needs dictate the geospatial products and services needed
  - These needs create the requirements for standards choice
  - Standards are adopted using a consensus (group) process
  - Education and training are the best means of promoting standards use



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Summary

- Critical infrastructure is connected – no one system or feature exists in isolation
  - Policies for data sharing are mandatory and must be established BEFORE an event occurs
  - Data sharing is a standards-based process
- Identifying data owners/stakeholders is an immediate requirement
  - Who, what, where, when, and how…



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Summary

- Technology is pervasive
  - Every citizen is a potential sensor and collaborator
  - Understand how to harness the power of the "crowd" and related limitations
- Identify appropriate uses for data based upon quality, currency, and relevance
- If data is not shared, someone will make their own and ignore you



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Maps for use during a crisis or an emergency are not for you. They are for those dealing with this…



Waveland, MS after Hurricane Katrina

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