Stevens Institute of Technology

Hoboken, NJ

July 30, 2014

NIST Community Resilience Program – Second Stakeholder Workshop

Therese McAllister, PhD, PE
Engineering Laboratory
Community Resilience Program

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Workshop Agenda

8:00-8:45	Introduction
8:45-10:15	Panel Session
10:15-10:45	Break and Networking
10:45-12:00	Morning Working Sessions
12:00-1:00	Lunch Break
1:00-2:00	Keynote Speaker
2:00-2:30	Break and Networking
2:30-4:30	Afternoon Working Sessions
4:30-5:00	Wrap up

Our Team

NIST

- Jason Averill
- Steve Cauffman
- Millie Glick
- Howard Harary
- Erica Kuligowski
- Terri McAllister
- Nancy McNabb
- Karen Reczek

Authors Present

- Erin Ashley
- Frank Lavelle
- David Mizzen
- Chris Poland
- Adrienne Sheldon
- Scott Tezak
- Peter Vickery
- Kent Yu

Facilitators

- Fred Hansen
- Katie Jereza
- Mauricio Justiniano
- Tommi Makila
- David Martin
- Joan Pellegrino
- Stephanie Shuff
- Ann Terranova

Conference Planner

- Tonia Bohnen

Event Locations

Breakout Session Locations

Babbio Center

Session	Breakout	Color
1	2. Community Disaster Resilience	Green
2	5. Buildings and Facilities	Red
3	6. Transportation Systems	Pink
4	7. Power/Energy Systems	White

Edwin A Stevens Hall

Session	Breakout	Color
5	8. Communication and Information Systems	Blue
6	9. Water and Wastewater Systems	Yellow
7	DRSP Charter	Orange

Disaster Resilience Framework
25% Draft Outline

1. The Community
2. Community Disaster Resilience for the Built Environment
3. Examples of Community Disaster Resilience
4. Sectors, Interdependencies and Cascading Effects
5. Building Sector
6. Transportation Sector
7. Energy Sector
8. Communication and Information Sector
9. Water and Wastewater Sector
10. Tools and Metrics for Evaluating Disaster Resilience
11. Recommendations and Next Steps

July 30th Working Sessions

2. Community Disaster Resilience of the Built Environment

5. Buildings and Facilities
6. Transportation Systems
7. Power and Energy Systems
8. Communication and Information Systems
9. Water and Wastewater Systems

Disaster Resilience Standards Panel (DRSP) Charter

October 27-28 Workshop
Norman, OK

The following chapters will be addressed at the October Workshop, in addition to continued work on the chapters addressed at the July Workshop:

1. The Community
4. Sectors, Interdependencies and Cascading Effects
10. Tools and Metrics for Evaluating Disaster Resilience

Goals of Working Sessions

- Develop awareness of community issues vs sector or owner issues
- Identify topics that need to be added or better addressed to achieve community resilience
  - These are 25% drafts!
- Learn about interests and issues for all stakeholders
  - Tell us what you like or don't like!

Built Environment

- What tools are needed by people, business, and government to achieve resilience?
  - Buildings
    - Government, healthcare, schools, residential, commercial, etc.
  - Infrastructure Systems
    - Transportation, power, energy, communication, information, water, waste water
  - Best defined in terms of recovery times


Source: NIST


Source: NIST


Source: NIST

Community Resilience

- The ability to return to full occupancy and function as soon as needed to support a well planned and expedited recovery.
  - Transparent Hazard Definitions
  - Transparent Performance Measures for the Built Environment
  - Restoration Goals that support response and recovery

Hazard Event and Performance Level Definitions

Level	Definition
Routine	Buildings and systems should be capable of remaining fully operational and not experience any significant damage.
Expected	The building or system 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 hazard level 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 occupants and allows them to evacuate safely.
	Emergency response plans should be planned for this extreme level.

