Energy and Climate Partnership of the Americas (ECPA)

Building Urban Resilience

NIST Community Resilience Tools and Research

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Community Resilience Program

National Institute of Standards and Technology

Website: http://www.nist.gov/el/resilience/

Google: NIST Community Resilience

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

Community Resilience Measurement Challenges

- **Metrics**
  - Identifying a minimum set of metrics to inform community resilience status
- **Data**
  - Varying spatial and temporal scales of data; Lack of recovery data to inform models
- **Models**
  - Integrate physical, social, economic data and analyses; Validate at community scale
- **Decision Support**
  - Short and long term decisions, before and after disruptive events

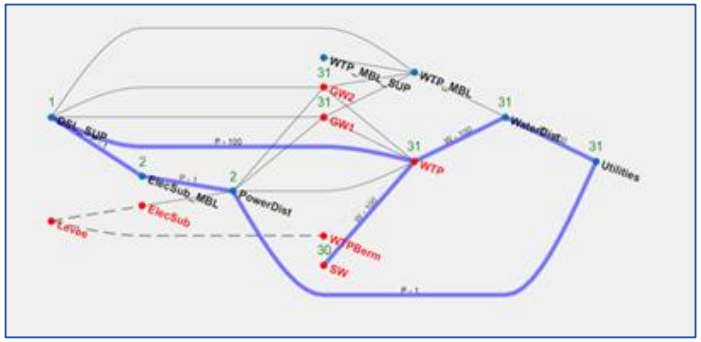
NIST Community Resilience Program

<u>Community Engagement</u>: Outreach, Collaboration, and Input

- ***Resilience needs*** of communities – planning, data, tools, guidance
- ***Data and decision 'levers'*** – being used or needed

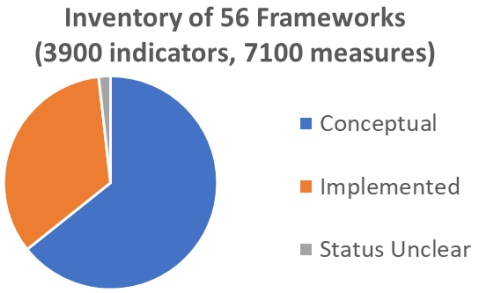
<u>Science-Based Tools</u>: Assess resilience and support informed decision making

- ***Guidance and best practices*** – social, economic, built systems
- ***Modeling*** – pre- and post-event performance assessment, alternate outcomes
- ***Metrics*** – quantitative and qualitative measures
- ***Economics*** – Small business, supply chain, resilience dividend
- ***Codes and standards*** – Improved design and assessment methods



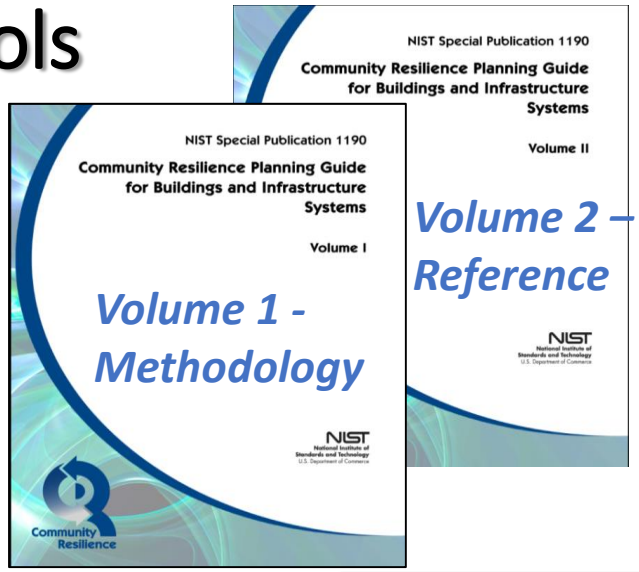
<u>Disaster and Failure Studies</u>: Metrology for field studies and data collection

- Improved field ***tools and methods***
- Integrated and longitudinal ***data collection***
- Loss of ***functions and services***



