

Resilience Townhall on Mitigation, Community Resilience, Lifeline Infrastructure, and Investment



Session Overview

- Panelists overview
- Councils initiatives
- Resiliency vision
- Open discussion with attendees

Session Panelists



Dr. Anne Cope
Chief Engineer, IBHS
MMC Chair



Dr. Roberto T. Leon
Via Professor of Civil and
Environmental Engineering,
Virginia Tech
BSSC Member at Large



Ron Eguchi
President & CEO, ImageCat
Lifeline Infrastructure Hub
Advisory Panel Chair



Dr. Daniel Kaniewski
Managing Director,
Marsh McLennan
CFIRE Chair

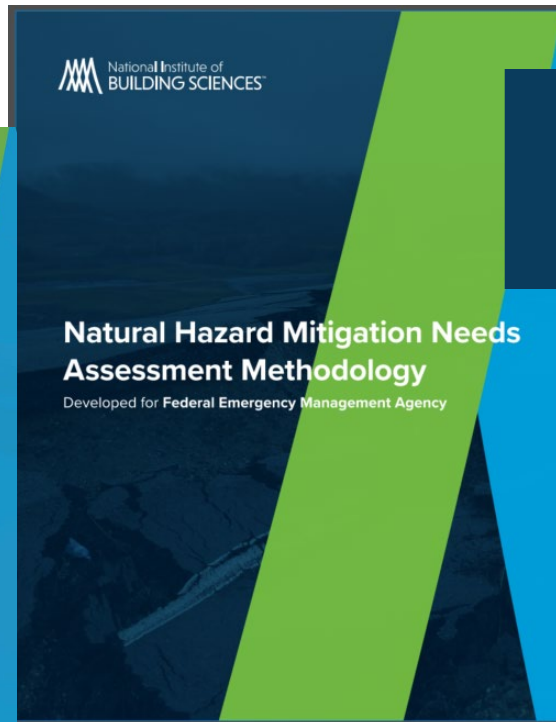
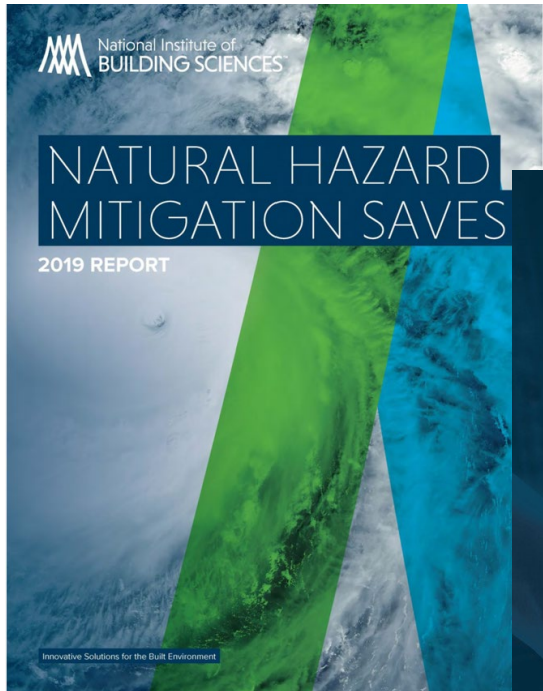
Dr. Anne Cope

Chief Engineer, IBHS
MMC Chair





Multi-Hazard Mitigation Council









 **TURBOGRANTS™**





BUILDING INNOVATION

Conference

 National Institute of BUILDING SCIENCES™		ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
Overall Benefit-Cost Ratio		11:1	4:1	4:1	4:1	6:1
Cost (\$ billion)		\$1/year	\$4/year	\$520	\$0.6	\$27
Benefit (\$ billion)		\$13/year	\$16/year	\$2200	\$2.5	\$160
 Riverine Flood		6:1	5:1	6:1	8:1	7:1
 Hurricane Surge		not applicable	7:1	not applicable	not applicable	not applicable
 Wind		10:1	5:1	6:1	7:1	5:1
 Earthquake		12:1	4:1	13:1	3:1	3:1
 Wildland-Urban Interface Fire		not applicable	4:1	2:1	not applicable	3:1

