



NCSTAC
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Presentation on Community Resilience Center of Excellence

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What is 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 on implementing measures to ensure that the community recovers to normal, or near normal *function*, in a reasonable timeframe.

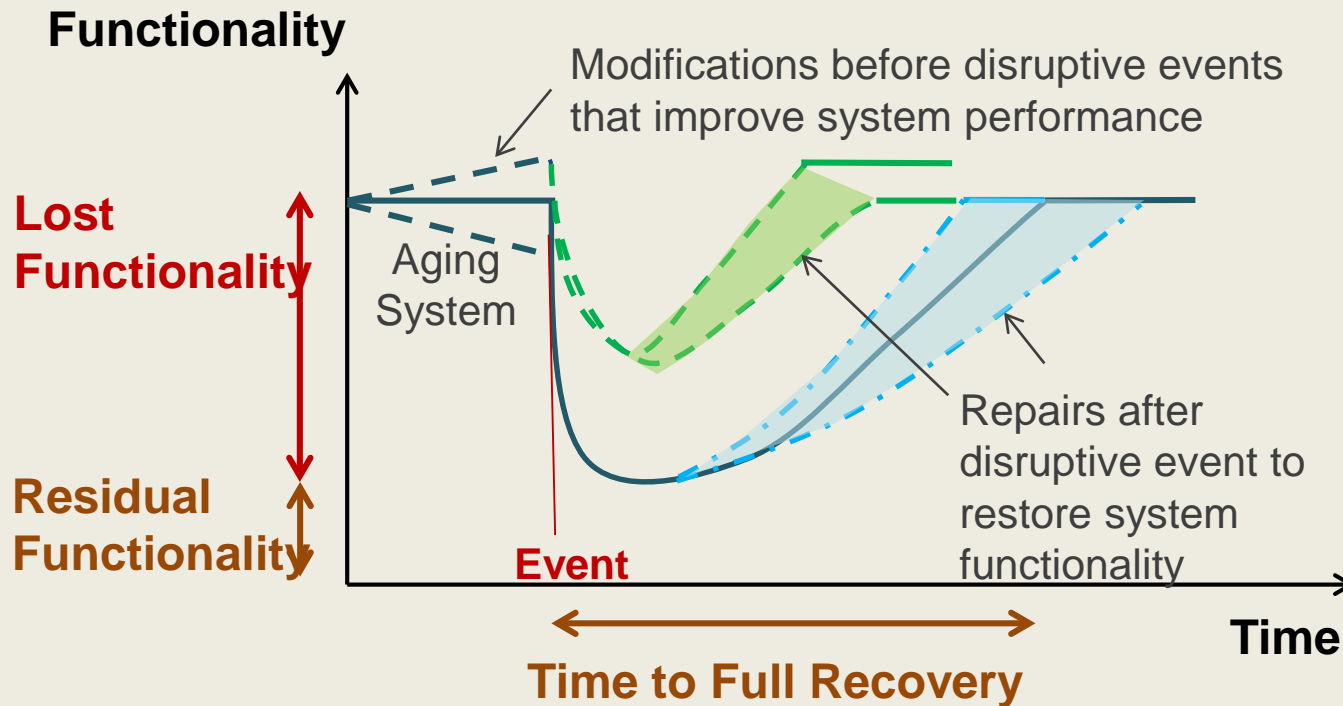
*As defined in Presidential Policy Directive 21.



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 for the Built Environment

- Natural hazards
- Manmade hazards
- Degradation
- Climate change



- Performance Goals
- Mitigation
- Response
- Recovery

Community resilience depends on the performance of the built environment and social, economic, and public institutions.

