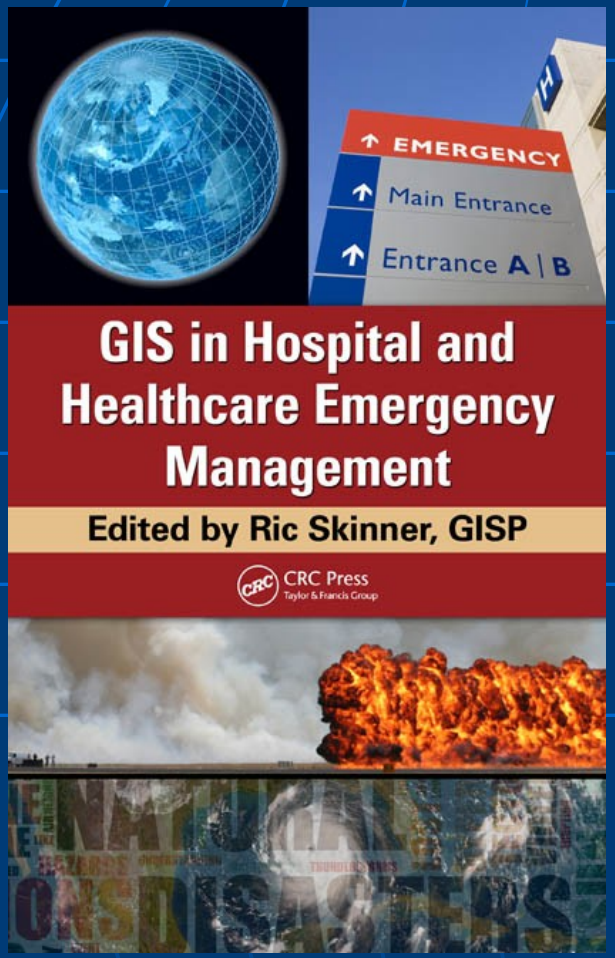

The Evolving Role of GIS in Hospital & Healthcare Emergency Management

EMForum Presentation
for GIS Day
Nov. 17, 2010

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The Stoneybrook Group LLC
Sturbridge, MA
ric.skinner@gmail.com
www.healthGISguy.com

Outline

The Why and How of the book?

Some examples from the book

Some other examples, time permitting

Q&A

"If you want a successful system of emergency management at the local, state, tribal, or federal level, you must utilize GIS – period! It will save time, money, and lives. GIS both accelerates the successful planning process and helps ensure that the final plan is executable. And, when the crisis hits, GIS utilization decreases the 'fog of war' that is inevitable in the early moments of a disaster response."

R. Tom Sizemore, III, MD,
Principal Deputy Director
Office of Preparedness & Emergency Operations
US Dept. of Health & Human Services

I. Conceptual Approaches

II. Applications

III. Case Stories

I. Conceptual Approaches

1. The Evolving Role of GIS in Hospitals & Healthcare Emergency Managemnet, Ric Skinner

2. A Spatial Approach to Hazard Vulnerability Analysis by Healthcare Facilities, Ric Skinner

3. Using GIS to Improve Workplace and Worker Safety Crisis Management, Jeffrey Miller

4. Infectious Disease Surveillance and GIS: Applications for Emergency Management, Michael Olesen

5. Role of GIS in Interagency Healthcare Logistical Support during Emergencies, Jerry VanVactor

6. Design Concept for a Location-based Hazard Vulnerability Assessment Tool for Healthcare Facilities, Ric Skinner

II. Applications

7. Trauma Center Siting, Optimization Modeling and GIS, Charles Branas, Brendan Carr, Megan Heckert and Robert Cheetham

8. Healthcare Facility Disaster Planning: Using GIS to Identify Alternate Care Sites, Johnathon Mohr, J. L. Querry and Gwenn Allen

9. Multi-scale Enterprise GIS for Healthcare Preparedness in South Carolina, Jared Shoultz, Doug Calvert, Guang Zhao and Max Learner

10. Hospital Preparedness Planning for Evacuation and Sheltering with GIS in South Carolina, Jared Shoultz, Doug Calvert, Guang Zhao and Max Learner

11. Making Sense Out of Chaos: Improving Prehospital and Disaster Response, Elizabeth Walters, Stephen Corbett and Jeff Grange

III. Case Stories

12. Disaster Preparedness for Influenza at a Community Hospital Network: A Case Study, Edward Rafalski, Vince Gallagher, Matthew Wakely and Armand Turceanu

13. Disaster Preparedness and Response for Vulnerable Populations: Essential Role of GIS for Emergency Medical Services during the San Diego County 2007 Firestorm, Isabel Corcos, Holly Shipp, Alan Smith, Barbara Stepanski and Leslie Upledger Ray

14. Natural Disasters and the Role of GIS in Assessing Need, Omar Ha-Redeye

15. GIS Application and a Regionalized Approach for Mass Casualty Incident Planning, Deborah Kim, William Proger, Kent Simons and Christopher Hiles

16. Building a GIS Common Operating Picture for Integrated Emergency Medical Services and Hospital Emergency Management Response, Frank Zanka

Natural Hazards

- Blizzard
- Dam Inundation
- Drought
- Dust Storm
- Earthquake
- Electrical Storm
- Epidemic
- Flood, External
- High Wind
- Hurricane
- Ice Storm
- Landslide/ Subsidence
- Pandemic
- Severe Thunderstorm
- Snow Fall
- Temperature Extremes
- Tidal Wave/Tsunami/Seiche
- Tornado
- Vog
- Volcano
- Wild Fire (Forest, Range)

Technological Hazards

- Communications Failure (Data)
- Communications Failure (Voice)
- Electrical Failure
- Explosion, External
- Explosion, Internal
- Fire Alarm Failure
- Fire, Internal
- Flood, Internal
- Fuel Shortage
- Generator Failure
- HVAC Failure
- Information Systems Failure
- Isolation Room Failure
- Medical Equipment Failure
- Medical Gas Failure
- Medical Vacuum Failure
- Natural Gas Failure
- Sewer System Failure
- Steam System Failure
- Structural Damage
- Supply Shortage
- Transportation Failure
- Water System Failure

Human-caused Hazards

- Bomb Threat
- Civil Disturbance
- Economic Disruption
- Forensic Admission
- Hostage Situation
- Infant Abduction
- Labor Action
- Mass Casualty (infectious)
- Mass Casualty (trauma)
- Missing Person
- Patient Elopement
- Suspicious Letter/Package
- Suspicious Person
- Terrorism, Biological Terrorism,
- Chemical Terrorism,
- Radiological Terrorist Threat
- VIP Situation
- Workplace Violence

HazMat Hazards

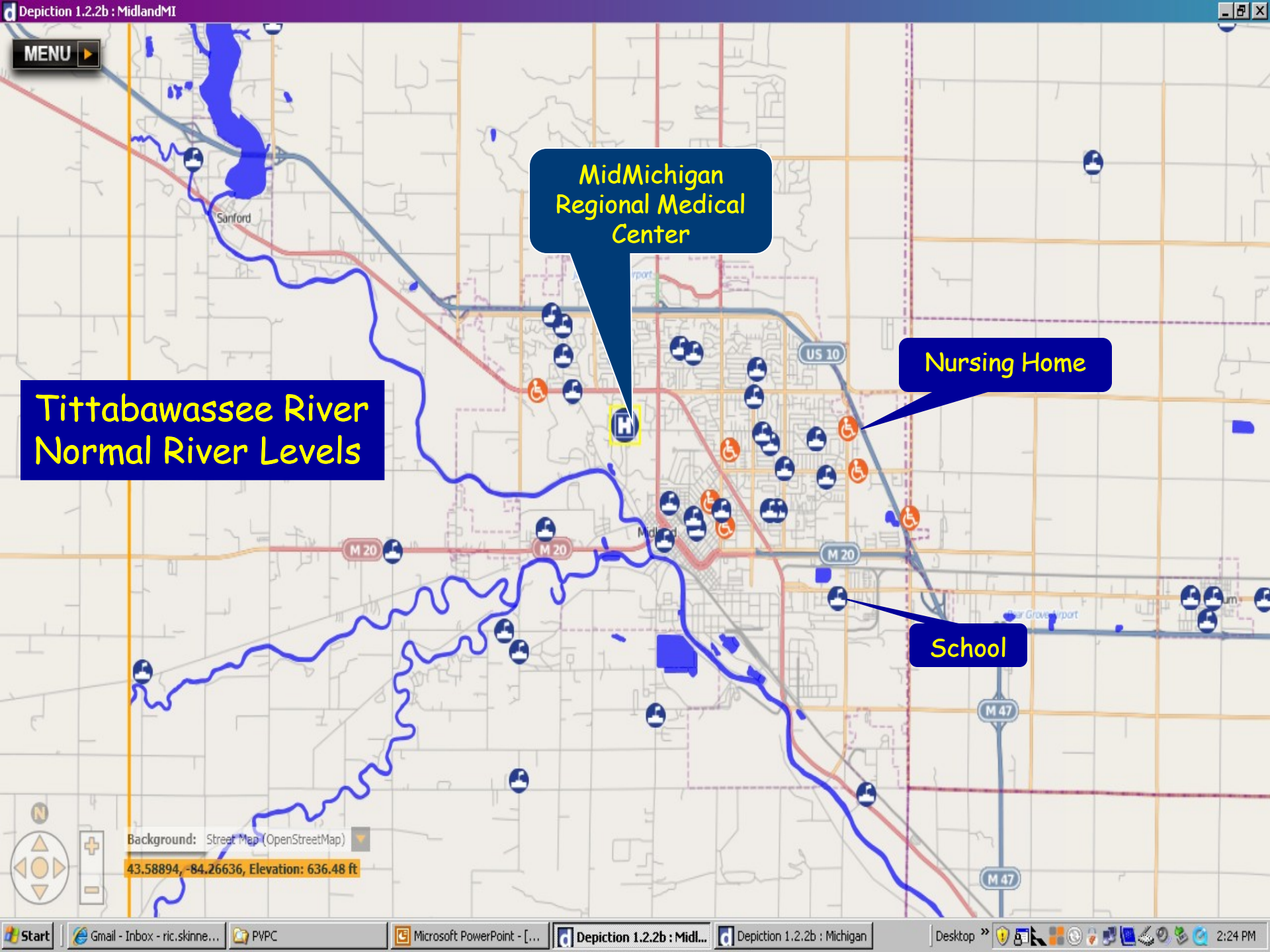
- Blood/Body Fluid Spill
- Chemical Exposure, External
- Chemical Exposure, Internal
- Chemotherapeutic Spill
- Large Spill, Internal
- Mass Casualty HazMat (<5 victims)
- Mass Casualty HazMat (>= 5 victims)
- Mercury Spill
- Radiologic Exposure, External
- Radiologic Exposure, Internal
- Small-Medium Spill, Internal