Copyright © 2019 The National Institute of Building Sciences



FEMA



INTERNATIONAL
CODE
COUNCIL®



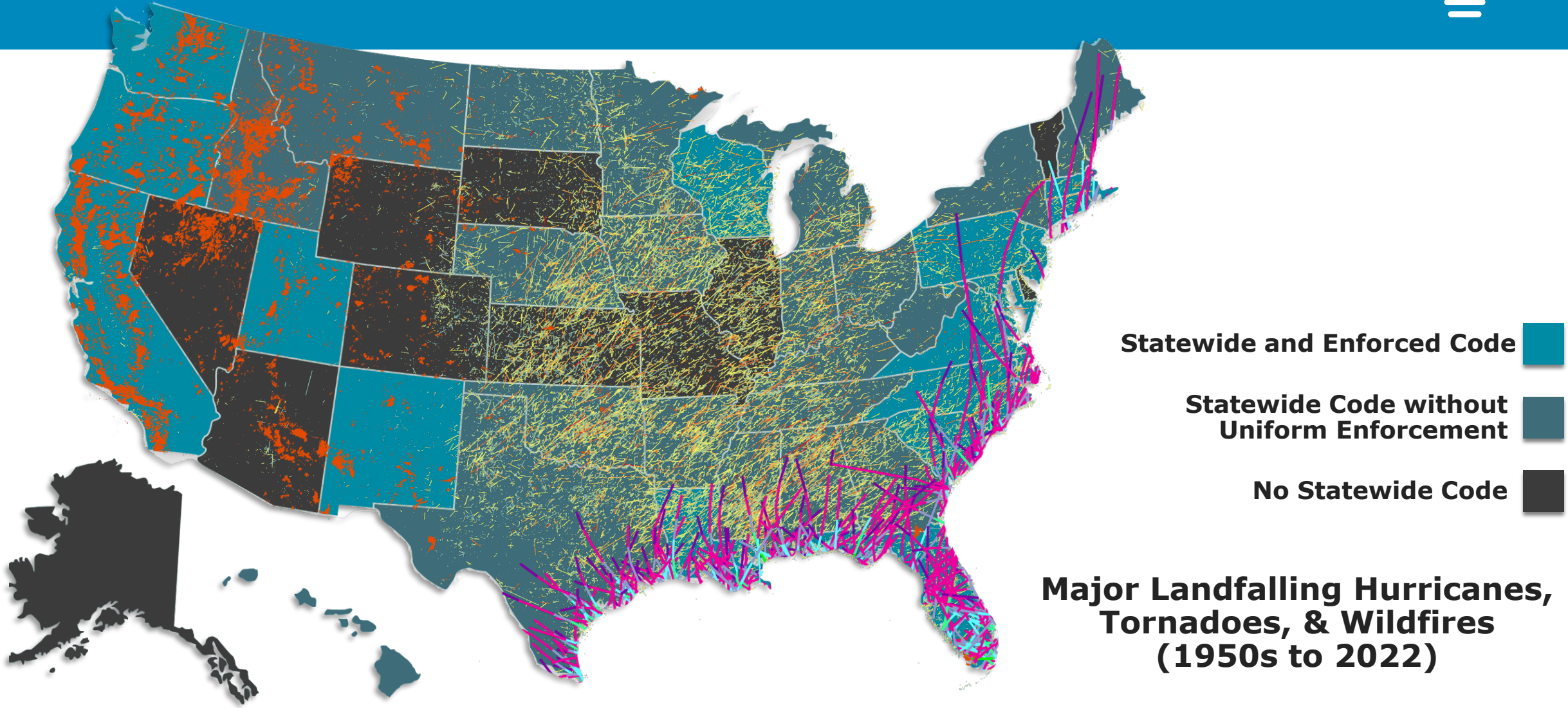
The American
Institute
of Architects

EVERY DOLLAR INVESTED IN ADOPTING
BUILDING CODES CAN **SAVE \$11** ON
RECOVERY COSTS, BUT **ONLY 40% OF U.S.**
COUNTIES HAVE MODERN BUILDING CODES

