Subcommittee on Disaster Reduction

Washington, DC

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NIST Community Resilience Program

Therese McAllister, PhD, PE
Leader, Community Resilience Group

therese.mcallister@nist.gov

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

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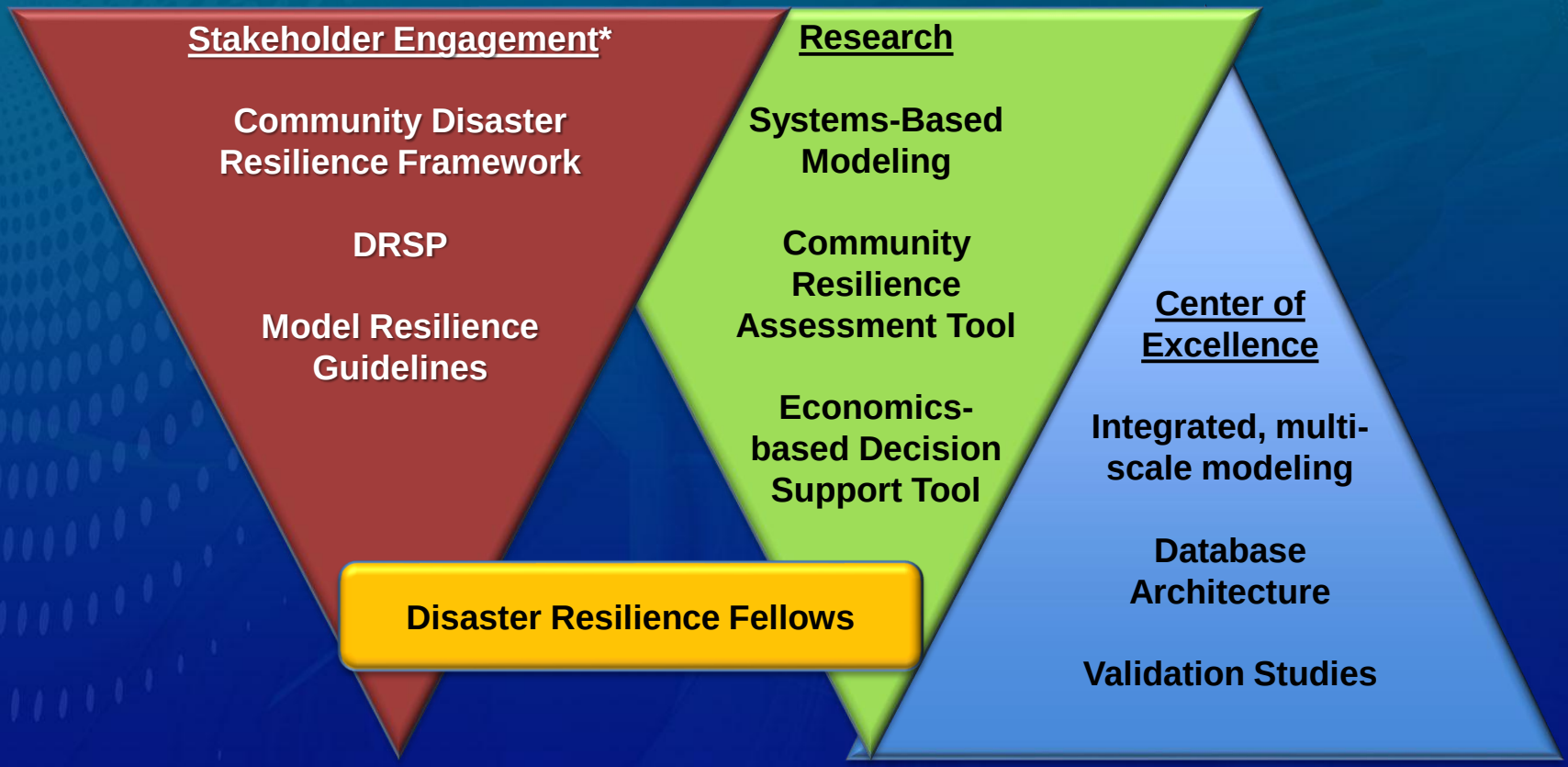