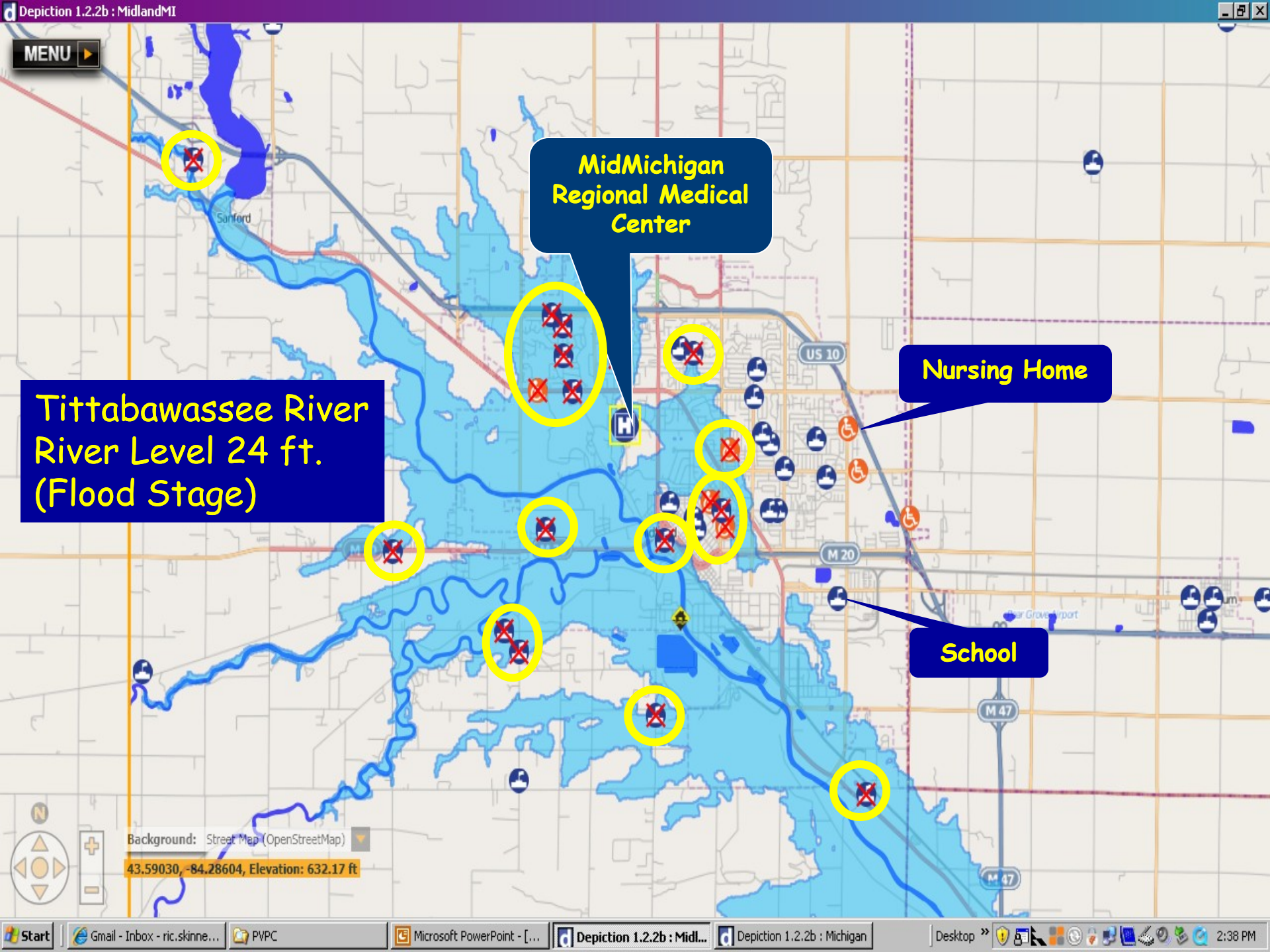
HAZARD AND VULNERABILITY ASSESSMENT TOOL
NATURALLY OCCURRING EVENTS

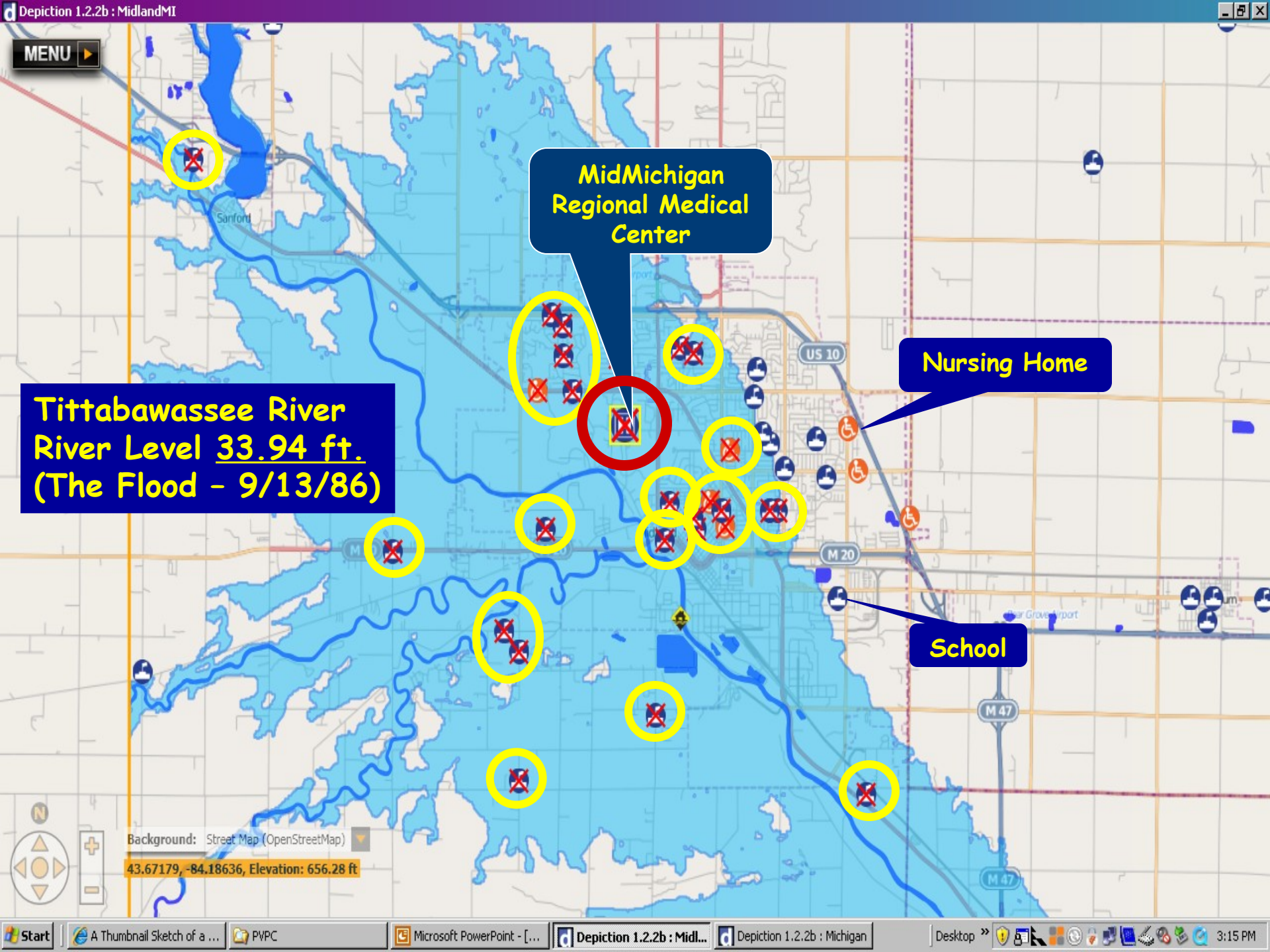
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	Likelihood this will occur	*Possibility of death or injury*	*Physical losses and damages*	*Interruption of services*	*Preplanning*	*Time, effectiveness, resources*	*Community Mutual Aid staff and supplies*	*Relative threat**
SCORE	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = High 2 = Moderate 3 = Low or none*	*0 = N/A 1 = High 2 = Moderate 3 = Low or none*	*0 = N/A 1 = High 2 = Moderate 3 = Low or none*	*0 - 100%*
Hurricane								0%
Tornado								0%
Severe Thunderstorm								0%
Snow Fall								0%
Blizzard								0%
Ice Storm								0%
Earthquake								0%
Tidal Wave								0%
Temperature Extremes								0%
Drought								0%
Flood, External								0%
Wild Fire								0%
Landslide								0%
Dam Inundation								0%
Volcano								0%
Epidemic								0%
AVERAGE SCORE	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0%**

