Data, Information, and Tools Needed for Community Resilience Planning and Decision-Making

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NIST Community Resilience Program

ASTM Webinar on Buildings, Communities, and Resilience

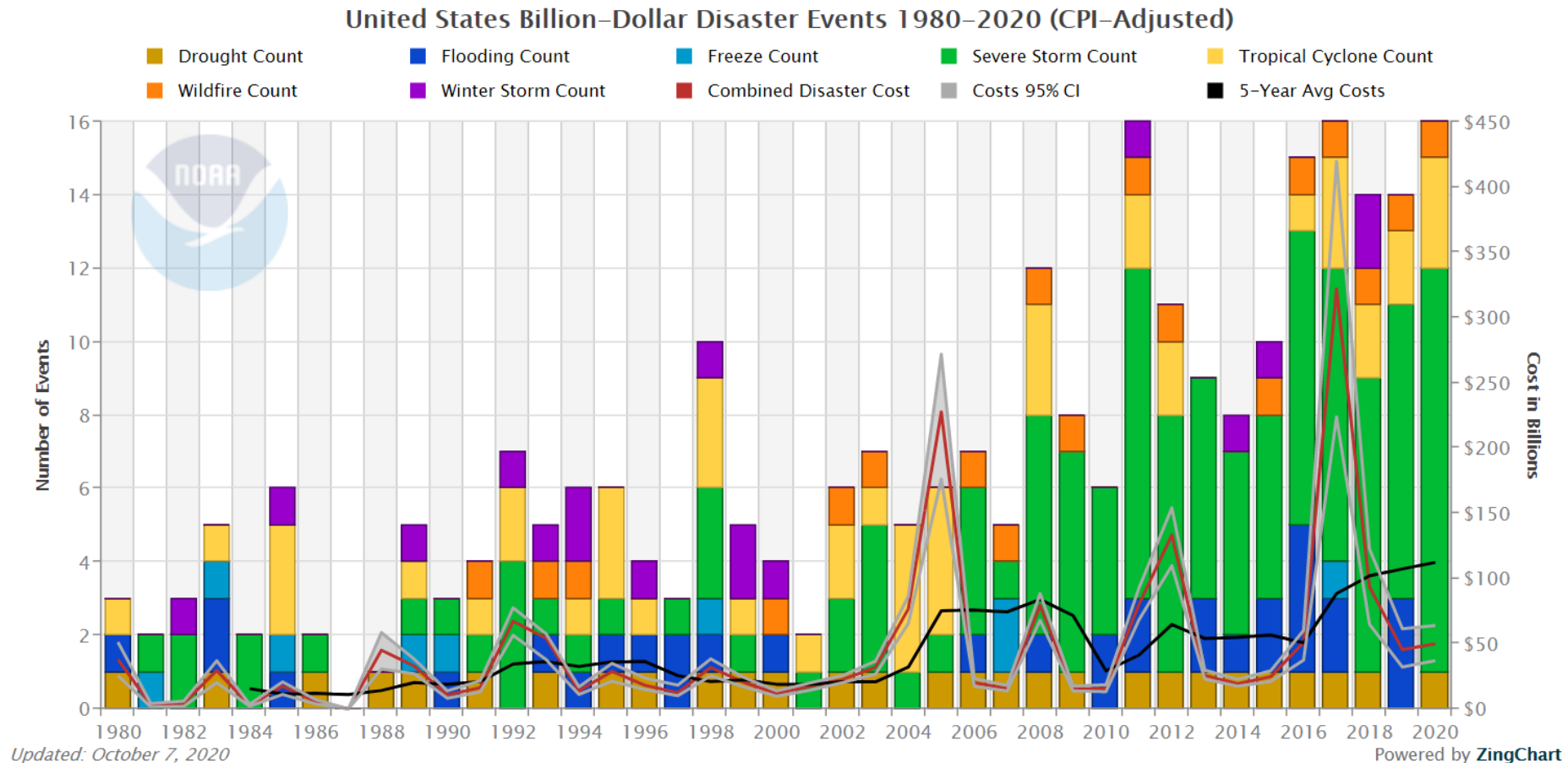October 14, 2020

How NIST Defines Resilience

Resilience is the ability to _prepare for_ and _adapt to_ changing conditions and to _withstand_ and _recover rapidly_ from disruptions. (PPD-8, PPD-21)

Tulsa, OK Bishop Tract Detention Facility

Community resilience goes beyond mitigating risk and includes implementing measures to ensure that the community recovers its function in a specified timeframe.