Performance Levels for After-Event Evaluation

Category	Buildings Performance Standard
A	**Safe and Operational** Essential facilities such as hospitals and emergency operations centers
B	**Safe and usable during repair** “Shelter in place” residential buildings, neighborhood businesses and services, and buildings needed for emergency operations
C	**Safe and not usable** The minimum needed to save lives. These facilities may be repaired or needed to restore the economy.
D	**Unsafe – partial or complete collapse** Damage that will lead to casualties

Performance Levels for After-Event Evaluations

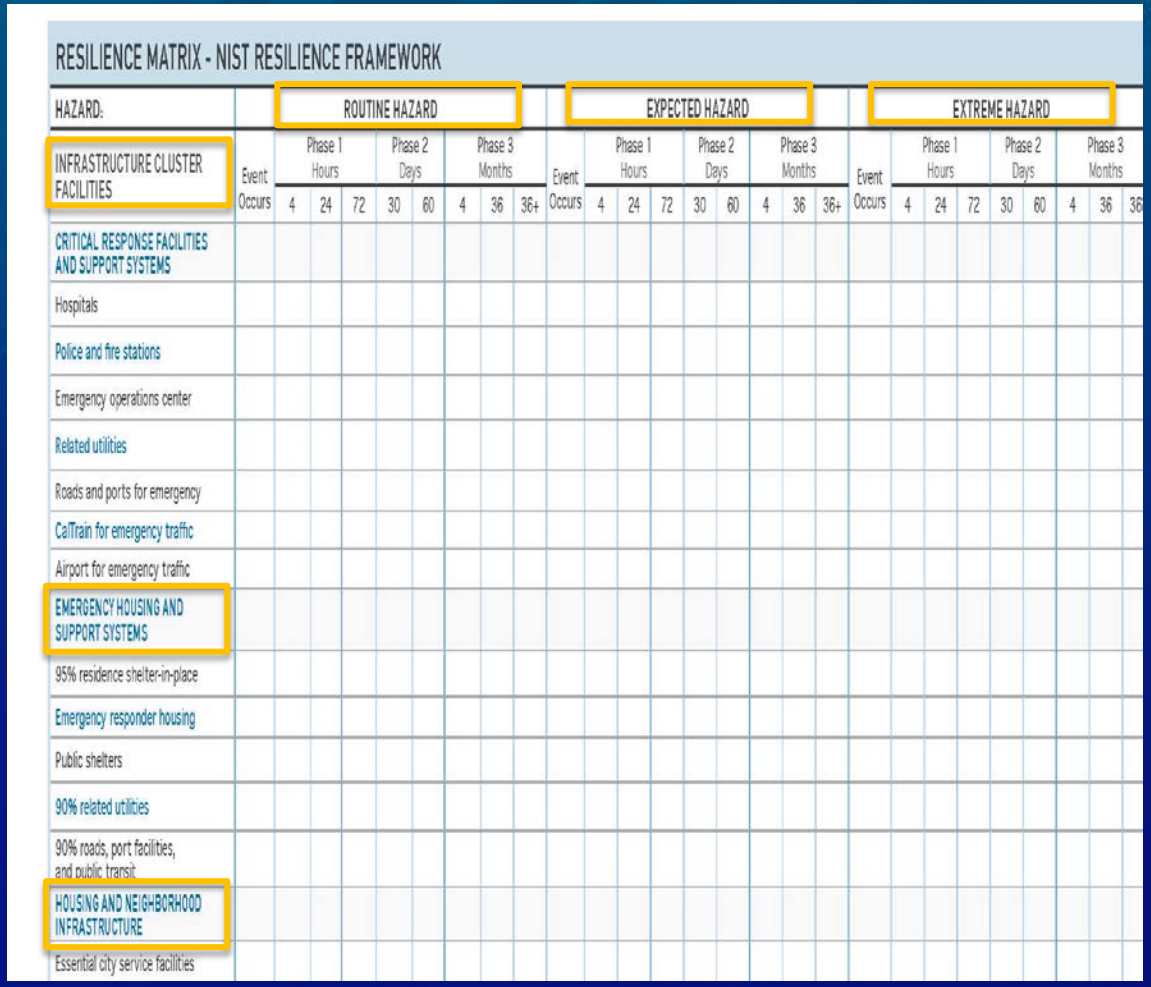
Category	Infrastructure System Performance Standard
I	Resume 100% service within days
II	Resume 90% service within weeks and 100% within months
III	Resume 90% service within months and 100% within years