**Threat increases with percentage*

RISK = PROBABILITY * SEVERITY		
0.00	0.00	0.00


Depiction 1.2.2b : MidlandMI
MENU
MidMichigan Regional Medical Center
Nursing Home
Tittabawassee River Normal River Levels
School
Sanford
US 10
M 20
M 47
Background: Street Map (OpenStreetMap)
43.58894, -84.26636, Elevation: 636.48 ft
Start
Gmail - Inbox - ric.skinne...
PVPC
Microsoft PowerPoint - [...
Depiction 1.2.2b : Midl...
Depiction 1.2.2b : Michigan
Desktop
2:24 PM


Depiction 1.2.2b : MidlandMI
MENU
MidMichigan Regional Medical Center
Nursing Home
School
Tittabawassee River River Level 24 ft. (Flood Stage)
US 10
M 20
M 47
Sanford
Background: Street Map (OpenStreetMap)
43.59030, -84.28604, Elevation: 632.17 ft
Start
Gmail - Inbox - ric.skinne...
PVPC
Microsoft PowerPoint - [...
Depiction 1.2.2b : Midl...
Depiction 1.2.2b : Michigan
Desktop
2:38 PM


Depiction 1.2.2b : MidlandMI
MENU
MidMichigan Regional Medical Center
Nursing Home
School
Tittabawassee River
River Level 33.94 ft.
(The Flood - 9/13/86)
US 10
M 20
M 47
Sanford
Background: Street Map (OpenStreetMap)
43.67179, -84.18636, Elevation: 656.28 ft
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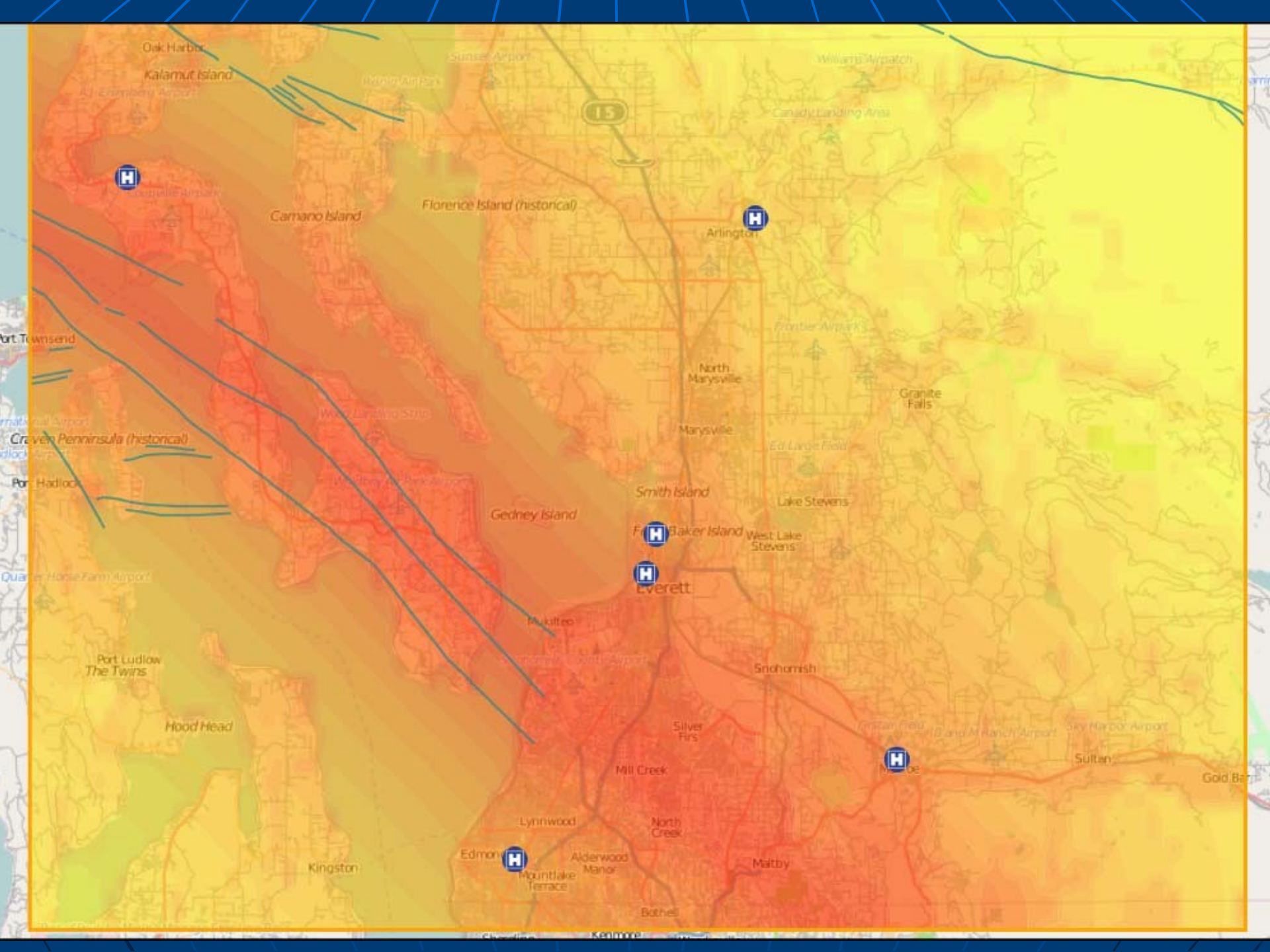
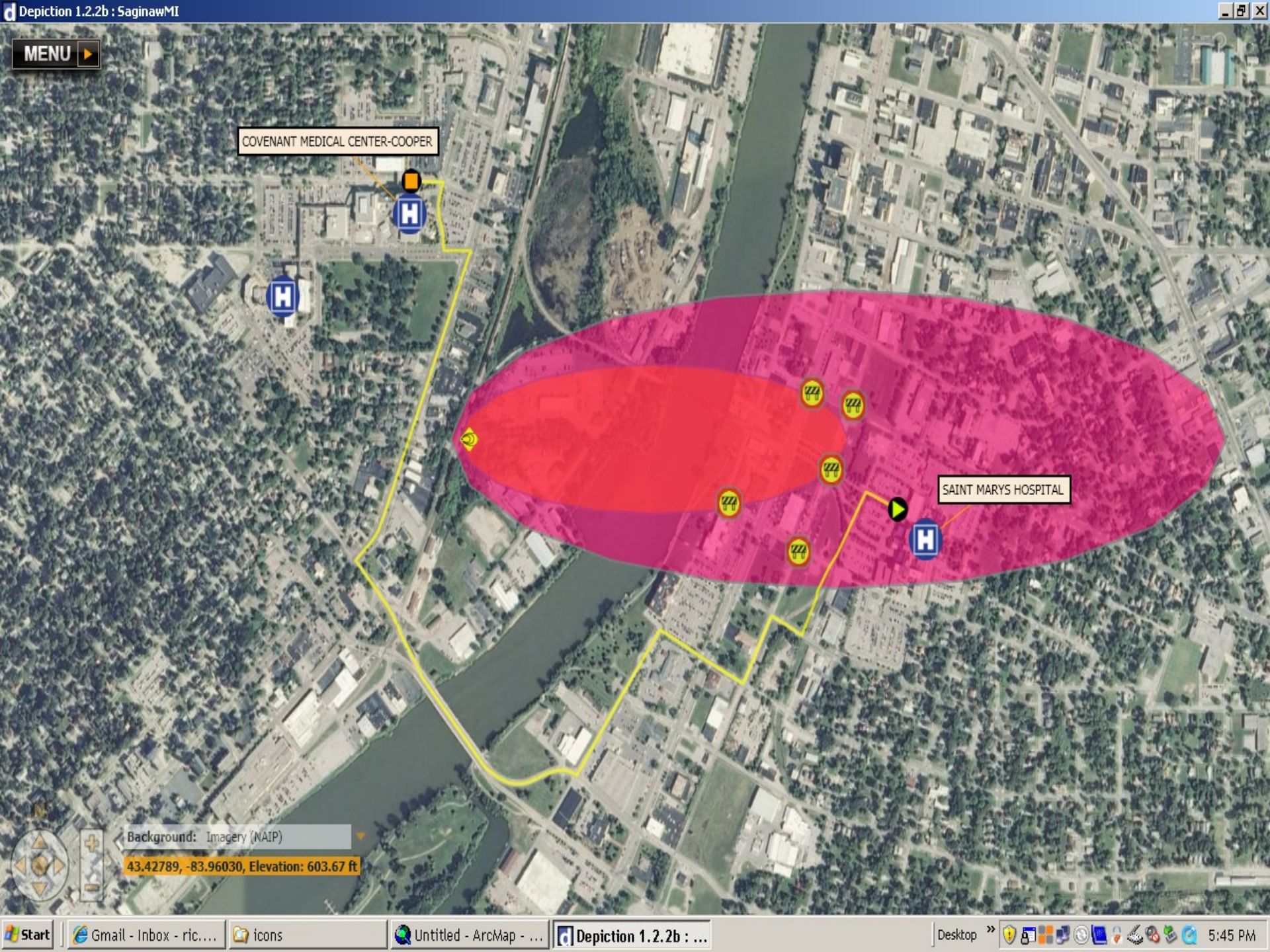
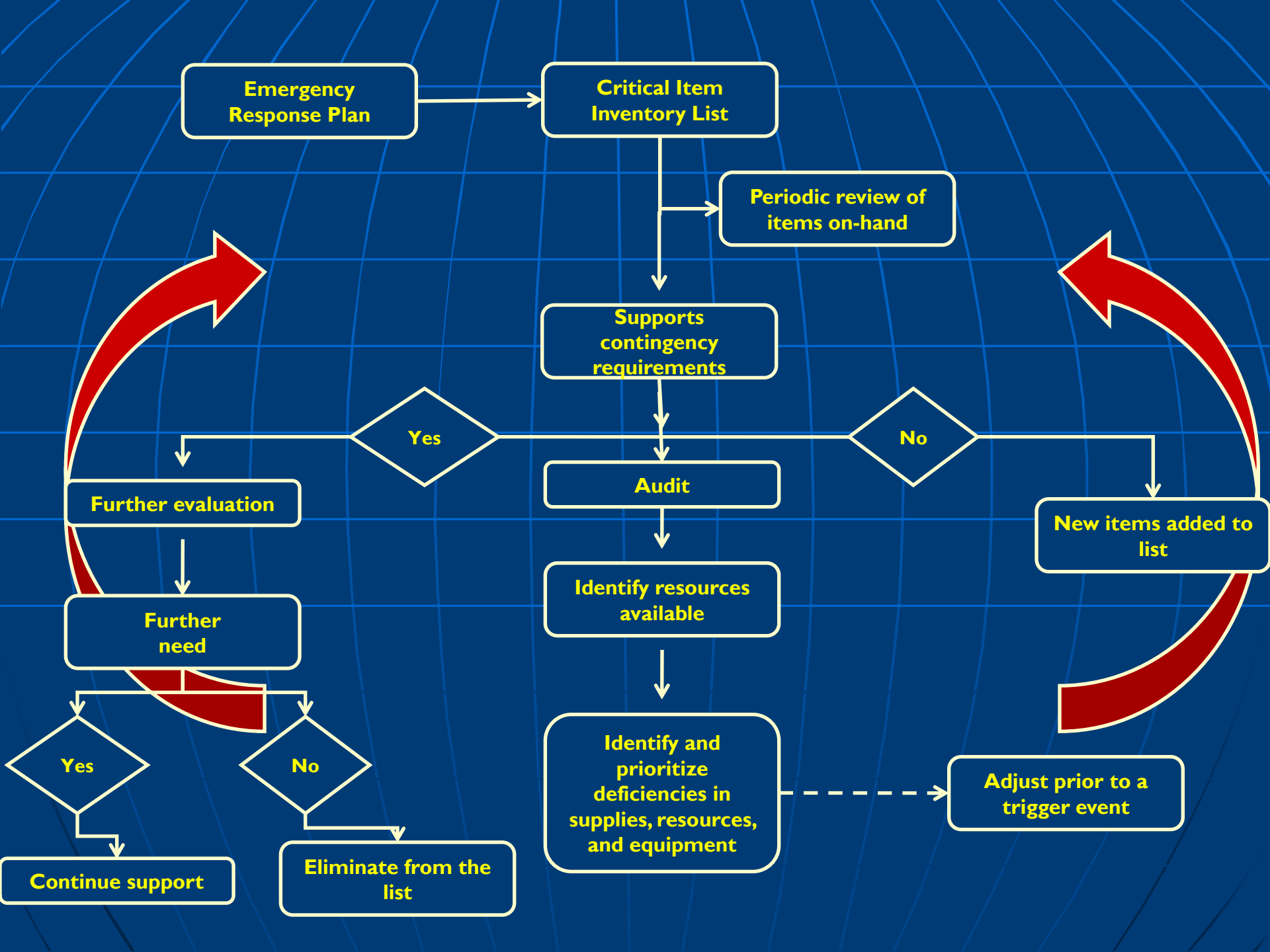
A Thumbnail Sketch of a ...
PVPC
Microsoft PowerPoint - [...
Depiction 1.2.2b : Midl...
Depiction 1.2.2b : Michigan
Desktop
3:15 PM