Image: http://www.100resilientcities.org/learning-from-disaster-tulsas-resilient-floodplain-design/

Billion-Dollar Weather and Climate Disasters: Time Series (NOAA 2020)

United States Billion-Dollar Disaster Events 1980–2020 (CPI-Adjusted)

NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (Oct 7, 2020). https://www.noaa.gov/news/us-hit-by-16-billion-dollar-disasters-year-so-far

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Why Community Resilience Planning?

- All communities face potential disruption from hazards.

- Communities bear primary responsibility to respond to the damage and impacts.

- Resilience includes planning and implementing **prioritized** measures to restore functions and services in a timely way – and build back better.

- The built environment exists to serve social functions (e.g., a hospital provides healthcare).

- Therefore, **social functions should drive the performance goals** of buildings and physical infrastructure.

City of Tulsa Centennial Park (100 Resilient Cities, 2015)

Community Focus

- National Disaster Recovery Framework (2016)
  - Community Focused Recovery: "The responsibility of preparing for disaster recovery begins with the individual and builds to the larger responsibility of the community and local government. The **local government has the primary role of planning and managing all aspects of the community's recovery.**"
  - "…community assumes leadership in **developing recovery priorities** and activities that are realistic, well-planned, and clearly communicated."
- Fulfilling this vision can be a technically complex, organizationally complex, and resource-intensive process.
- Communities are where the effects of hazards are most immediately realized; where mitigation and recovery are most effective.
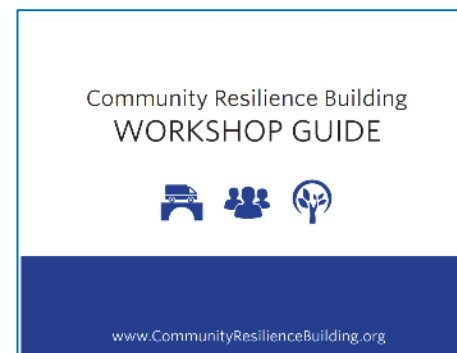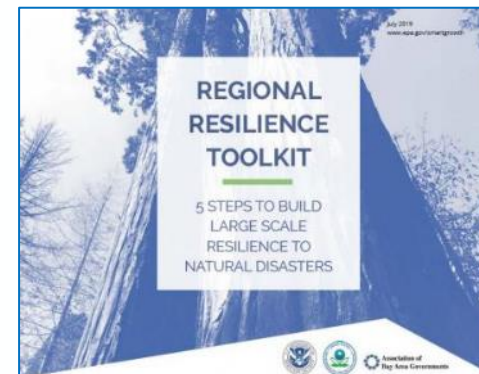

Joplin 2011 Tornado

2017 Tubbs Wildfire

Report on "Data, Information, and Tools Needed for Community Resilience Planning and Decision-Making"

https://tinyurl.com/resilence-data-info

Community Resilience Planning Research & Practice - Where are we now?

- The research community is engaged in aiding community & decision maker resilience planning efforts.

- Researchers, practitioners, and government agencies are providing:
  - Planning guidance and tools
  - Qualitative and quantitative data with a variety of formats
  - Data and tool portals to provide 'one stop shopping'
  - Simple to complex modeling environments

- Communities are responsible for integrating the diversity of resources available. But, what are they looking for?
  - Validated and accepted methods, data and data formats, and tools for resilience
  - Guidance on when and how methods, data, and tools are applicable
  - Technical assistance applying these methods and guidance

Objectives of Oct 2018 Community Resilience Workshop on Data Needs for Resilience Planning and Decision Making

- Gain a more complete understanding of **communities' decision-making processes** associated with resilience planning at the community level,

- Identify issues associated with the **data and information needed** to support community resilience planning and decision-making,