*Stakeholder Engagement component is called out in the President's Climate Action Plan

Community Disaster Resilience Framework (CDRF)

- The CDRF is targeted to local government as a logical convener
- Provides a comprehensive, customizable tool to help communities plan and implement resilience measures and to recover efficiently
- The Disaster Resilience Framework complements the National Mitigation Framework (PPD-8)
- The framework has benefitted from extensive public and private sector input

CDRF Outline

- Volume 1 – 25 pages
  - Call to Action
  - Executive Summary
  - Chapter 1: Introduction
  - Chapter 2: Establishing the Resilience Team
  - Chapter 3: Characterizing the Community
  - Chapter 4: Disaster Resilience Plan
  - Chapter 5: Implementation
  - Chapter 6: Future Directions
  - Appendix: Worked Example
- Volume 2
  - Chapter 7: Characterize the Social Community
  - Chapter 8: Dependencies
  - Chapter 9: Buildings
  - Chapter 10: Transportation
  - Chapter 11: Energy
  - Chapter 12: Communications
  - Chapter 13: Water and Wastewater
  - Chapter 14: Metrics

Framework Development Process

Next Steps – Stakeholder Engagement

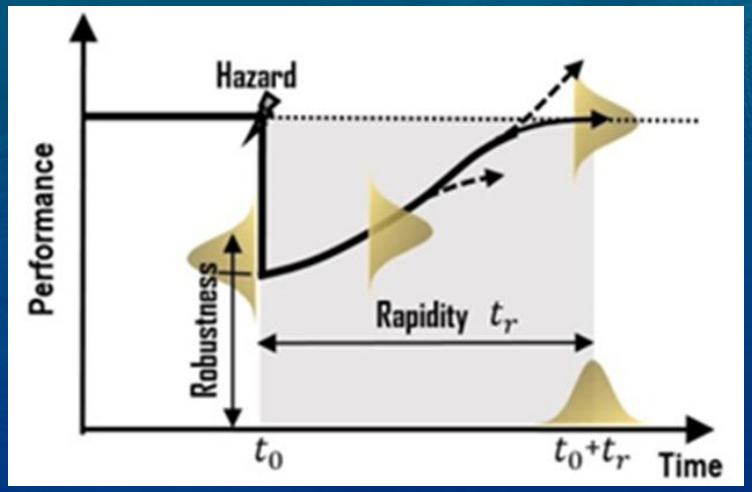
- Disaster Resilience Standards Panel
  - Planning to develop charter and bylaws has been conducted in parallel with the Framework development
  - Federal Register Notice to request interested parties indicate their interest
  - First meeting planned for August 2015
- Identify Pilot Communities
  - Work with communities interested in using the framework to develop resilience plans
  - Gather feedback to support revisions to Framework
- Model Resilience Guidelines
  - Provide guidance based on existing codes, standards, and best practices
  - Support implementation of resilience plans by communities

Federal Agency Engagement

- Federal Agency representatives have participated in workshops
- Comments on 50% and 75% framework drafts received from several agencies
- Cross-agency coordination is occurring through Climate Action Plan Insurance work streams MitFLG, and other mechanisms.
- NIST sent the latest draft to federal agencies for comments before the release for public comment; comments due April 8.