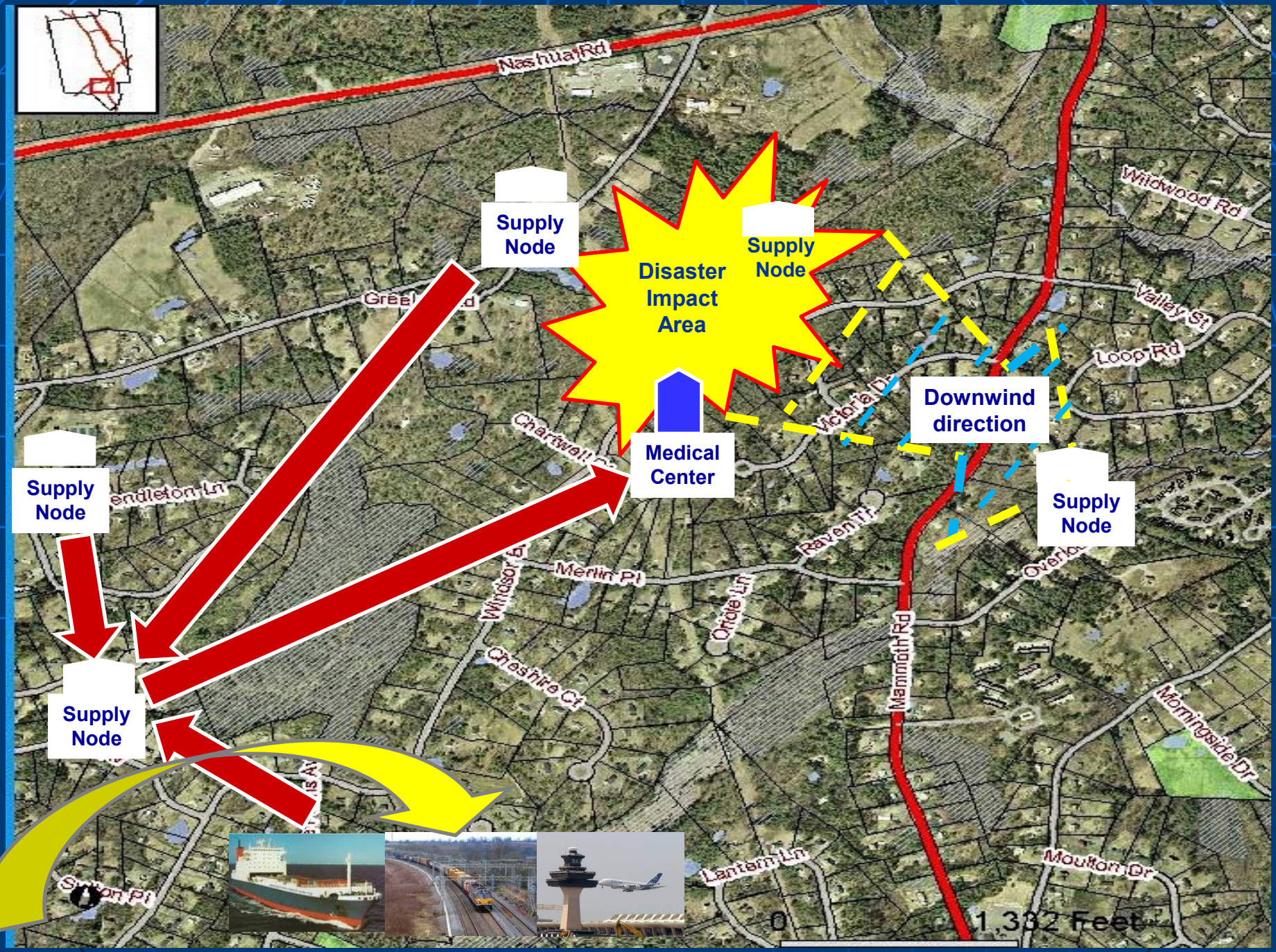

Oak Harbor
Kalamut Island
Camano Island
Florence Island (historical)
Arlington
North Marysville
Marysville
Granite Falls
Lake Stevens
West Lake Stevens
Smith Island
Gedney Island
Baker Island
Everett
Mukilteo
Snohomish
Silver Firs
Mill Creek
Sultan
Lynnwood
North Creek
Alderwood Manor
Maltby
Kingston
Bothell
Port Ludlow
The Twins
Hood Head
Crescent Harbor Airport
Sky Harbor Airport


Depiction 1.2.2b : SaginawMI
MENU
COVENANT MEDICAL CENTER-COOPER
SAINT MARYS HOSPITAL
Background: Imagery (NAIP)
43.42789, -83.96030, Elevation: 603.67 ft
Start
Gmail - Inbox - ric....
icons
Untitled - ArcMap - ...
Depiction 1.2.2b : ...
Desktop
5:45 PM


Depiction 1.2.2b : KalamazooMI
MENU
Helipad
Road Barricades
Trauma/ER Entrance
Staging Area
Ambulance Bays
Hospital Evacuation Planning
Floor Plan 1st Floor
Background: Imagery (NAIP)
42.28648, -85.58039
start
Images
Microsoft PowerPoint...
Gmail - Inbox - ric.ski...
Google Calendar - Wi...
Depiction 1.2.2b : Kal...
Desktop
1:47 PM


