Business Investment: Developing Standards to Evaluate the Economics of Community Resilience

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Reference: NIST Special Publication 1197
What is the Problem?

• Natural and man-made disasters result in significant costs due to direct and indirect losses.
• Superstorm Sandy caused over $65B in losses.
• Large single events can cause losses exceeding $100B.
• Current approach of response and rebuilding is impractical and inefficient for dealing with natural disasters.
• Planning does not account for interconnected nature of buildings and infrastructure, nor for the affect on social institutions.
• Changing nature of hazards is not always considered.
NIST Community Resilience Program

**Stakeholder Engagement**
- Community Resilience Planning Guide
- DRSP
- Community Resilience Implementation Guideline

**Research**
- Systems-Based Modeling
- Community Resilience Assessment Tool
- Economics-based Decision Support Tool

**Center of Excellence**
- Integrated, multi-scale modeling
- Database Architecture
- Pilot Studies

*Stakeholder Engagement component is called out in the President’s Climate Action Plan (2013).
What is Resilience?

• Resilience is defined as:
  – “the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies”. (PPD-8)
  – “the ability to prepare for and adapt to changing conditions and to withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.” (PPD-21)

• In the context of community resilience, the emphasis is not solely on mitigating risk, but implementing measures to ensure that the community recovers to normal, or near normal function, in a reasonable timeframe.
What is a Community?

The term “community” refers to a place that:

- Is designated by geographical boundaries
- Functions under the jurisdiction of a governance structure, such as a town, city, or county.

Each community has its own identity based on its location, history, leadership, and available resources.

Some systems (e.g., electric power) often extend beyond the boundaries of the community.
Community Needs Drive Functional Requirements for the Built Environment

- Social systems drive the performance requirements for our built environment
  - Resilience levels for facilities and infrastructure systems depend on their role in the community, and
  - Enable a rational prioritization of available resources.
Community Resilience Planning Guide

- Form a Collaborative Team
- Understand the Situation
- Determine the Goals and Objectives
- Plan Development
- Plan, Preparation, Review and Approval
- Plan Implementation and Maintenance
Economic Decision Guide

Provides a standard methodology for evaluating investment decisions aimed at improving the resilience of communities.

- Specifically designed for use with NIST’s Community Resilience Planning Guide for Buildings and Infrastructure Systems.
  - Provides a mechanism to evaluate the efficiency of resilience actions and to prioritize them.

- Frames the economic decision process
  - Identifies and compares resilience-related benefits & costs.
    - Across competing alternatives.
    - Versus the status quo (do-nothing).
Process Overview

Select Candidate Strategies
- Form a Collaborative Planning Team
- Understand the Situation
- Determine Community Goals & Objectives
- Plan Development

Define Investment Objectives and Scope
- Define Economic Objective Function
- Define Planning Horizon
- Identify Constraints

Identify Benefits and Costs
- Identify Costs & Losses
- Identify Savings & Benefits
- Identify Externalities

Identify Non-Market Considerations
- Value of a Statistical Life
- Value of a Statistical Injury
- Identify Sociocultural Impacts
- Identify Environmental Impacts

Define Analysis Parameters
- Select Discount Rate
- Define Probability Distributions
- Define Risk Preference

Perform Economic Evaluation
- Compute Present Expected Value
- Evaluate Impact of Uncertainty

Select Strategies
- Plan Preparation, Review, & Approval
- Plan Implementation & Maintenance
Future Directions

• Additional resources are needed to ensure that the economic evaluations are *straightforward, transparent* and *repeatable* within a given community, across communities, and over time.

• To achieve this objective, two additional resources are needed:
  1. Industry consensus standards focused on the economics of community disaster resilience and
  2. A user-friendly decision-support software tool based on those standards.

• Develop industry consensus standards to evaluate the economics of community resilience.
Let’s Connect!

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