- Identify **common data needs of communities and researchers** for the development and use of tools, and

- Identify **actions to support the development of analysis tools** that support planning and decision-making by communities.
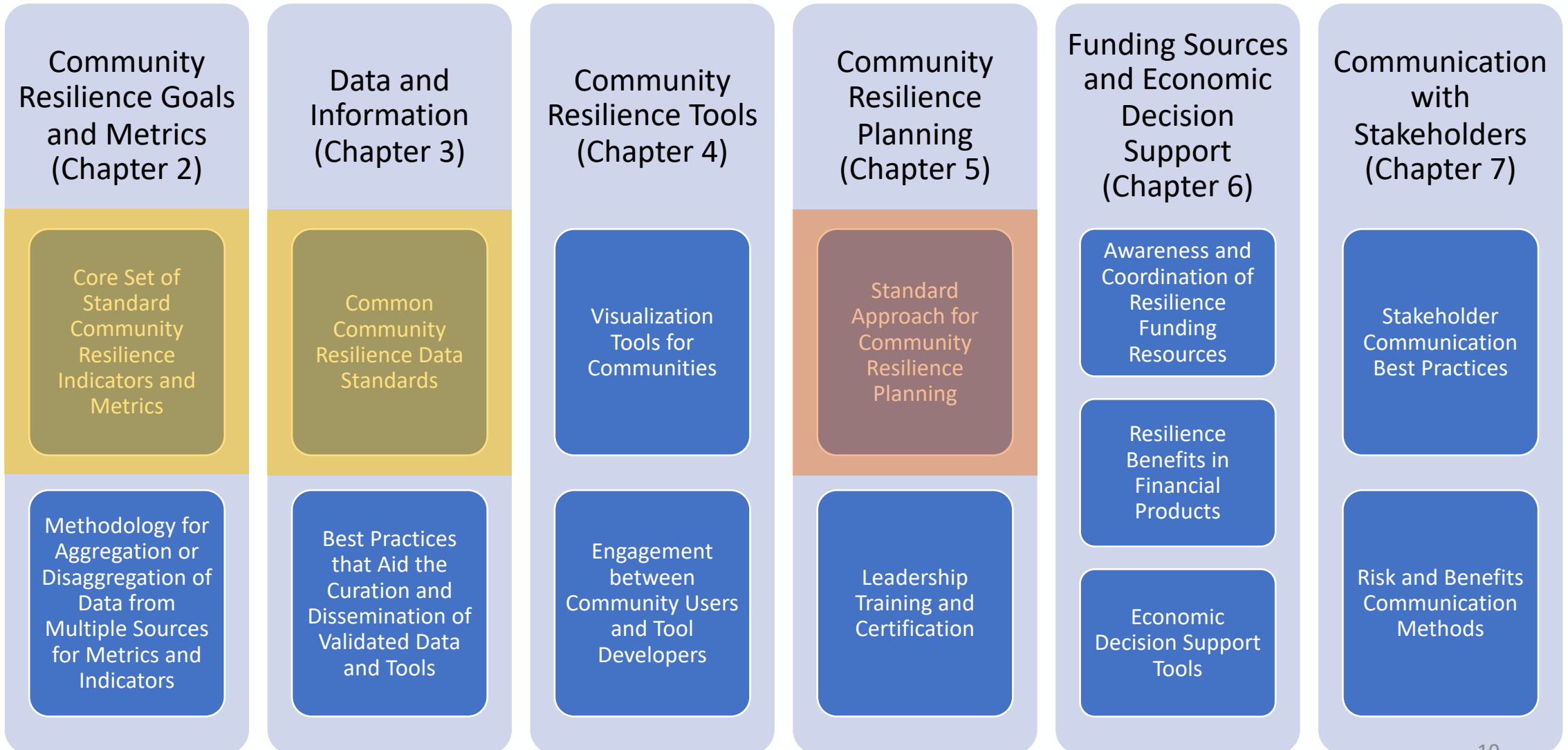
Key Take Aways (1/2)

1. Communities seek practical **approaches and methods** to develop resilience plans, communicate with stakeholders, and track progress.

