NIST Community Resilience Program - Third Stakeholder Workshop

National Center for Employee Development (NCED)
Norman, OK
Oct 27-28, 2014

Therese McAllister, PhD, PE
Leader, Community Resilience Group
Workshop Agenda
Monday, October 27

8:30-9:15  Introduction
9:30-12:00    Session 1: Breakout
              Performance Goals
12:00-1:00  Lunch Break
1:00-2:00  Keynote Interview
              Resilience Lessons from Joplin and Moore
2:00-2:15  Transition Break
2:15-5:00  Session 2: Breakout
              Dependencies of Sectors
6:00-7:00  Networking Session
Workshop Agenda
Tuesday, October 28

8:30-10:15  Session 3: Plenary
            Dependencies Discussion

10:15-10:30  Transition Break

10:30-11:30  Session 4: Breakout
            Key Dependencies

11:30-12:30  Lunch Break

12:30-1:20  Wrap Up Session
            Prepare Sector Report

2:40-5:00  Optional Tour: National Weather Center
Event Locations

Plenary
Framework Chapters - 50% (Overview Chapters)

• Ch. 1: Introduction and Scope (75% draft)
• Ch. 2: The Community
  – Social Community and Performance Goals
• Ch. 3: Community Resilience for the Built Environment
  – Performance Goals
  – Mitigation and Recovery Strategies
• Ch. 4: Interdependencies and Cascading Effects
  – Buildings and Infrastructure Systems
Framework Chapters - 50% (Sector Chapters)

- Ch. 5: Building Sector
  - Systems (Schools, Healthcare, Governance...)
  - Performance Goals
  - Regulatory Environment, Codes and Standards
  - Tools and Strategies
- Ch. 6: Transportation Sector
- Ch. 7: Energy Sector
- Ch. 8: Communications and Information Sector
- Ch. 9: Water and Wastewater Sector
Framework Chapters - 50% (Summary Chapters)

• Ch. 10: Existing Tools and Metrics (75% Draft)
  - Community and Sector-specific
  - Prioritization of Alternatives

• Ch. 11: Recommendations and Next Steps (75% Draft)

• Economic Considerations for Community Resilience (75% Draft)
  - Economic Sectors and Development
  - Planning and Decision Making
Breakout Session Locations

1. Community Resilience (Ch 3) & Metrics (Ch 10) - Salon G
2. Buildings (Ch 5) - Salon H
3. Infrastructure Systems - Salon I
   Transportation (Ch 6)  Power (Ch 7)
   Communication (Ch 8)  Water (Ch 9)
4. Social Aspects - Salon N
5. DRSP - Salon O
Framework & Workshop Team

NIST
- Jason Averill
- Dave Butry
- Steve Cauffman
- Howard Harary
- Erica Kuligowski
- Terri McAllister
- Nancy McNabb

Authors
- Erin Ashley
- Jeff Kotcamp
- Frank Lavelle
- David Mizzen
- Bob Pekelnicky
- Chris Poland
- Adrienne Sheldon
- Scott Tezak
- Peter Vickery
- Kent Yu

Conference Planner
- Tonia Bohnen
- Facilitators
  - Paget Donnelly
  - Katie Jereza
  - Mauricio Justiniano
  - Ann Terranova
  - Walt Zalis
Goals of Sessions

• Develop example community performance goals for recovery
• Identify key dependencies between sectors
• Learn about concerns and issues for community resilience
Resilience Concept

Maintain acceptable levels of functionality during and after disruptive events

Recover full functionality within a specified period of time

Adapted from Bruneau, 2003 and McDaniels, 2008
Example Community Performance Recovery Goals