Community Resilience Center of Excellence

- $4M/year cooperative agreement for 5 years, renewable for a total of 10 years



- Objectives
  - Develop an integrated, multi-scale, computational modeling environment (NIST-CORE) for community systems to support development of new standards and tools for assessment and decision making
  - Foster the development of data architectures and data management tools to enable disaster resilience planning
  - Conduct studies to validate resilience data architectures, data management tools, and models

Community Resilience Center of Excellence

- Awarded to Colorado State University (CSU) and 9 other institutions on 19 February 2015
- NIST researchers and the Center will collaborate and conduct research to develop the science basis for decision-support tools for local governments
- The decision support system will be embedded in a state-of-the-art computational environment that integrates
  - physics-based modeling of buildings and other infrastructure, including dependencies and cascading effects
  - networks for transportation, energy, water, and communication
  - a spectrum of hazards and hazard intensities
  - models of socio-economic networks
  - resilience-based performance criteria and metrics

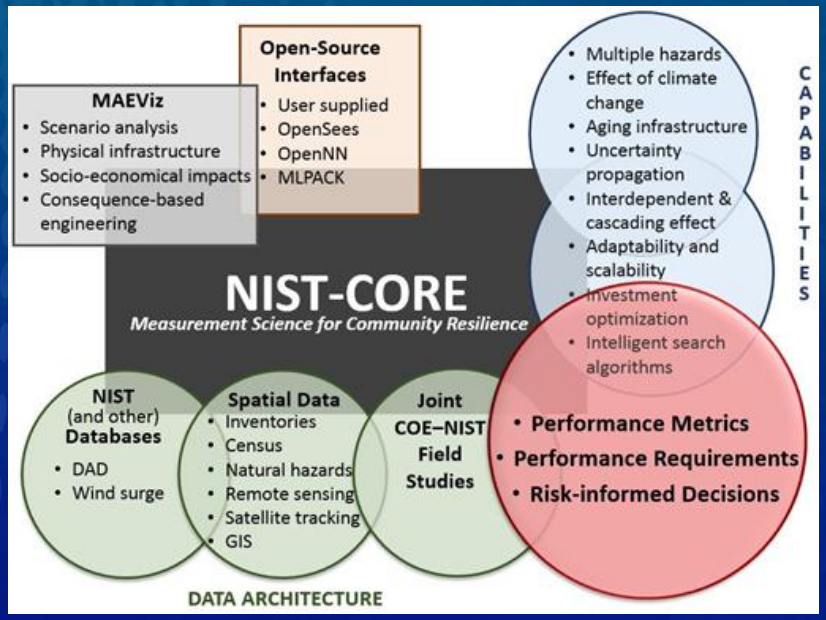
Community Resilience CoE

- Principal Investigators and Co-directors
  - CSU, John W. van de Lindt, George T. Abell Distinguished Professor of Infrastructure
  - CSU, Bruce Ellingwood, Professor of Civil and Environmental Engineering, NAE
- Associate Directors
  - University of Illinois at Urbana-Champaign, Paolo Gardoni, Professor of Civil and Environmental Engineering
  - Oregon State University, Daniel Cox, Professor of Civil and Environmental Engineering
- Teams
  - Engineering, Economics and Social Science, Data/Framework

Community Resilience CoE Institutions

- Colorado State University
- Oregon State University
- University of Illinois at Urbana-Champaign
  - **National Center for Supercomputing Applications (NCSA)**
- University of Oklahoma
- Rice University
- Texas A&M University
- University of Washington
- University of South Alabama
- California Polytechnic University in Pomona
- Texas A&M-Kingsville