Hazard Events

Hazards	Types and Effects
Wind	Storms, hurricane, tornadoes
Earthquake	Ground shaking, faulting, landslides, liquefaction
Inundation	Riverine flooding, coastal flooding, tsunami
Fire	Building, wildfire
Snow/ Rain	Freeze/thaw
Man-made	Blast, vehicular impact

Resilience Recovery Matrix

- Hazard Levels vs Recovery Times
- Clusters or groupings
  - Critical Response
  - Emergency Housing
  - Neighborhoods
  - Community Recovery

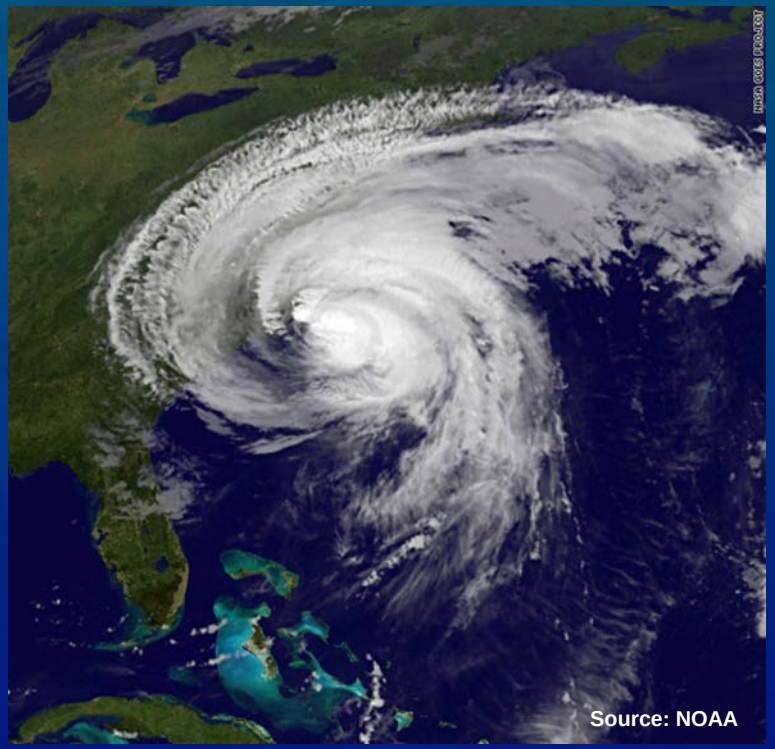


RESILIENCE MATRIX - NIST RESILIENCE FRAMEWORK

HAZARD:		ROUTINE HAZARD									EXPECTED HAZARD									EXTREME HAZARD								
INFRASTRUCTURE CLUSTER FACILITIES	Event Occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months			Event Occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months			Event Occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months		
		4	24	72	30	60	4	36	36+		4	24	72	30	60	4	36	36+		4	24	72	30	60	4	36	36
CRITICAL RESPONSE FACILITIES AND SUPPORT SYSTEMS																											
Hospitals																											
Police and fire stations																											
Emergency operations center																											
Related utilities																											
Roads and ports for emergency																											
CalTrain for emergency traffic																											
Airport for emergency traffic																											
EMERGENCY HOUSING AND SUPPORT SYSTEMS																											
95% residence shelter-in-place																											
Emergency responder housing																											
Public shelters																											
90% related utilities																											
90% roads, port facilities, and public transit																											
HOUSING AND NEIGHBORHOOD INFRASTRUCTURE																											
Essential city service facilities																											