Hospital
Hospital Staff Residence in Plume
Chem. Tank
Plume
Hospital Staff Residence
No scale
Hospital
Ruptured Chemical Storage Tank
Hospital Staff Residence
Hazardous Chemical Plume
Hospital Staff Residence in Plume


Emergency Response Plan
Critical Item Inventory List
Periodic review of items on-hand
Supports contingency requirements
Yes
No
Audit
Further evaluation
New items added to list
Identify resources available
Further need
Yes
No
Identify and prioritize deficiencies in supplies, resources, and equipment
Adjust prior to a trigger event
Continue support
Eliminate from the list


Nashua Rd
Supply Node
Disaster Impact Area
Supply Node
Medical Center
Downwind direction
Supply Node
Supply Node
Supply Node
Witchwood Rd
Valley St
Loop Rd
Merlin Pl
Raven Tr
Windsor Dr
Oriole Ln
Cheshire Ct
Mammoth Rd
Morningside Dr
Lantern Ln
Moulton Dr
Stratton Pl
0
1,332 Feet

AMERICAN TRAUMA SOCIETY
IMPROVING CARE, SAVING LIVES

MAPS HOME

Map Tool to Assess Timely Access to Trauma Centers

Select Year:
2008

Select Response Time:
60 Minutes

Select Transport Method:
Helicopter or Ambulance

Map Layers
- Major Cities
- States
- Interstates

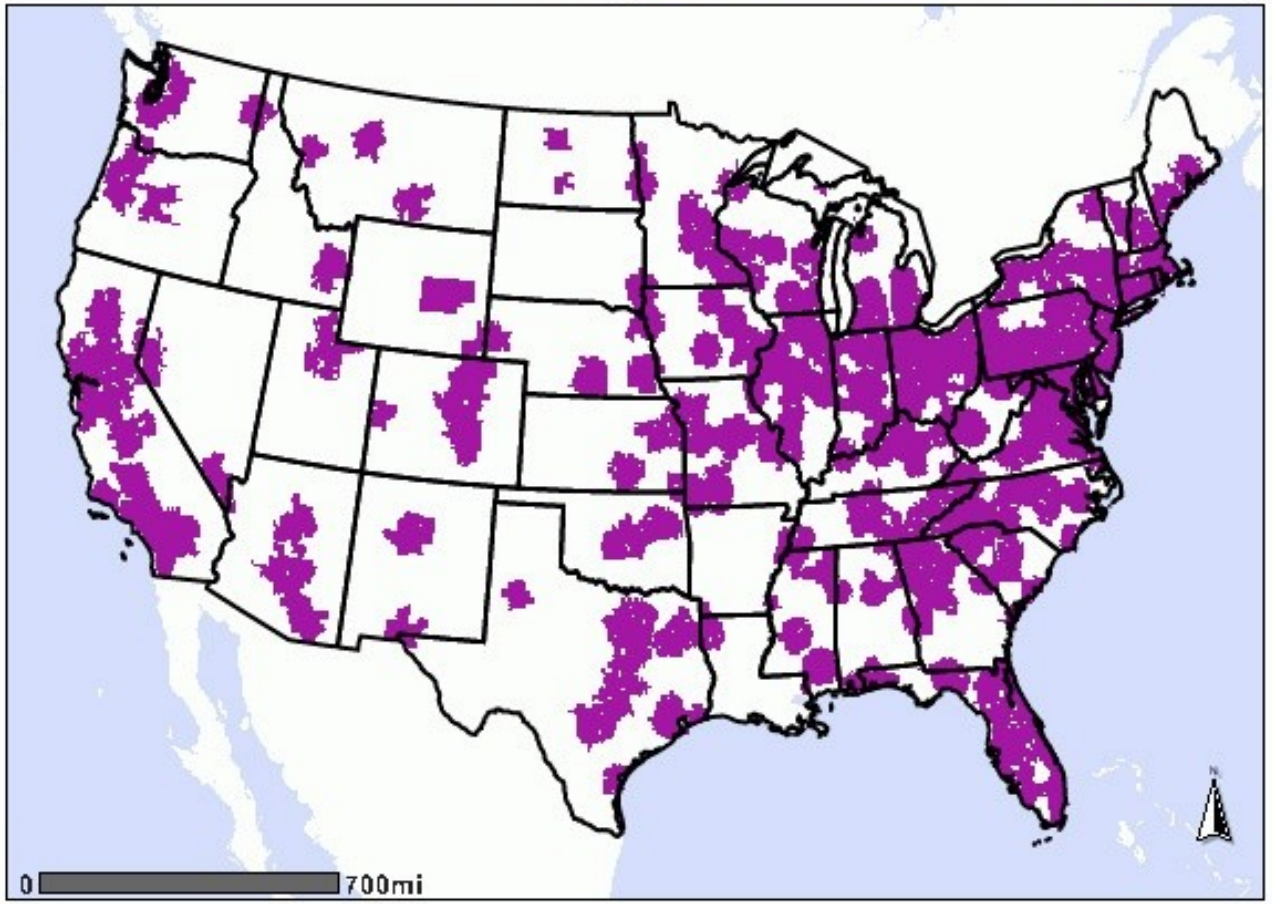
Continental US | Alaska | Hawaii

-- Select a state

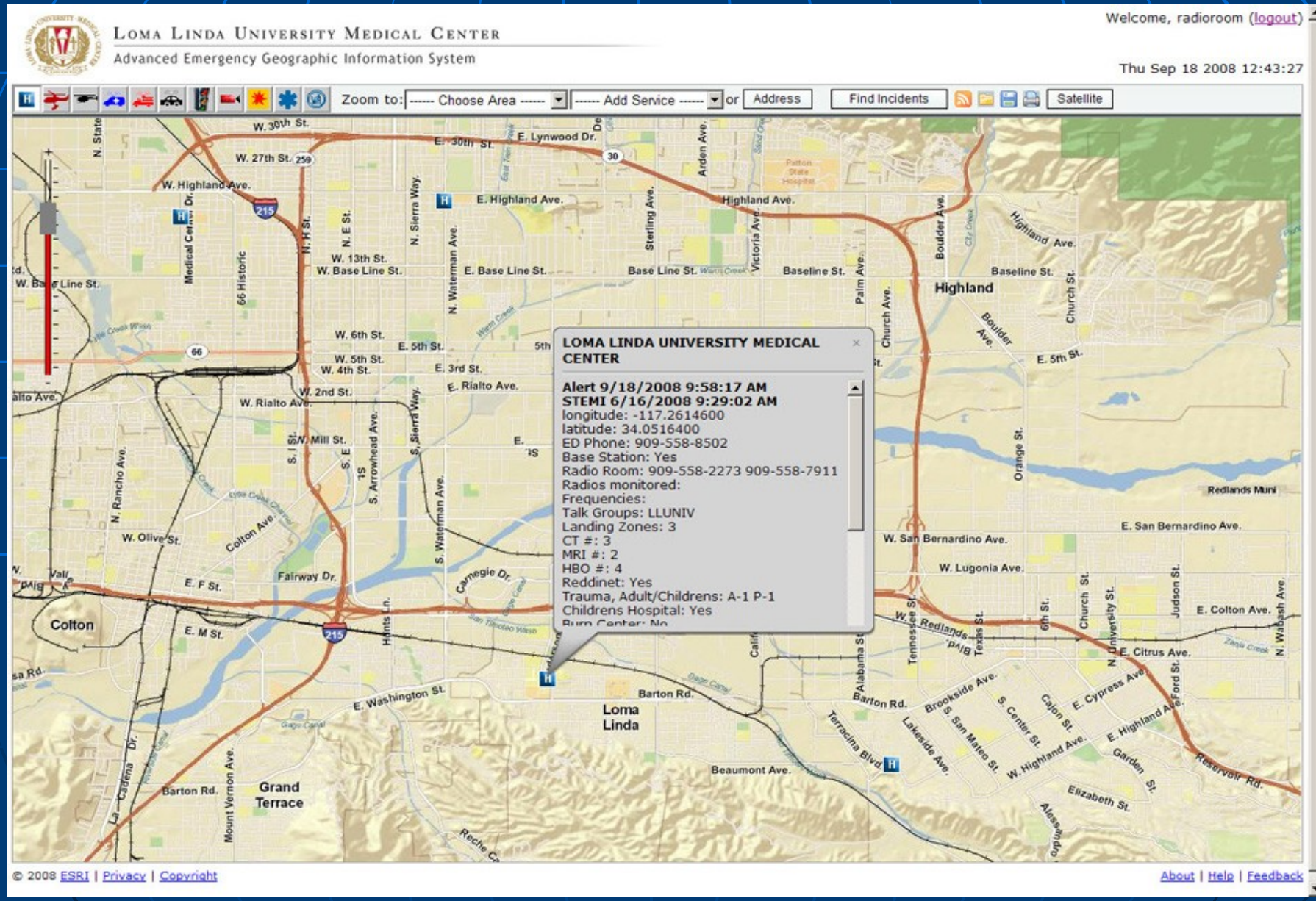
Print Map
Support

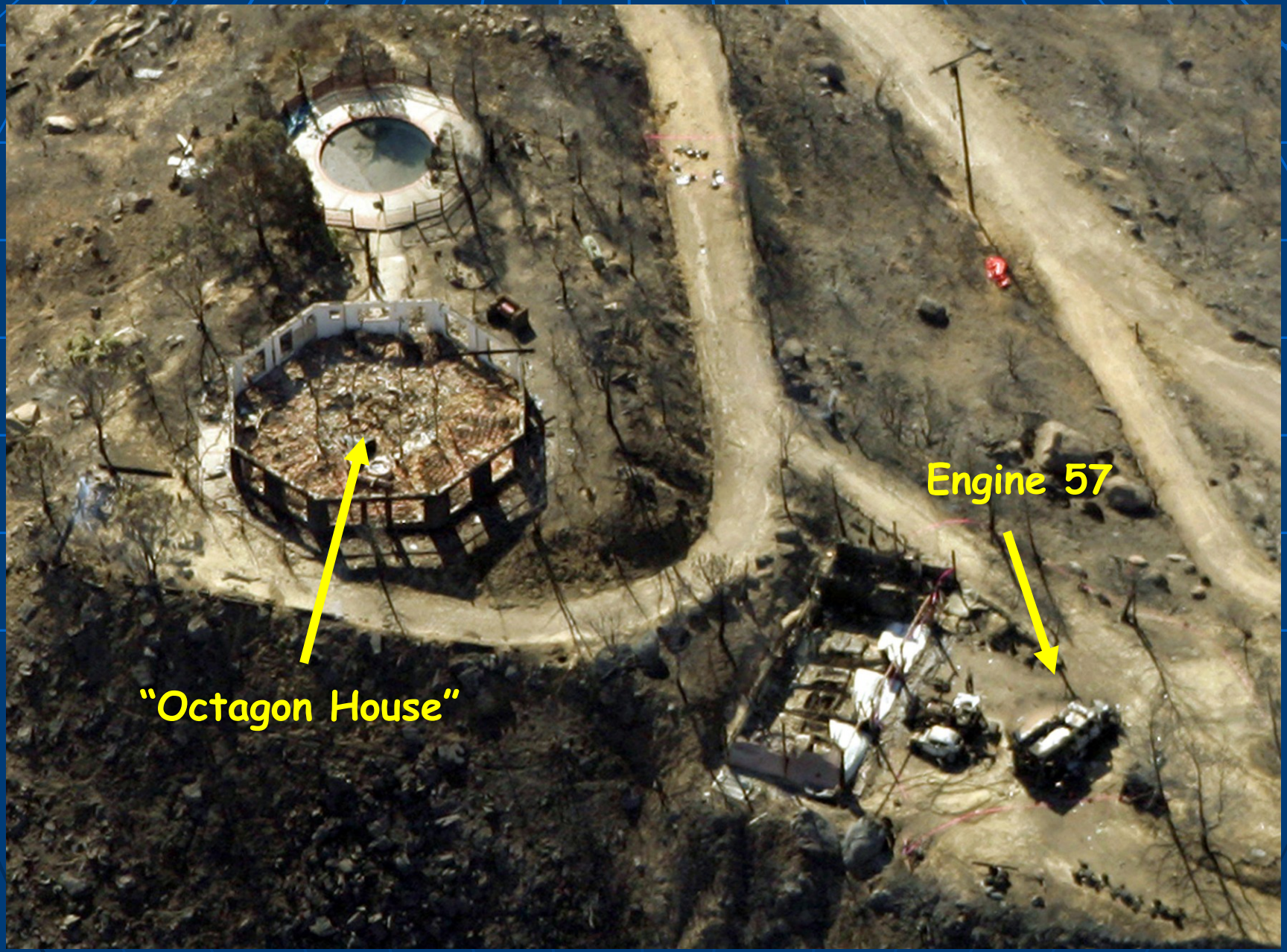
Level I/II Trauma Center Coverage	% Popn	% Land
Existing System:	82.62%	24.08%

