NIST Disaster Resilience Framework

Communication and Information Systems

Presenter: David Mizzen
          Applied Research Associates

Chapter Goals

- Provide guidance to:
    1. Understand potential vulnerabilities/damage to infrastructure observed in the past
    2. Provide example performance goals to be developed by community to identify resilience gaps and prioritize changes
    3. Provide guidance to close the resilience gaps (mitigate failures and/or recovery plans)

Example Dependencies

- Access, Fuel, Security
- Power/Energy
  - External electric power for charging cell phones
  - Air conditioning in Central Offices to cool equipment
- Transportation
  - needed to make repairs
- Water
  - Cooling systems
  - Cannot enter Central Offices without functioning water

Photo Provided by: Kentucky Public Services Commission

Overview of Infrastructure

- Landline Telephone Systems
  - Central Offices
  - Distribution Lines
  - Digital Loop Carrier Remote Terminals (DLC RTs)
  - CATV Uninterruptible Power Supply (UPS)
- Internet Systems
  - Internet Exchange Points (IXP)
  - Backbone connecting "network of networks"
- Cellular/Mobile Systems
  - Cell towers, external power

Central Office Performance Comparison

- City of New York Completed Study in 2013
  - Compared performance and recovery of 2 Central Offices during Hurricane Sandy

- 140 West Street
  - Hardened after WTC Building 7 collapsed onto it on 9/11

- 104 Broad Street
  - ~1 mile away from 140 West

Photo from Google Maps
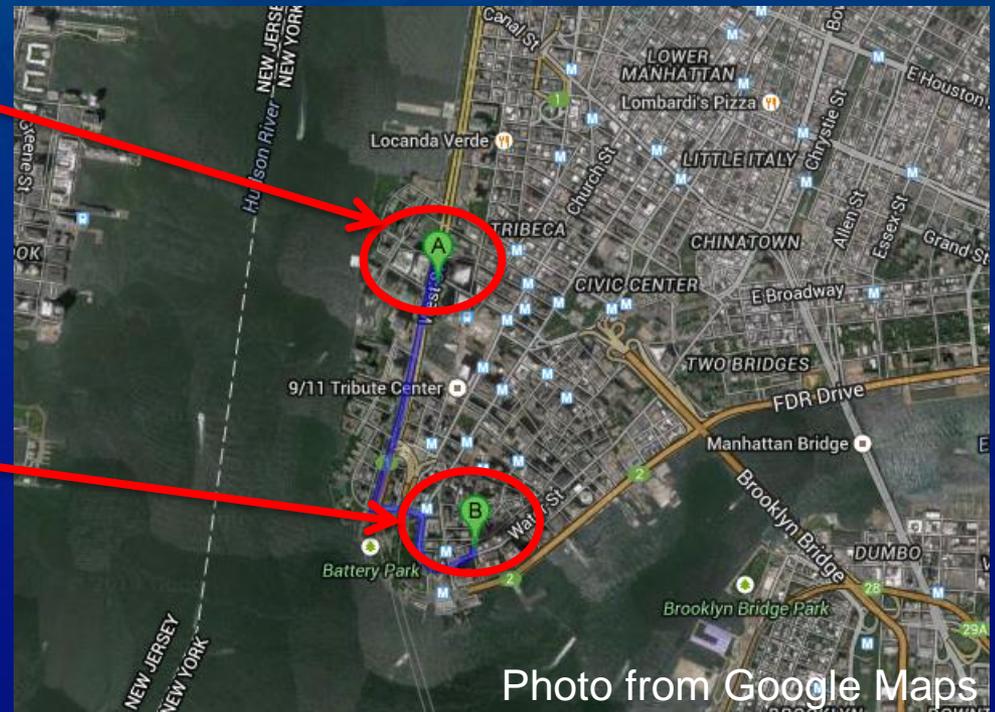
Performance of Central Offices

Strategies/Results	140 West Street	104 Broad Street
Building Structure	• Hardened after 9/11/2001	• Not hardened
Critical Equipment	• Elevated electrical switchgear, standby power	• Electrical switchgear, standby power in basement
Wires	• Copper encased in plastic casing • Fiber optic cable also used	• Encased in lead casing
Flood Protection	• Pumps	• N/A
Operational (min)	**<24 hours**	**11 Days**
Needs to become Operational	• Temporary fuel tanks	• Replacement generators, switchgear, HVAC