A Successful Workshop will…

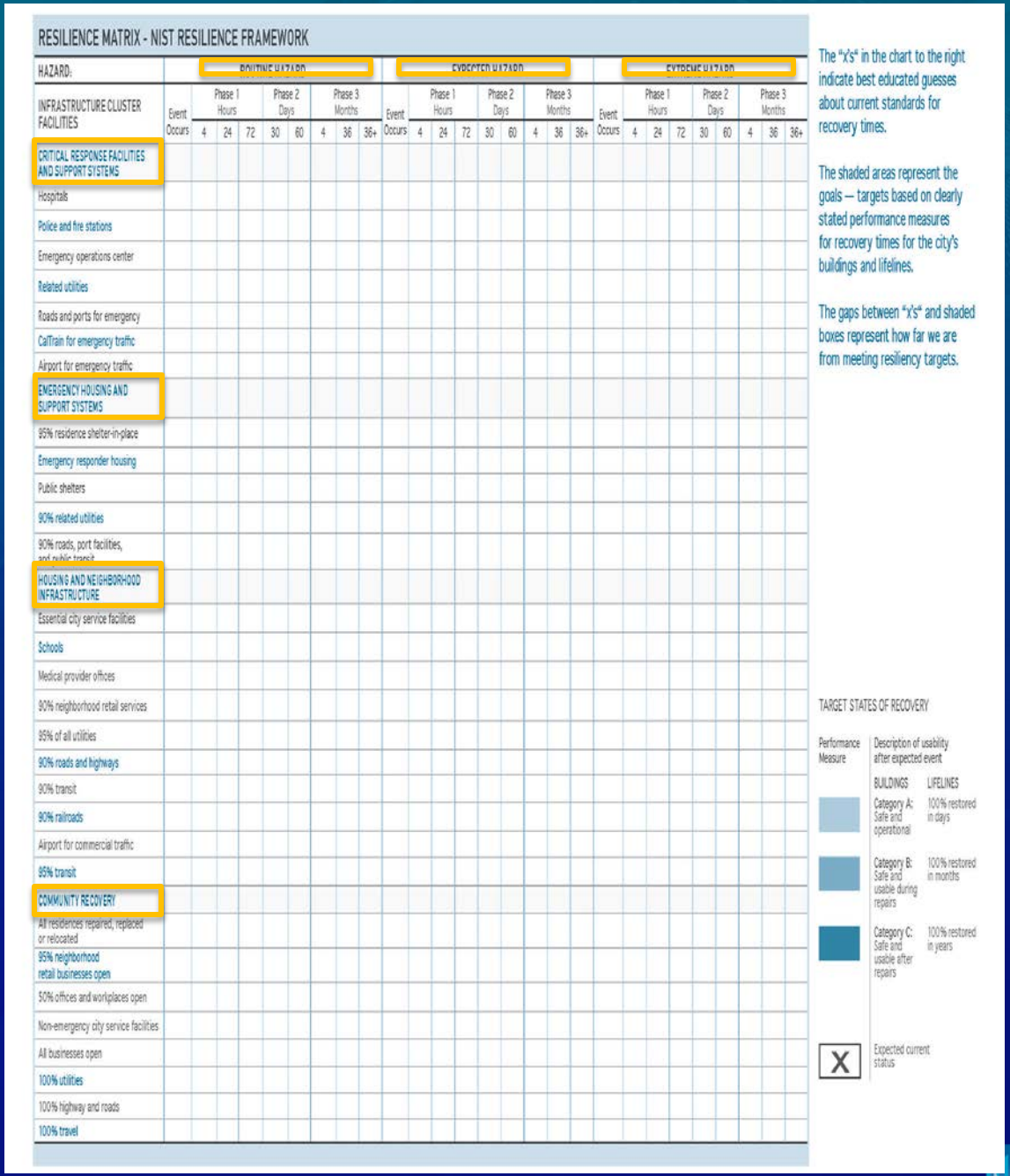
- Advance the Framework scope and content
- Engage stakeholders for continued input
- Develop interest among potential members of the DRSP



Questions ?

Resilience Matrix

- Hazard Levels vs Recovery Times
- Clusters or groupings
  - Critical Response
  - Emergency Housing
  - Neighborhoods
  - Community Recovery



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HOUSING AND NEIGHBORHOOD INFRASTRUCTURE																											
Essential city service facilities																											
Schools																											
Medical provider offices																											
90% neighborhood retail services																											
95% of all utilities																											
90% roads and highways																											
90% transit																											
90% railroads																											
Airport for commercial traffic																											
95% transit																											
COMMUNITY RECOVERY																											
All residences repaired, replaced or relocated																											
95% neighborhood retail businesses open																											
50% offices and workplaces open																											
Non-emergency city service facilities																											
All businesses open																											
100% utilities																											
100% highway and roads																											
100% travel																											

The "x's" in the chart to the right indicate best educated guesses about current standards for recovery times.

The shaded areas represent the goals – targets based on clearly stated performance measures for recovery times for the city's buildings and lifelines.

The gaps between "x's" and shaded boxes represent how far we are from meeting resiliency targets.