Source: FEMA Director Leanne Criswell

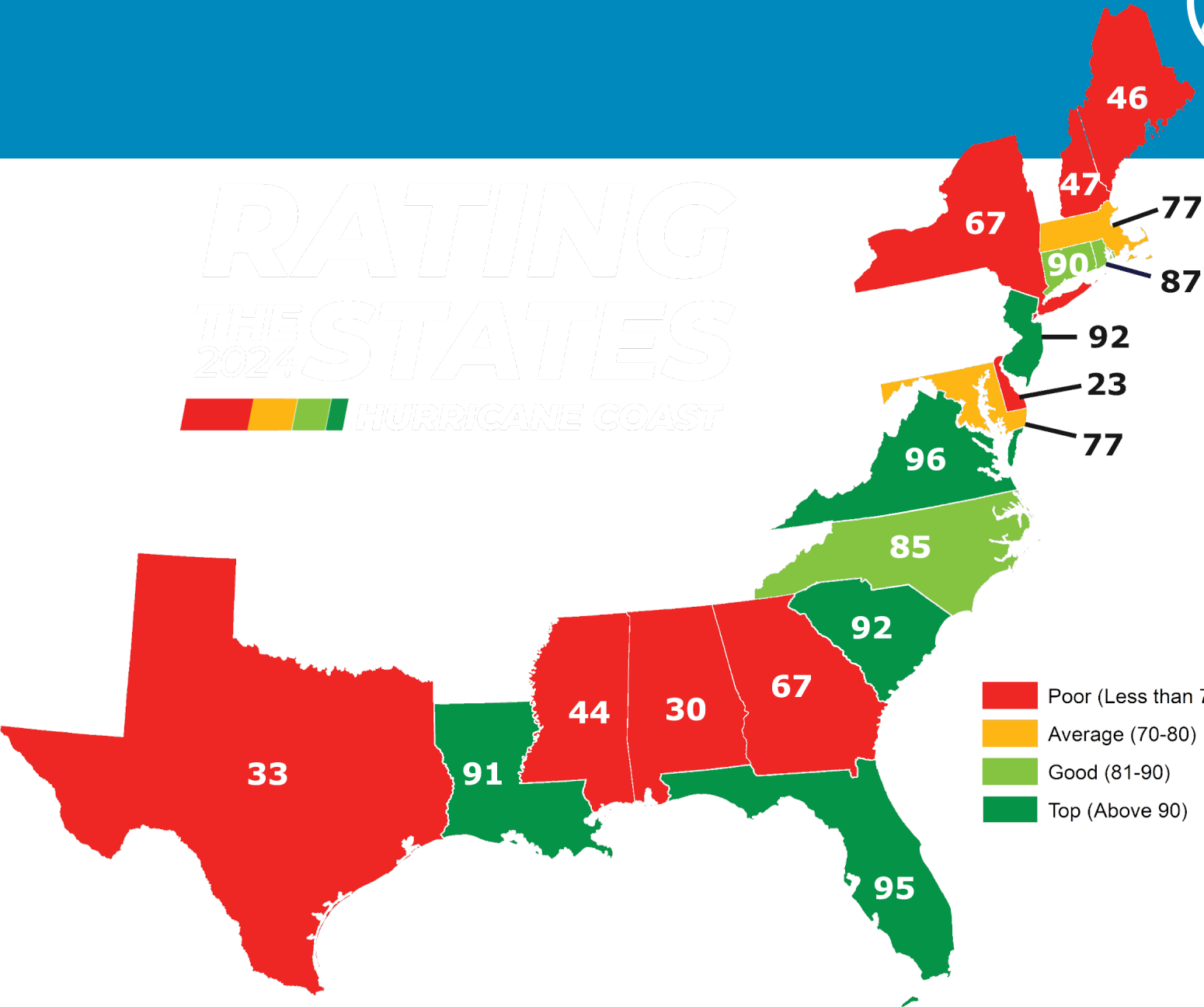
Statewide Building Codes

ACROSS THE UNITED STATES





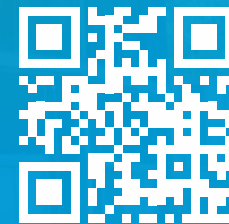
	State	Score
1	Virginia	96
2	Florida	95
3	South Carolina	92
4	New Jersey	92
5	Louisiana	91
6	Connecticut	90
7	Rhode Island	87
8	North Carolina	85
9	Massachusetts	77
10	Maryland	77
11	Georgia	67
12	New York	67
13	New Hampshire	47
14	Maine	46
15	Mississippi	44
16	Texas	33
17	Alabama	30
18	Delaware	23





Anne Cope, PhD, P.E.

Chief Engineer



↗ ibhs.org



🐦 [IBHS_org](https://twitter.com/IBHS_org)

Dr. Roberto T. Leon

Via Professor of Civil and Environmental Engineering,
Virginia Tech

BSSC Member at Large



Roberto T. Leon, PE, PhD, DM ASCE



- Via Professor, CEE, Virginia Tech
- Member, BSSC Board
- Large scale experimentation
- Seismic design/rehabilitation of steel and composite structures
- Past leader SEI/ASCE, ATC, NEES
- AISC, ASCE, BSSC/PUC,



Building Seismic Safety Council



The council's purpose is to enhance public safety by providing a national forum that fosters improved seismic planning, design, construction and regulation in the building community.

BSSC Strategic Directions:

- Functional Recovery Design for Federal Buildings
- Establishing a Lifeline Organization within NIBS/BSSC