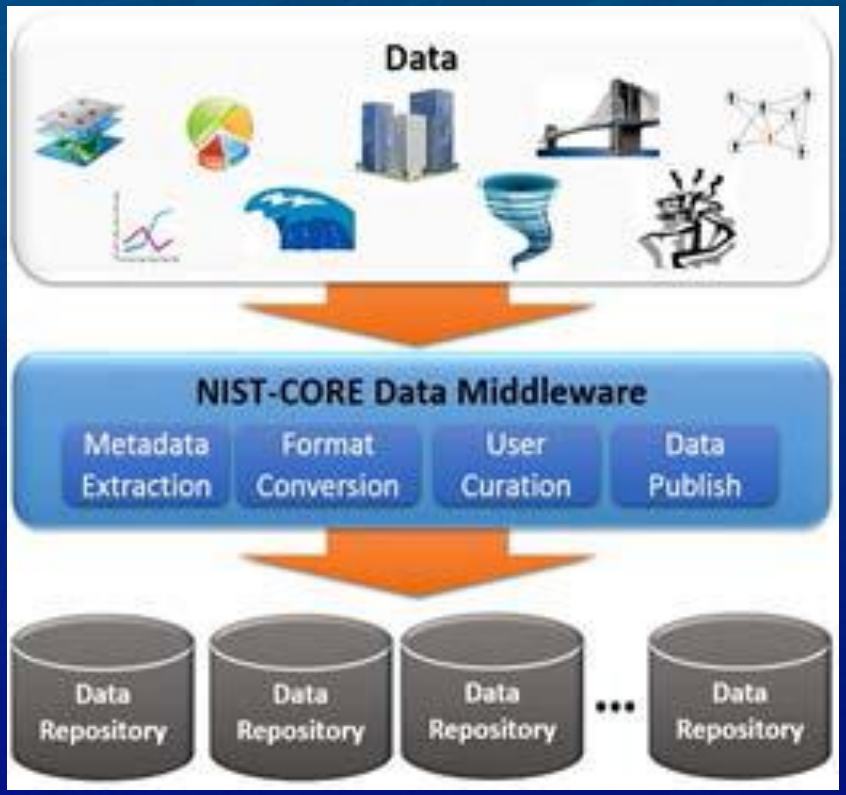
NIST-CORE
NIST-Community Resilience Modeling Environment



- The centerpiece will be NIST-CORE
  - Open-source platform
  - Computer model and associated software and databases
  - Risk-informed approach to decision-making
  - Quantitative comparisons of different resilience strategies
  - Integrated social systems vital to the functioning and recovery of communities

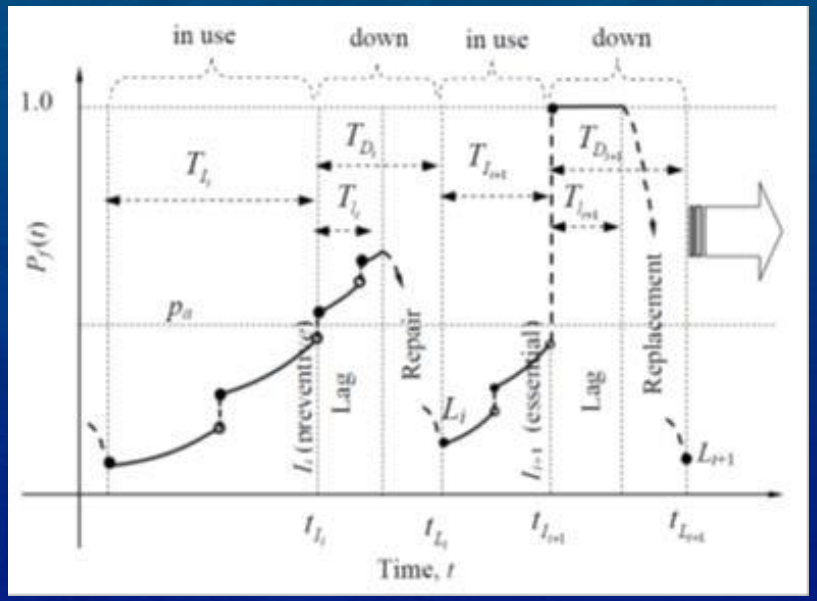
Data Architecture & Management Tools

- Produce a standardized data ontology, a robust data architecture, and effective data management tools.
- Incorporate multiple domains of science, user and stakeholder requirements.
- Integrate existing ontology, data types and data formats for communities and stakeholders.
- Help users ingest, manage, query, visualize and share data effectively.