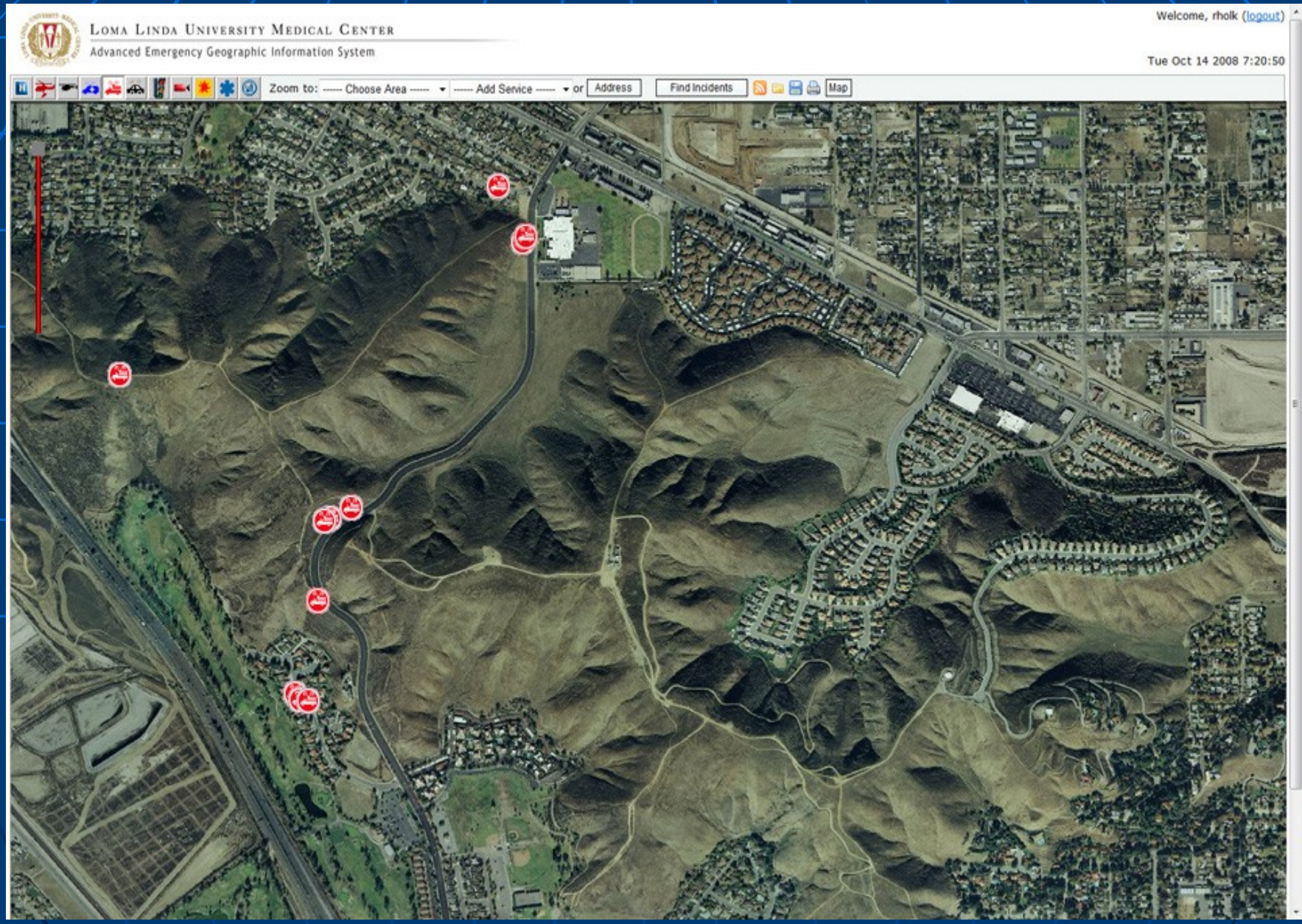
Legend
Helicopter Ambulance Either

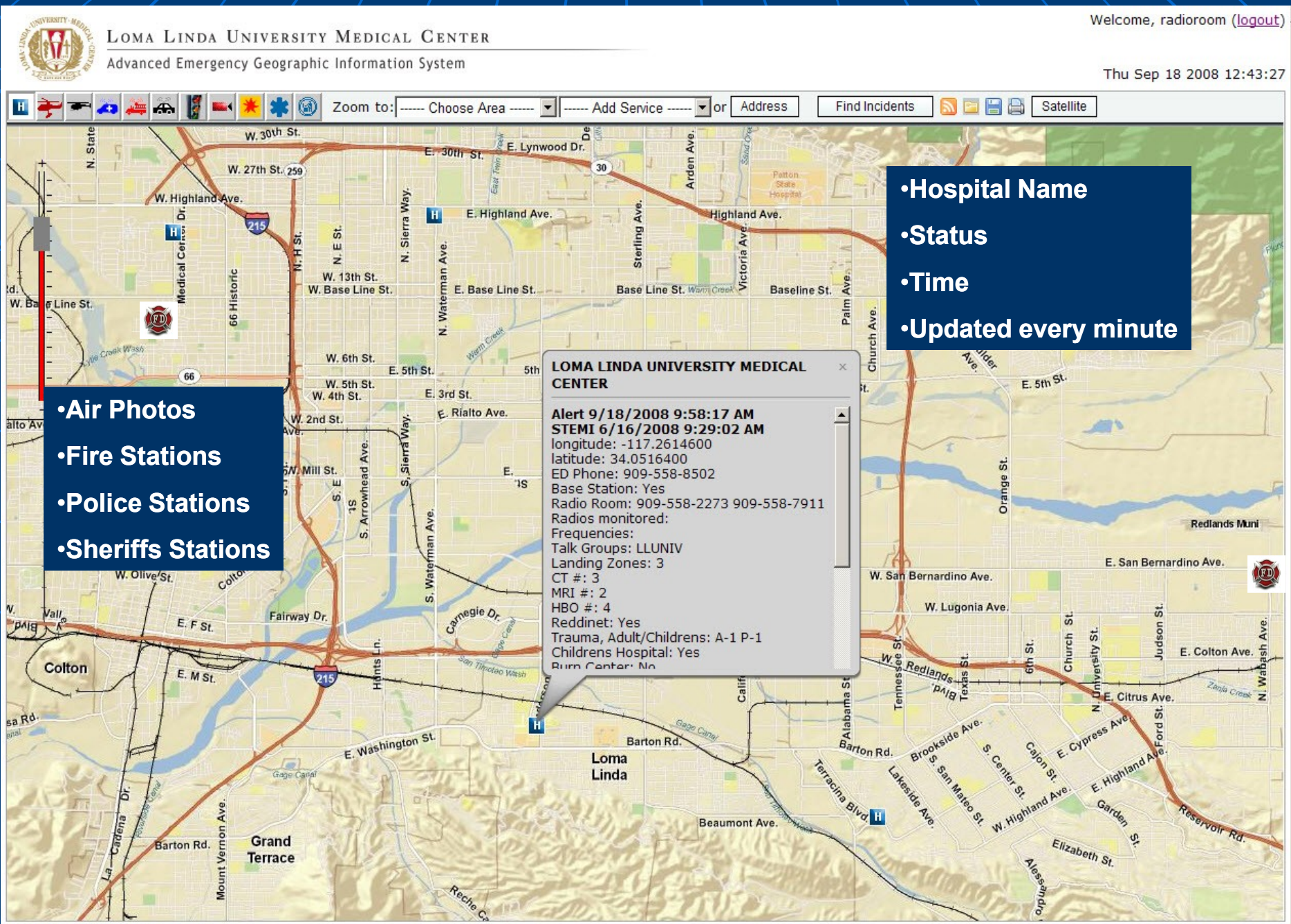


Advanced Emergency GIS (AEGIS)
Loma Linda (CA) University Medical Center




Engine 57
"Octagon House"


Loma Linda University Medical Center
Advanced Emergency Geographic Information System
Welcome, rholk (logout)
Tue Oct 14 2008 7:20:50
Zoom to: ------ Choose Area ------
------ Add Service ------
or
Address
Find Incidents
Map


Loma Linda University Medical Center
Advanced Emergency Geographic Information System
Welcome, radioroom (logout)
Thu Sep 18 2008 12:43:27
Zoom to: ----- Choose Area -----
----- Add Service -----
or
Address
Find Incidents
Satellite
•Hospital Name
•Status
•Time
•Updated every minute
•Air Photos
•Fire Stations
•Police Stations
•Sheriffs Stations
LOMA LINDA UNIVERSITY MEDICAL CENTER
Alert 9/18/2008 9:58:17 AM
STEMI 6/16/2008 9:29:02 AM
longitude: -117.2614600
latitude: 34.0516400
ED Phone: 909-558-8502
Base Station: Yes
Radio Room: 909-558-2273 909-558-7911
Radios monitored:
Frequencies:
Talk Groups: LLUNIV
Landing Zones: 3
CT #: 3
MRI #: 2
HBO #: 4
Reddinet: Yes
Trauma, Adult/Childrens: A-1 P-1
Childrens Hospital: Yes
Colton
Loma Linda
Grand Terrace