- Seismic/Multi-Hazard Evaluation of Existing Structures
- Ideation/Innovation



U.S. Seismic Regulations and Seismic Codes Development and the Role of NEHRP Provisions



● **1927 UBC (Uniform Building Code)** Included first seismic provisions, with non-mandatory appendix

● **1933: Field Act and Riley Act.** the first mandatory statewide adoption of seismic requirements

● **1959 Blue Book**
Developed by SEAOC, incorporated by UBC, adopted by the Western US

● **1977:** Passage of National Earthquake Hazards Reduction Act (NEHRP)

● **1978 ATC 3-06 Project**
Funded by NSF and NIST, developed advanced seismic analysis and design methods.

California-centric effort



**1977:
NEHRP Act
passed**

**1979: BSSC
established**

● **1985 NEHRP Provisions**
1st edition, developed based on lessons learned through a FEMA initiative on a national trial design of ATC-3 methods.

● **1988, 1991, 1994 NEHRP Provisions**
Written in code language for direct adoption by regional model codes and national standards.

● **1997, 2000, and 2003 NEHRP Provisions**
Formed the basis of the first edition of International Building Code (2000 IBC) and its following editions.

● **2009, 2015, and 2020 NEHRP Provisions**
Keep serving as the state-of-the-art document providing recommended changes to ASCE 7 standards, which were then adopted by IBC.