Example Performance Goals

Functional Category: Cluster	(4) Support Needed	(5) Target Goal	Expected Hazard Level								
			Phase 1 – Short Term			Phase 2 -- Intermediate			Phase 3 -- Long Term		
			Days 0	Days 1	Days 1-3	Wks 1-4	Wks 4-8	Wks 8-12	Mos 4	Mos 4-24	Mos 24+
Core and Central Offices		A									
Central Offices			90%			X					
Buildings Containing Exchanges			90%			X					
Internet Exchange Point (IXP)			90%			X					
Distribution Nodes		A									
Free Standing Cell Phone Towers			90%			X					
Towers Mounted on Buildings			90%			X					
Last Mile											
Critical Facilities		1									

Resilience Gaps

Example Performance Goals Established by Community

Example Anticipated Performance Established by Community

Strategies for Implementing Community Resilience Plans

- Raise critical/electrical equipment

- Watertight doors
  - Performed well in 2011 Japan earthquake & tsunami

- Adequately mount critical equipment

- Provide adequate standby power

- Eliminate single points of failure

- Cell on Light Truck (COLT)
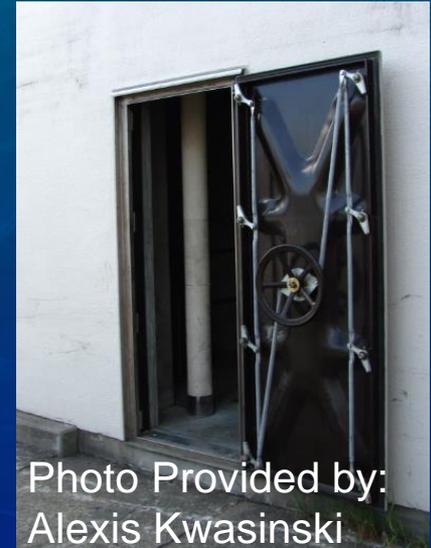 - Restored service <24 hours at hospital after Joplin 2011 tornado


Photo Provided by: Alexis Kwasinski

Services for Critical Facilities

- Government Emergency Telecommunication Service (GETS)
  - Prioritized landline service for users supporting national security and emergency preparedness/response after disaster event

- Wireless Priority Service (WPS)
  - Prioritizes cell phone service for users supporting national security and emergency preparedness/response after disaster event

- Telecommunications Service Priority (TSP)
  - Prioritizes participants when they need additional lines or service restoration (not just after disasters)

Standby Power Considerations

- Placement and Protection
- Permanent or Temporary
  - Permanent can be costly, require maintenance & testing
  - Temporary has logistical challenges
- Fuel, natural gas, other?
  - Fuel can be scare after event
  - Natural gas often shutdown prior to events to avoid fire, explosion

All Photos on Slide Provided by: Alexis Kwasinski
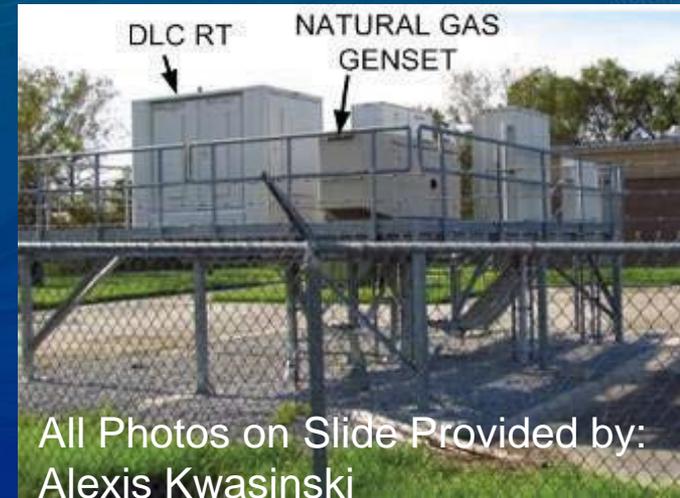
Breakout Groups

- Is the approach used in the framework helpful to communities/service providers for resilience planning and implementation?
  - How would you use the approach?
  - Would you integrate it with existing plans?
- What are the gaps in the approach and content?
- How will integrating the framework impact your disaster recovery plans? Day-to-day operations?