2. **Resilience data standards** would improve the accessibility of data and tool development.

3. Advancing plan implementation requires **identifying optimal funding opportunities and evaluating economics** of resilience projects.

Key Take Aways (2/2)

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)	Communication 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 and Coordination of Resilience Funding Resources	Stakeholder Communication Best Practices
Methodology for Aggregation or Disaggregation of Data from Multiple Sources for Metrics and Indicators	Best Practices that Aid the Curation and Dissemination of Validated Data and Tools	Engagement between Community Users and Tool Developers	Leadership Training and Certification	Resilience Benefits in Financial Products	Risk and Benefits Communication Methods
				Economic Decision Support Tools	

Community Resilience Goals & Metrics

- ## Current Practices & Approaches
  - Many metric and indicator frameworks for performance and function of social, economic, physical, natural systems
    - Majority of frameworks in conceptual stage (vs implemented)
  - Validation remains a challenge
  - Data assimilation challenge for application of national to local data for community-scale outcomes

- ## Future Needs
  - Core Set of Standard Community Resilience Indicators and Metrics, and Data Requirements
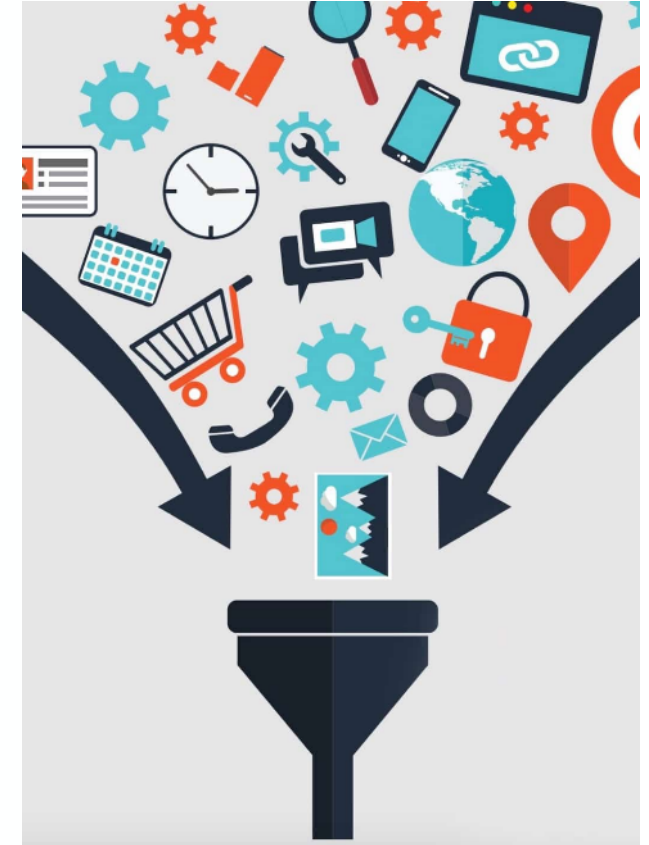 - Methodology for Aggregation or Disaggregation of Data from Multiple Sources for Metrics and Indicators

Data & Information

Current Challenges, Practices & Approaches

- Local government developed data management systems, databases for unique planning needs and requirements
- Challenges persist in research-practitioner-community coordination:
  - Discovery and access of public data in a timely manner
  - Understand appropriate uses of the data for resilience planning
  - Ensuring that data are compatible with the platforms and analytical tools in use

Future Needs

- Development of Data Standards, Data Management, and Best Practices
- Processes that Aid the Curation and Dissemination of Validated Data

Data and Information – Community-Cited Sources

Built environment

Adopted building code at time of building construction

Structural plans and drawings (when required)

Number of dwelling units

Construction type

First floor elevation (FFE)

Location of heating, ventilation, and air conditioning (HVAC) systems

Social and Demographic

Population and household data [American Community Survey, Census Bureau]

Population, household, and transportation data [US Census of Population and Housing, CDC Social Vulnerability Index]

Household information - Community Assessment for Public Health Emergency Response (CASPER) [CDC]

Economic

Assessed value of structures

Employment and wages data [BLS]