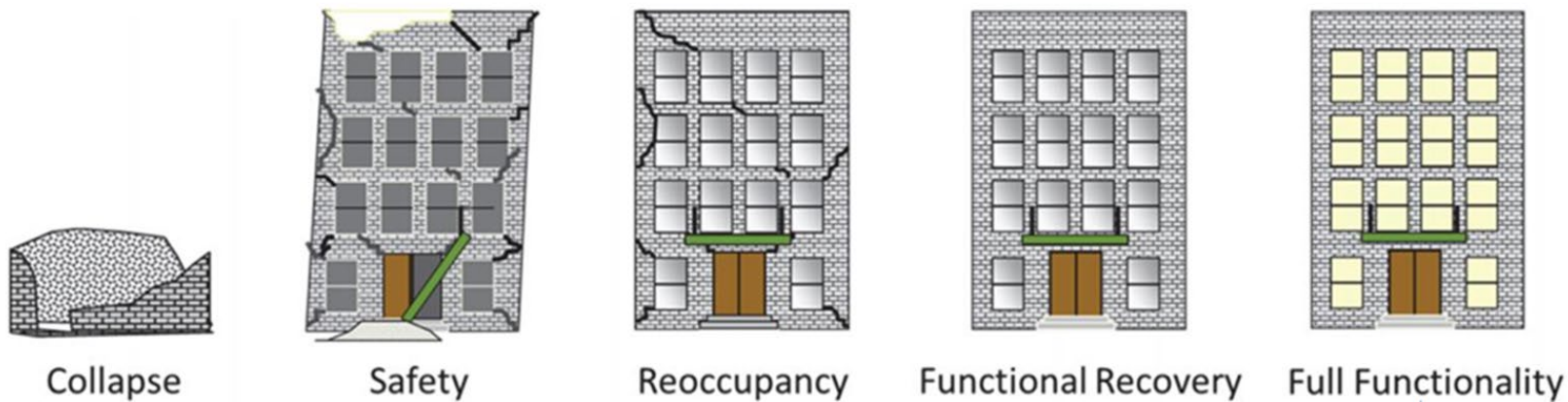
National in scope



BSSC – Functional Recovery



Functional recovery is a post-earthquake performance state in which a building or lifeline infrastructure system is maintained, or restored, to safely and adequately support the basic intended functions associated with the pre-earthquake use or occupancy of a building, or the pre-earthquake service level of a lifeline infrastructure system.