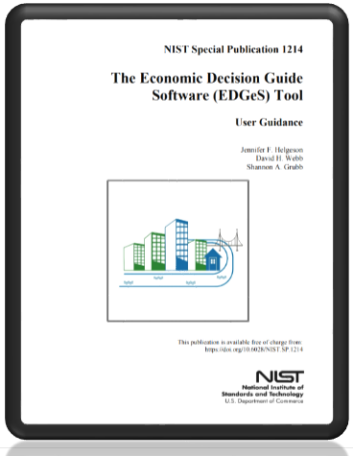
NIST Community Resilience Tools

http://www.nist.gov/el/resilience/



Community Resilience Planning Guide

- Planning at the community scale
- Links social needs and building and infrastructure performance
- Establish community resilience goals
- Local government is the logical convener for comprehensive resilience planning



Economic Decision Guide

- Standard approach for consistently evaluating investment decisions (ASTM Standard E3130)

EDGe$ Software Tool

- Tool to assist decision-makers with resilience planning choices
- Beta version available at User Guide with example planning scenarios: NIST.SP.1214.pdf

Center for Risk-Based Community Resilience Planning

- Led by Colorado State University with ~12 institutions
- Completing its 5th year of collaboration with NIST
- Objectives
  - **Community model (IN-CORE)**
    - Integrated, systems analysis tool
    - Buildings, infrastructure, dependencies
    - Population dislocation, housing, social institutions
    - Tax base, revenue/income
    - Decision support
    - First release with 2 case studies – December 2019
  - **Data management tools**
    - Multi-disciplinary, multi-scale data integration
    - Standard formats
  - **Field studies**
    - Validate models and tools
    - Testbeds - Seaside, OR; Galveston, TX; Shelby County, TN
    - Hindcast - Joplin, MO
    - Field Study – Lumberton, NC

Resilience

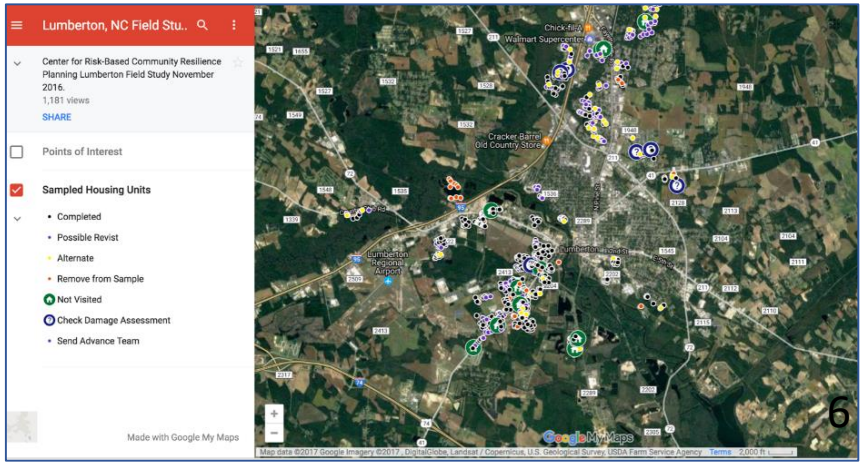
NIST and CoE Longitudinal Field Study

Lumberton, NC Impacts from 2016 Hurricane Matthew

- Novel field study data collection methods:
  - Focus around social dimensions (*e.g., education*) critical to community resilience
  - Surveys and sampling plans ensure representation of physical damage, socio-demographics, and housing types
  - GIS-enabled structured surveys that integrate physical and social impacts

Hazard Event	Wave 1	Wave 2	Hazard Event	Wave 3
Oct 2016	Nov 2016	Jan 2018	Sep 2018	Apr 2019

NIST Special Publication (NIST SP 1230)



Data, Information, and Tools Workshop

Community Resilience Planning and Decision-Making (NIST SP 1240)

Summary of Potential Next Steps

Community Resilience Goals and Metrics (Chapter 2)	Data and Information (Chapter 3)	Community Resilience Tools (Chapter 4)	Community Resilience Planning (Chapter 5)	Funding Sources and Economic Decision Support (Chapter 6)	Communi-cation with Stakeholders (Chapter 7)
Core Set of Standard Community Resilience Indicators and Metrics	Common Community Resilience Data Standards	Visualization Tools for Communities	Standard Approach for Community Resilience Planning	Awareness & Coordination of Resilience Funding Resources	Stakeholder Communi-cation Best Practices
Methodology for Aggregation or Dis-aggregation of Data from Multiple Sources	Best Practices to Aid Curation & Dissemination of Validated Data & Tools	Engagement between Community Users and Tool Developers	Leadership Training and Certification	Resilience Benefits in Financial Products Economic Decision Support Tools	Risk & Benefits Communi-cation Methods