Validation Studies

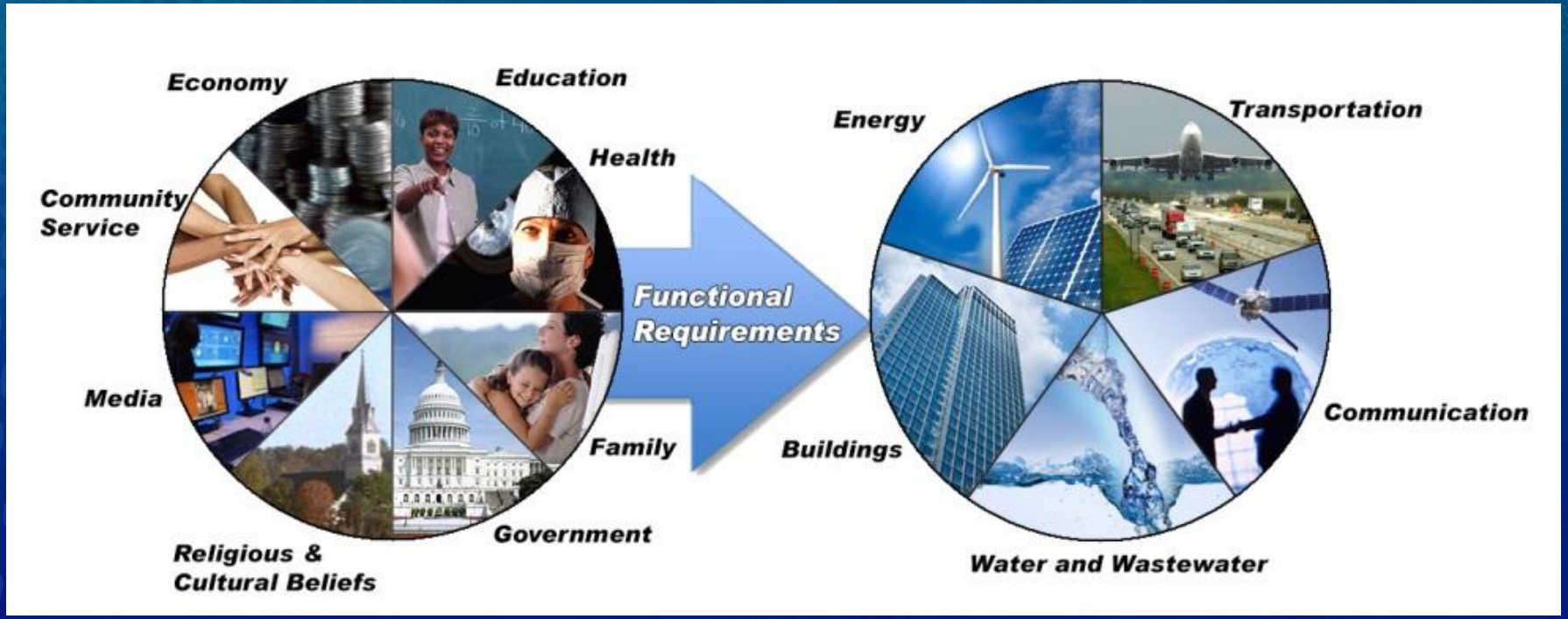
- Validate the resilience data architecture through a series of hindcasts and forecasts.
- Test the process of data collection, its integration into the computational modeling environment, and decision support-based intelligent search and decision algorithms.
- Participate in field studies and other investigations to validate and improve the computational environment and its supporting databases.



Life Cycle of Physical Infrastructure

Questions?

Community Needs Drive Functional Requirements for Buildings and Infrastructure



- The effects of hazards often result in damage to buildings and infrastructure.
- The consequences are felt in the social and economic systems and can have far-reaching effects.

Community Resilience for the Built Environment

- Natural hazards
- Manmade hazards
- Degradation
- Climate change

- Performance Goals
- Mitigation
- Response
- Recovery

Goal: Limit disruption to a duration desired by the community for an expected (design level) event, and minimize detrimental effects.

What is Disaster Resilience?

- The term "resilience" means the ability to *prepare for* and *adapt to* changing conditions and *withstand* and *recover rapidly* from disruptions*
- 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.

*As defined in Presidential Policy Directive 21.