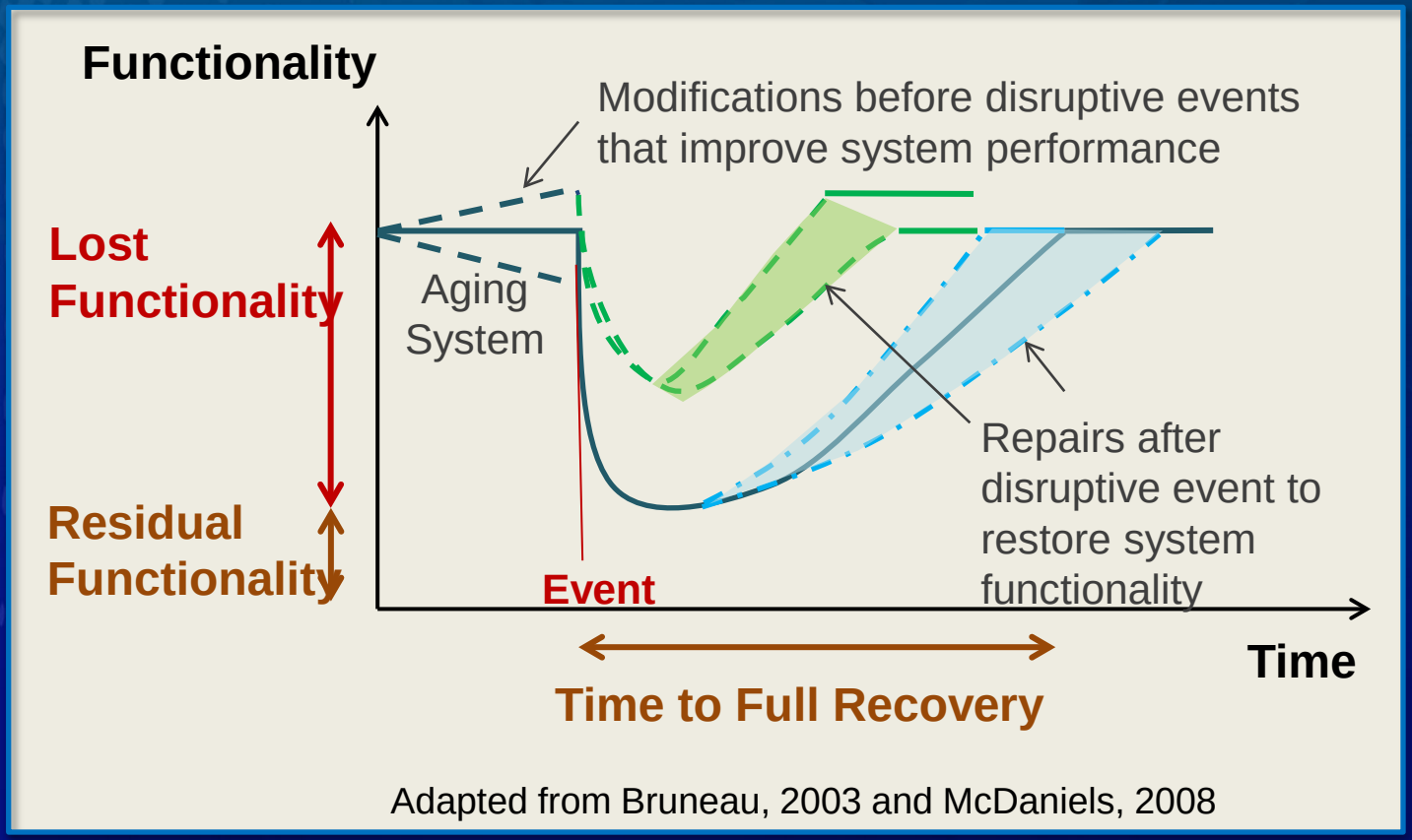
TARGET STATES OF RECOVERY

Performance Measure	Description of usability after expected event		
	BUILDINGS	LIFELINES	
	Category A: Safe and operational	100% restored in days	
	Category B: Safe and usable during repairs	100% restored in months	
	Category C: Safe and usable after repairs	100% restored in years	
X	Expected current status		

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

Community Resilience