Redlands Muni
E. Highland Ave.
Highland Ave.
Barton Rd.
E. Washington St.
E. San Bernardino Ave.
W. San Bernardino Ave.
W. Lugonia Ave.
E. Colton Ave.
E. Citrus Ave.
Beaumont Ave.
E. 5th St.
W. 6th St.
E. Base Line St.
Base Line St.
Baseline St.
Fairway Dr.
Carnegie Dr.
E. F St.
E. M St.
W. Olive St.
W. 30th St.
E. 30th St.
E. Lynwood Dr.
W. 27th St.
W. Highland Ave.
W. 13th St.
W. Base Line St.
W. 5th St.
W. 4th St.
E. 3rd St.
E. Rialto Ave.
W. 2nd St.
N. Mill St.
Terracina Blvd
Reservoir Rd.
Elizabeth St.
Garden St.
W. Highland Ave.
S. San Mateo St.
Lakeside Ave.
Brookside Ave.
E. Cypress Ave.
E. Highland Ave.
Barton Rd.
Mount Vernon Ave.
La Cadena Dr.
Medical Center Dr.
66 Historic
Gage Canal
San Timoteo Wash
Warm Creek
Patton State Hospital
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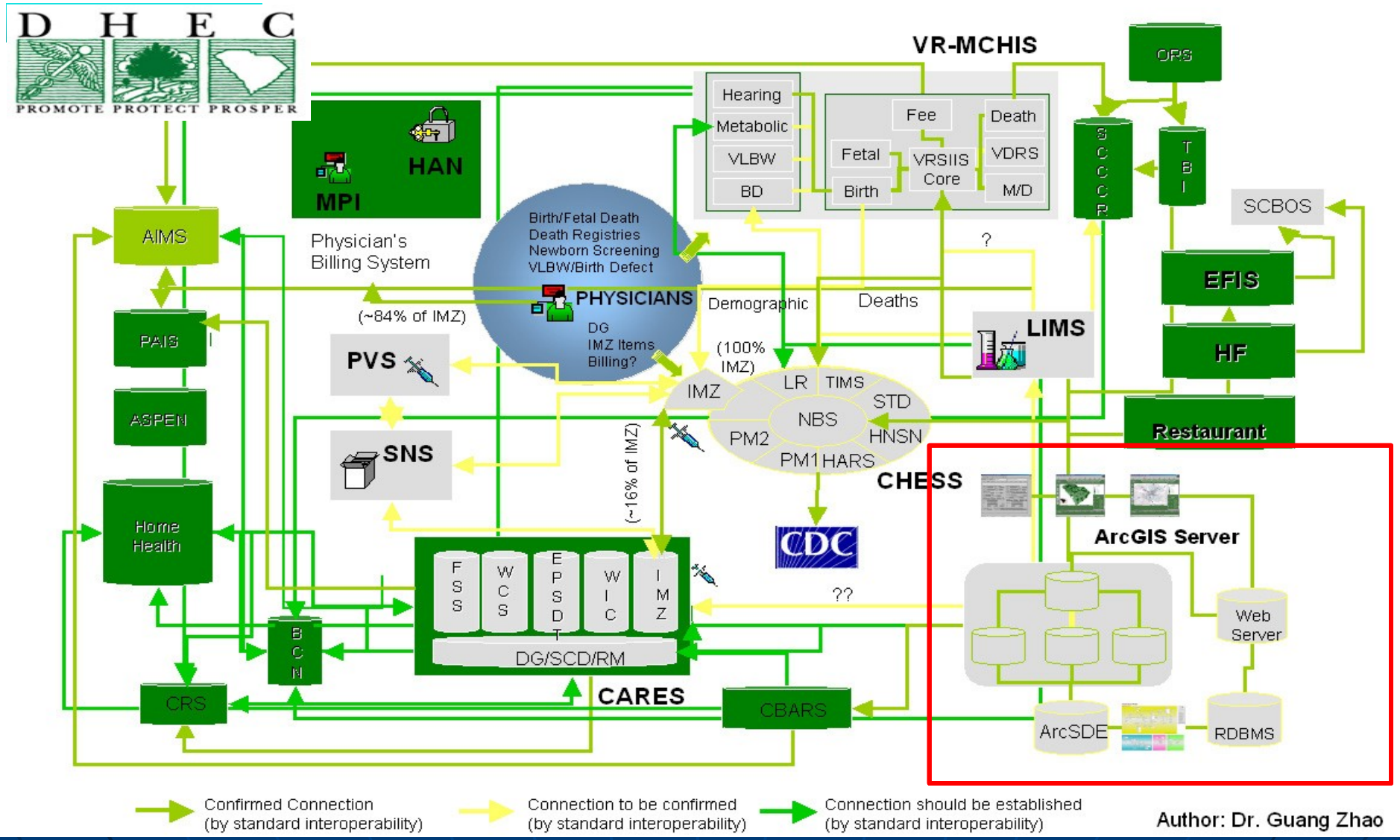
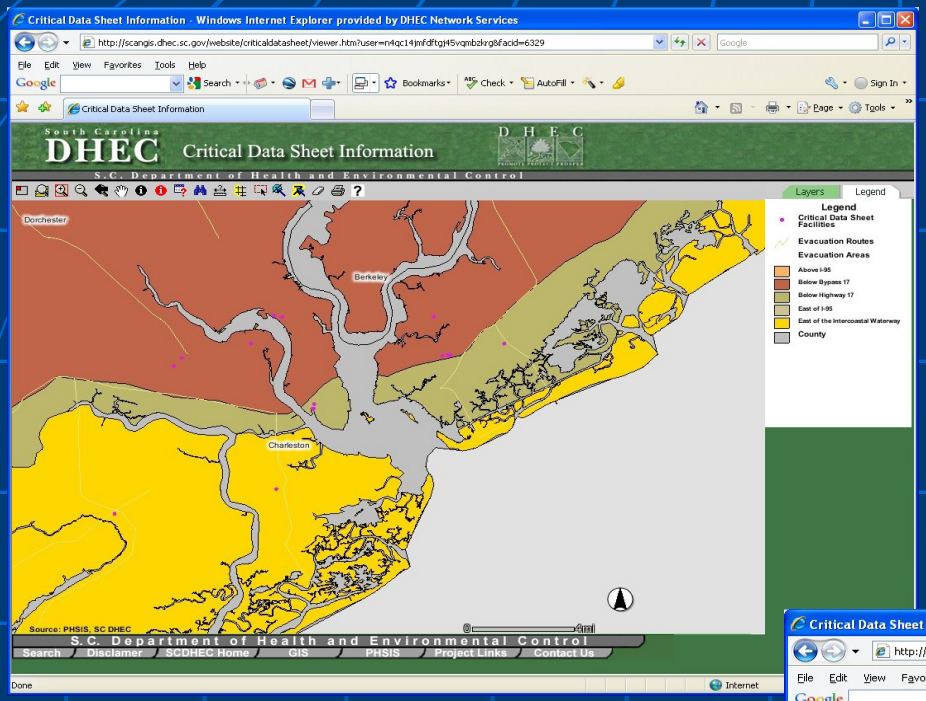
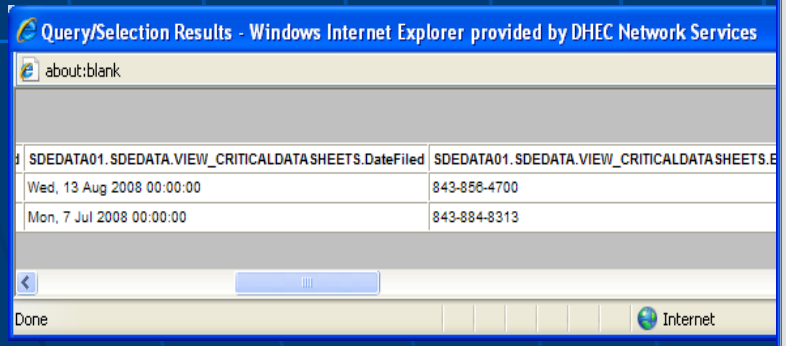
Large agencies with multiple program areas, mandates, funding sources, and computer systems need systems integration to generate business intelligence. GIS is well suited to integrate data from across the enterprise based on the one common aspect of all data, GEOGRAPHY.