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

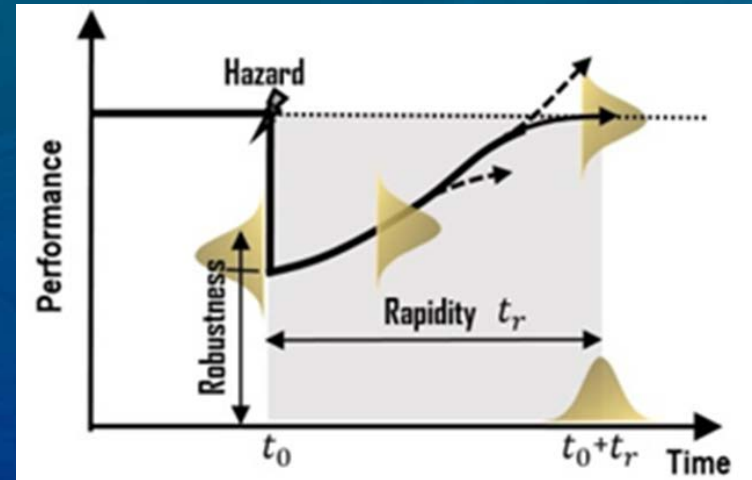


Community Resilience Center of Excellence

- \$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



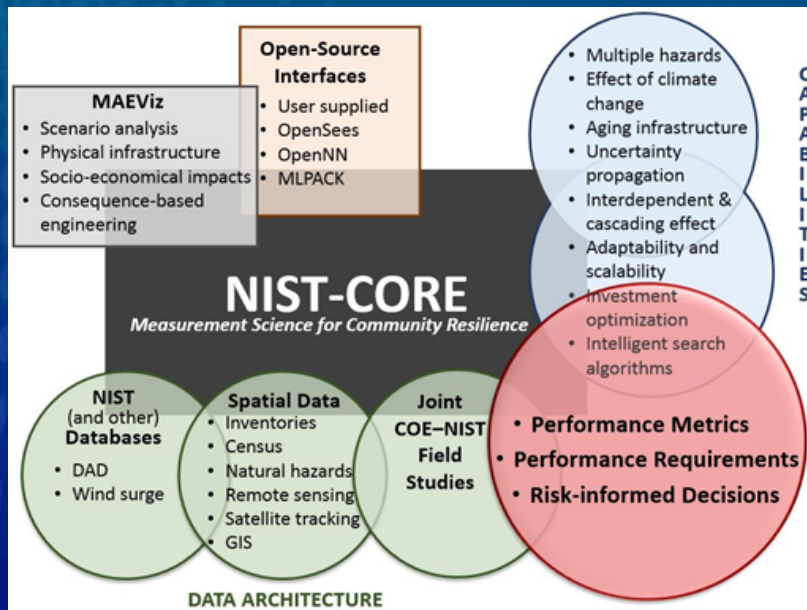
Community Resilience CoE Institutions

- 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

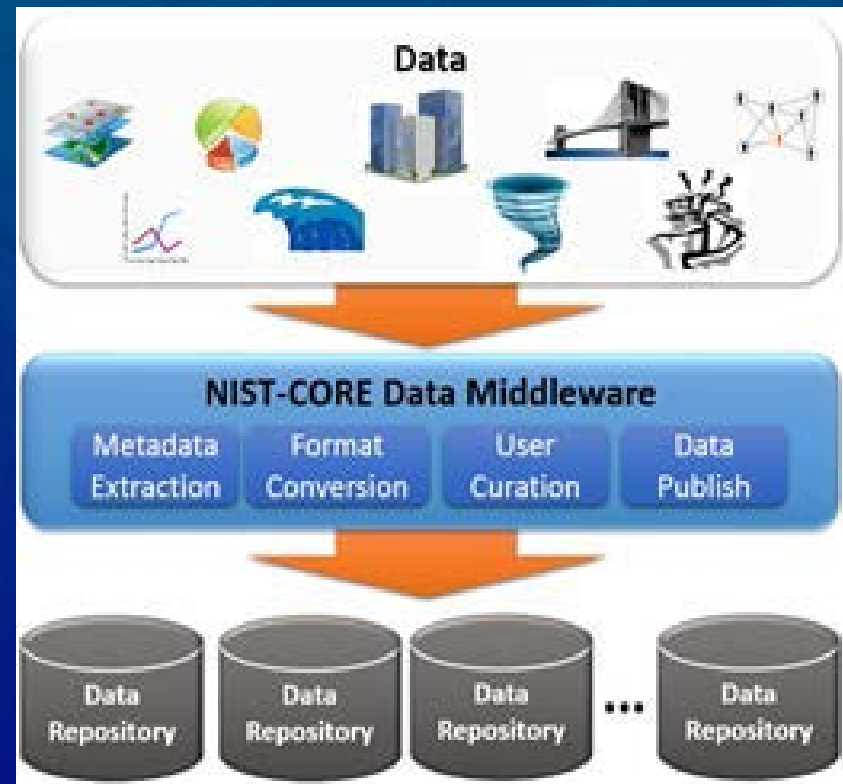


- The centerpiece will be NIST-CORE
 - Open-source platform
 - Computer model and associated software and databases
 - Risk-informed approach to decision-making
 - Quantitative comparisons of different resilience strategies
 - Integrated social systems vital to the functioning and recovery of communities



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.



QUESTIONS ?