<table>
<thead>
<tr>
<th>Disturbance</th>
<th>Hazard level</th>
<th>Affected Area</th>
<th>Disruption Level</th>
<th>Restoration Time</th>
<th>Desired</th>
<th>Actual - X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>Hazard Level</td>
<td>Community</td>
<td>Moderate</td>
<td></td>
<td>30%</td>
<td>60%</td>
</tr>
<tr>
<td>Hazard Level</td>
<td>Any</td>
<td>Community</td>
<td>Moderate</td>
<td></td>
<td>60%</td>
<td>X</td>
</tr>
<tr>
<td>Affected Area</td>
<td>Community</td>
<td></td>
<td></td>
<td></td>
<td>90%</td>
<td>X</td>
</tr>
</tbody>
</table>

### Functional Category: Cluster

- **Critical Facilities**
  - Buildings: 90%  
  - Transportation: 90%  
  - Energy: 90%  
  - Water: 90%  
  - Waste Water: 90%  
  - Communication: 90%

- **Emergency Housing**
  - Buildings: 90%  
  - Transportation: 90%  
  - Energy: 90%  
  - Water: 90%  
  - Waste Water: 90%  
  - Communication: 90%

- **Housing/Neighborhoods**
  - Buildings: 90%  
  - Transportation: 90%  
  - Energy: 90%  
  - Water: 90%  
  - Waste Water: 90%  
  - Communication: 90%

- **Community Recovery**
  - Buildings: 90%  
  - Transportation: 90%  
  - Energy: 90%  
  - Water: 90%  
  - Waste Water: 90%  
  - Communication: 90%

### Footnotes:
1. Specify hazard being considered
   - Specify level: Routine, Expected, Extreme
   - Specify the size of the area affected: Localized, community, regional
   - Specify severity of disruption: Minor, moderate, severe
2. 30% 60% 90% Restoration times relate to number of elements restored within the cluster
3. X Estimated 90% restoration time for current conditions based on design standards and current inventory
# Hazard Event and Performance Level Definitions

<table>
<thead>
<tr>
<th>Event</th>
<th>Performance Level</th>
</tr>
</thead>
</table>
| **Routine**      | Hazard level is below the expected (design) level and occurs more frequently.  
                   **Buildings and systems should remain fully useable and not experience any significant damage that would disrupt the flow of normal living.** |
| **Expected (Design)** | Design hazard level.  
                   **Buildings and systems should remain functional at a level sufficient to support the response and recovery of the community. This level is based on the design level normally used for buildings.** |
| **Extreme**      | Maximum considered occurrence based on the historic record and changes anticipated due to climate change.  
                   **Critical facilities and infrastructure systems should remain functional. Other building and infrastructure systems should perform at a level that protects the occupants and allows them to egress without assistance. In addition, emergency response plans should be based on scenarios that represent this extreme level.** |
# Affected Area

<table>
<thead>
<tr>
<th>Event</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localized</td>
<td>Damage and lost functionality is contained within an isolated area of the community. While the Emergency Operations Center (EOC) may open, it is able to organize needed actions within a few days and allow the community to return to normal operations and manages recovery.</td>
</tr>
<tr>
<td>Community</td>
<td>Significant damage and loss of functionality is contained within the community, such that assistance is available from neighboring areas that were not affected. The EOC opens, directs the response and turns recovery over to usual processes once the City governance structure takes over.</td>
</tr>
<tr>
<td>Regional</td>
<td>Significant damage occurs beyond community boundaries. Area needing emergency response and recovery assistance covers multiple communities in a region, each activating their respective EOCs and seeking assistance in response and recovery from outside the region.</td>
</tr>
<tr>
<td>Event</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Minor</td>
<td>All required response and recovery assistance is handled within the normal operating procedures of the affected community agencies, departments, and local businesses with little to no disruption to the normal flow of living. Critical facilities and emergency housing are functional and community infrastructure is functional with local minor damage.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Community EOC activates and all response and recovery assistance is orchestrated locally, primarily using local resources. Critical facilities and emergency housing are functional and community infrastructure is partially functional.</td>
</tr>
<tr>
<td>Severe</td>
<td>Response and recovery efforts are beyond the authority and capability of local communities that are affected and outside coordination is needed to meet the needs of the multiple jurisdictions affected. Professional services and physical resources are needed from outside of the region. Critical facilities and emergency housing have moderate damage but can be occupied with repairs, community infrastructure is not functional for most needs.</td>
</tr>
</tbody>
</table>
Example Community Performance Recovery Goals