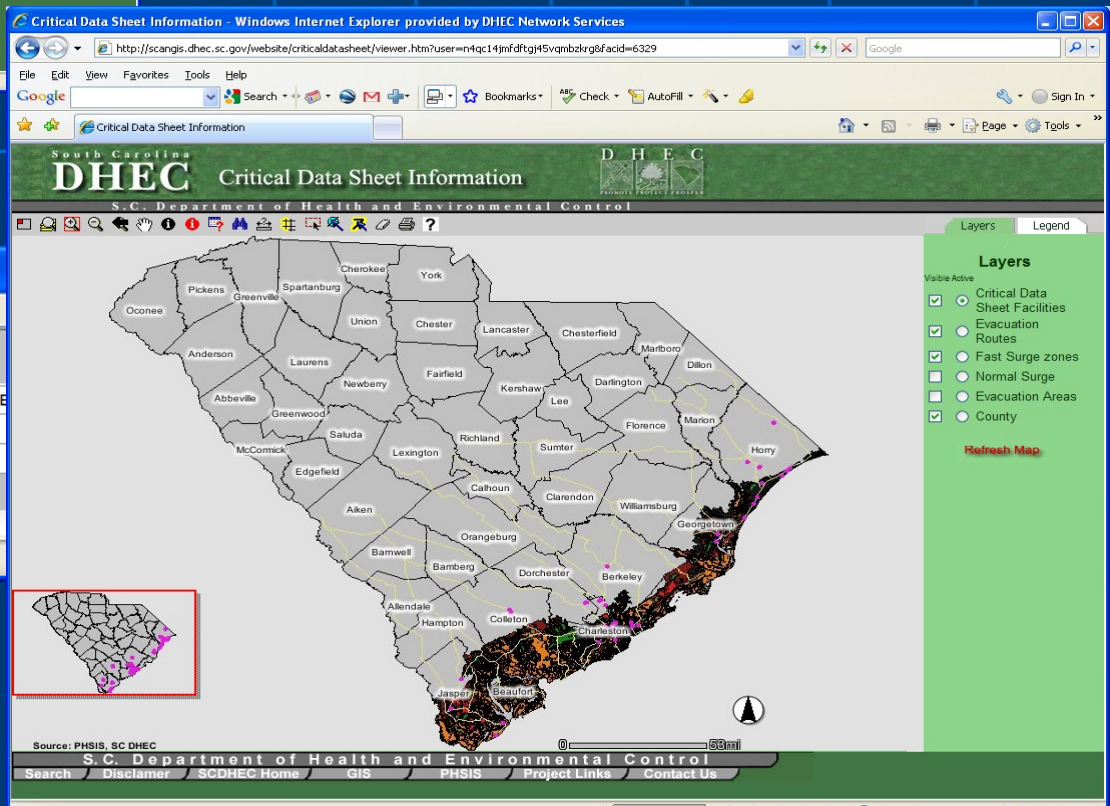




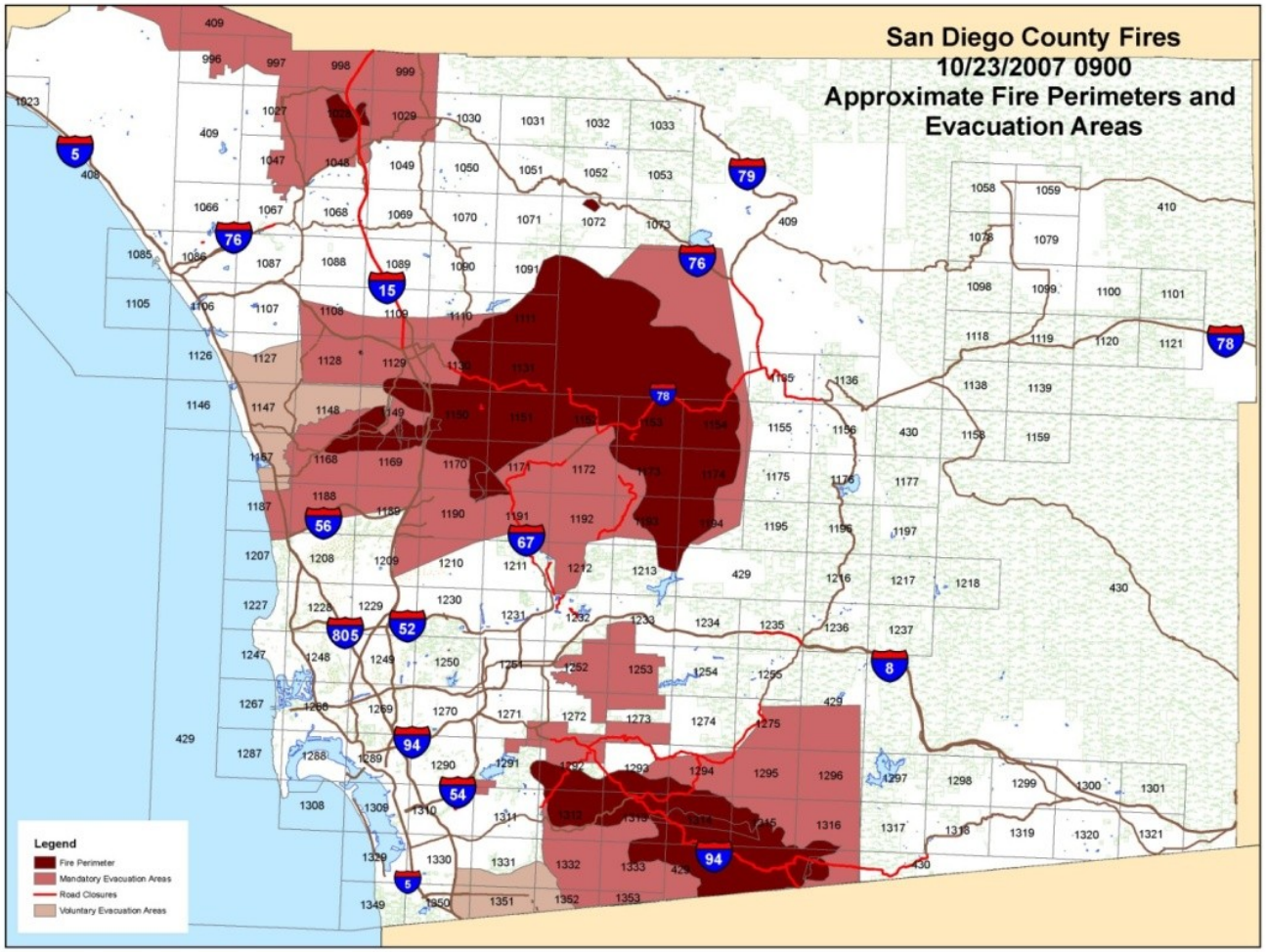
Spatial Benefits

- Spatial Tools for facilities with no "in-house" GIS
- Advanced Analysis, Visualization and Reporting
- Predefined overlays with surge zones, evacuation zones and evacuation routes
- "Real-time" overlay capabilities with weather and hurricane track data






SeaSpace
CORPORATION
Aqua MODIS
October 23, 2007
21:34GMT (2:34PM PST)
True Color Image



EMS directed 2100 medical evacuations in one day

- 2 acute care hospitals
- 1 psychiatric hospital
- 12 skilled nursing facilities

Evacuation with minimal impact on patients

Moved them only once

- With 3 days of medications
- With their medical records
- With staff from the sending facility

GIS in Control:
Public Health Command Centers

Think spatially …

Decide visually …

Act wisely …

Be satisfied

Questions?

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Sturbridge, MA

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www.linkedin.com/in/ricskinner

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