County or community tax data

Community Resilience Planning

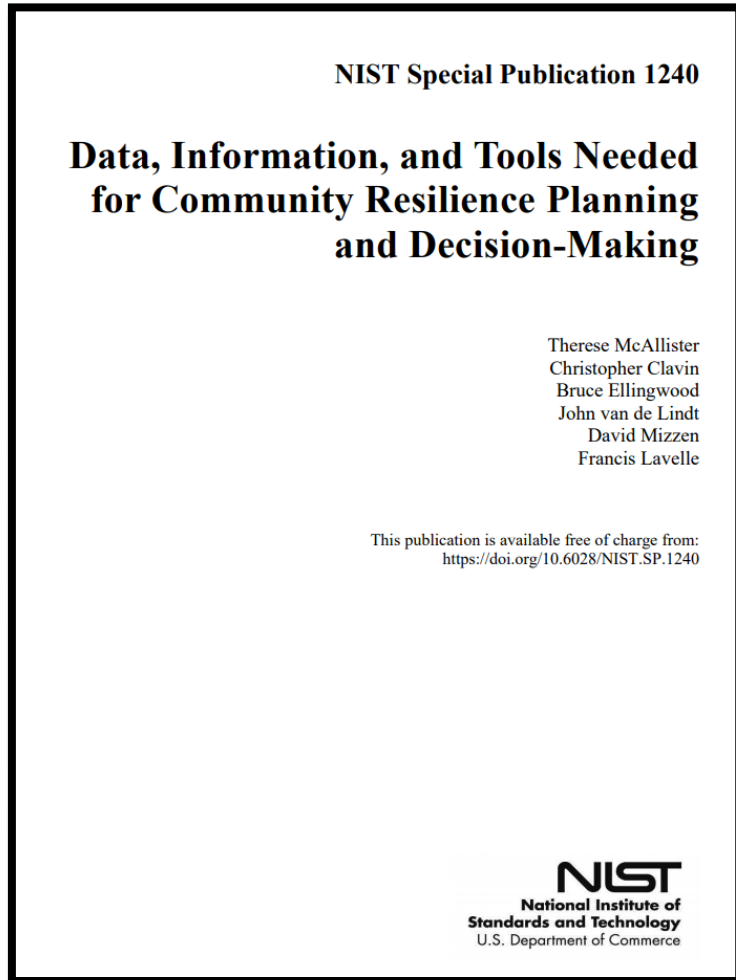**Current Challenges, Practices & Approaches**

- Wide range of approaches for supporting communities efforts to address natural hazards and future climate impacts

- A standard approach for community resilience planning is lacking.

    - Examples:

        - Hazard Mitigation Plan Requirements

        - MA Municipal Vulnerability Program

        - Regional Resilience Toolkit (EPA)

        - 100 Resilient Cities

        - NIST Community Resilience

- Communities have existing requirements for planning (e.g. comprehensive plans, economic development, hazard mitigation).

- Resilience should guide and be integrative, but often is supplemental.

Future Needs

- Standard Approach for Community Resilience Planning

- Education, Leadership Training and Certification

Acknowledgements & Resources

NIST Special Publication 1240

Data, Information, and Tools Needed for Community Resilience Planning and Decision-Making

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- Report: https://nvlpubs.nist.gov/nistpubs/specialpublications/NIST.SP.1240.pdf

- Also: https://tinyurl.com/resilence-data-info

- Other resources:
  - NIST Community Resilience Program: https://www.nist.gov/topics/community-resilience
  - NIST Community Resilience Planning Guide: https://www.nist.gov/topics/community-resilience/planning-guide
  - EDGe$ Online Tool: https://edges.nist.gov

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Thank You

Email: christopher.clavin@nist.gov

Data & Info for CR Planning Report: https://tinyurl.com/resilence-data-info

Website: https://www.nist.gov/topics/community-resilience

Image Source (L-R): (1) Getty Images, Oct 23, 2017; (2) Sonoma Magazine, Oct 23, 2017. (3) NPR, Getting Back What You Lost — Rebuilding In A Wildfire Zone, Oct 16 2018; (3)