<table>
<thead>
<tr>
<th>Functional Category</th>
<th>Critical Facilities</th>
<th>Emergency Housing</th>
<th>Neighborhoods</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Transportation</td>
<td>90%</td>
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<tr>
<td>Energy</td>
<td>90%</td>
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<tr>
<td>Water</td>
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<tr>
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</tr>
<tr>
<td>Communication</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recovery Time**
- Desired: 30%, 60%, 90%
- Actual - X

Footnotes:
1. Specify hazard being considered
   - Specify level - Routine, Expected, Extreme
     - Specify severity of the area affected - localised, community, regional
2. 30% 60% 90% Restoration times relate to number of elements restored within the cluster
3. X Estimated 90% restoration time for current conditions based on design standards and current inventory
## Performance Levels for After-Event Evaluation

<table>
<thead>
<tr>
<th>Category</th>
<th>Buildings Performance Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><strong>Safe and Operational</strong></td>
</tr>
<tr>
<td></td>
<td>Essential facilities such as hospitals and emergency operations centers</td>
</tr>
<tr>
<td>B</td>
<td><strong>Safe and usable during repair</strong></td>
</tr>
<tr>
<td></td>
<td>“Shelter in place” residential buildings, neighborhood businesses and services, and buildings needed for emergency operations</td>
</tr>
<tr>
<td>C</td>
<td><strong>Safe and not usable</strong></td>
</tr>
<tr>
<td></td>
<td>The minimum needed to save lives. These facilities may be repaired or needed to restore the economy.</td>
</tr>
<tr>
<td>D</td>
<td><strong>Unsafe - partial or complete collapse</strong></td>
</tr>
<tr>
<td></td>
<td>Damage that will lead to casualties</td>
</tr>
</tbody>
</table>
# Performance Levels for After-Event Evaluations

<table>
<thead>
<tr>
<th>Category</th>
<th>Infrastructure System Performance Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Resume 100% service within days</td>
</tr>
<tr>
<td>II</td>
<td>Resume 90% service within weeks and 100% within months</td>
</tr>
<tr>
<td>III</td>
<td>Resume 90% service within months and 100% within years</td>
</tr>
</tbody>
</table>
Interdependencies

• Social/Organizational Systems
  – Government, Emergency Response, Neighborhoods, Workforce, etc.

• Building Clusters
  – Critical Facilities
  – Emergency Housing
  – Workforce / Neighborhoods
  – Community Recovery

• Infrastructure Systems
  – Transportation
  – Power
  – Communication
  – Water & Wastewater
Figure 4-1. Potential Service Restoration Timeframes following a Scenario M 7.9 Earthquake on the San Andreas Fault. (CCSF Lifelines Council 2014)
A Successful Workshop will...

- Advance the Framework scope and content
- Engage you as stakeholders for continued input
- Develop interest for membership in the DRSP

Source: NOAA
Questions ?
# Hazard Events

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Types and Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>Storms, hurricane, tornadoes</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Ground shaking, faulting, landslides, liquefaction</td>
</tr>
<tr>
<td>Inundation</td>
<td>Riverine flooding, coastal flooding, tsunami</td>
</tr>
<tr>
<td>Fire</td>
<td>Building, wildfire</td>
</tr>
<tr>
<td>Snow/ Rain</td>
<td>Freeze/thaw</td>
</tr>
<tr>
<td>Man-made</td>
<td>Blast, vehicular impact</td>
</tr>
</tbody>
</table>
Pathway to Community Resilience

Figure 3-1: Flow Chart for Developing Resilience Plan