© R. Hamburger

BSSC – Functional Recovery

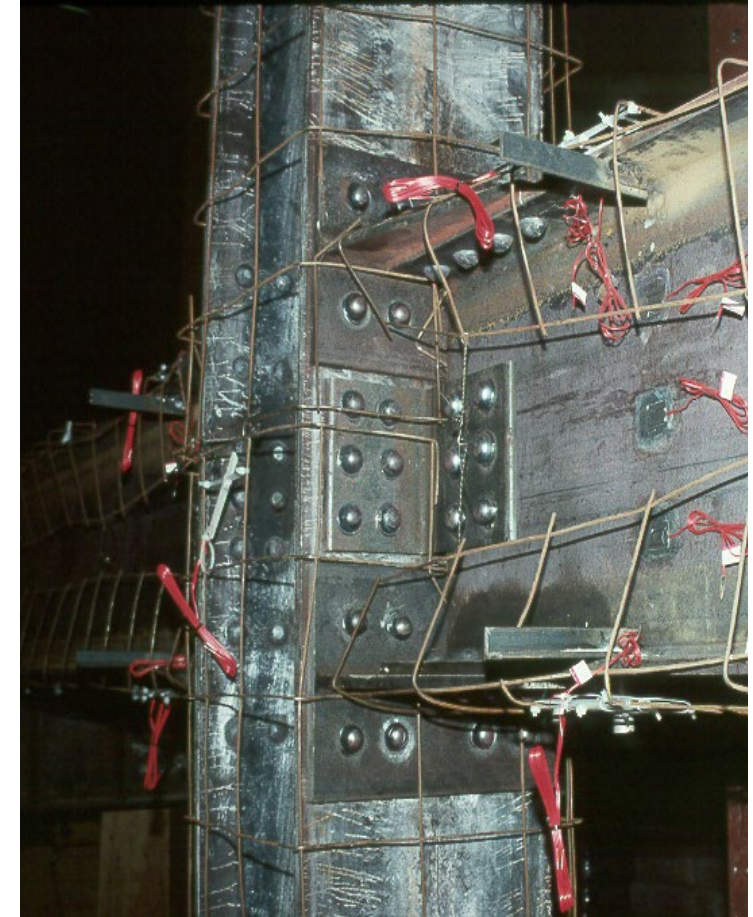


Functional Recovery Category	Target Functional Recovery Time	Recovery Phase and Associated Functions and Services ⁽¹⁾	Examples of Buildings and Lifeline Infrastructure Systems
Functional Recovery Category A (FRC-A)	Hours (or less)	Near-Term (Nearly Immediate) and Emergency Response – rescue, safety, security, and event stabilization	Emergency and first-responder facilities (e.g., hospitals, fire and police stations), designated shelters, emergency operations centers, and lifeline infrastructure systems supporting emergency response (e.g., power, communication, critical transportation)

Functional Recovery Design Requirement	Target Functional recovery Time, T_{target}			
	1 Hour	1 Day	1 Week	1 Month
Structural				
Limits on lateral system selection	Required	Required	Required	–
Limits on drift	Required	Required	Required	–
Factor on required strength	Required	Required	–	–



Existing Buildings



Existing Buildings

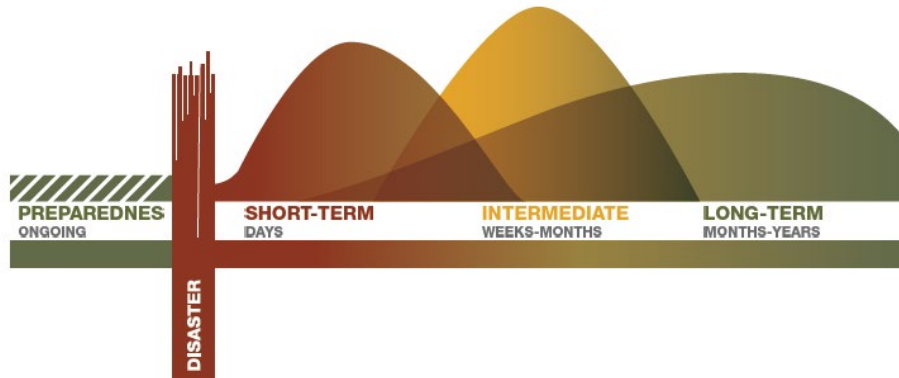


- Better and less conservative approaches must be developed to assess existing federal building to meet sustainability and resilience targets.
- There is not a simple, useful, common tool to prioritize building evaluation being used by federal agencies.
- Even though building inventory differs substantially from agency to agency, some common guidelines need to be developed as a baseline.
- Current performance targets for existing buildings are patterned after those for new buildings; this needs to be reconsidered if we want to implement economical retrofits.

Building Seismic Safety Council



Most work through the Provisions Update Committee that develops and extends seismic design provisions in ASCE-7



Sample Topics in 2026 Cycle:

- Evaluation of structures in very high seismic regions
- Drift limit evaluations
- Unification of diaphragm design provisions
- Building designed as rocking systems
- Provisions for buried structures
- Elastic design with limited ductility
- Nurture engineer creativity/innovation

Future work



Priority	ID	Recommendation
<i>Improve Code Development</i>		
High	D1	Increase seismic code developer diversity
	D2	Conduct pre-cycle regional workshops
	D3	Require paid worked examples for proposed code changes
<i>Improve Code Content and Ease of Use</i>		
High	C1	Address functional recovery and enhanced resilience in model code framework
	C2	Make low and moderate seismic provisions more usable
Medium	C3	Develop more usable performance-based procedures for design
	C4	Develop construction quality assurance <i>NEHRP Provisions</i> Part 3 resource paper
	C5	Improve seismic code provisions for foundation design
<i>Improve Dissemination and Education on Code and Code Changes</i>		
High	E1	Develop coordinated strategy for improving understanding of seismic codes
	E2	Develop interactive online platform for seismic code provisions

Ron Eguchi

President & CEO, ImageCat

Lifeline Infrastructure Hub Advisory Panel Chair

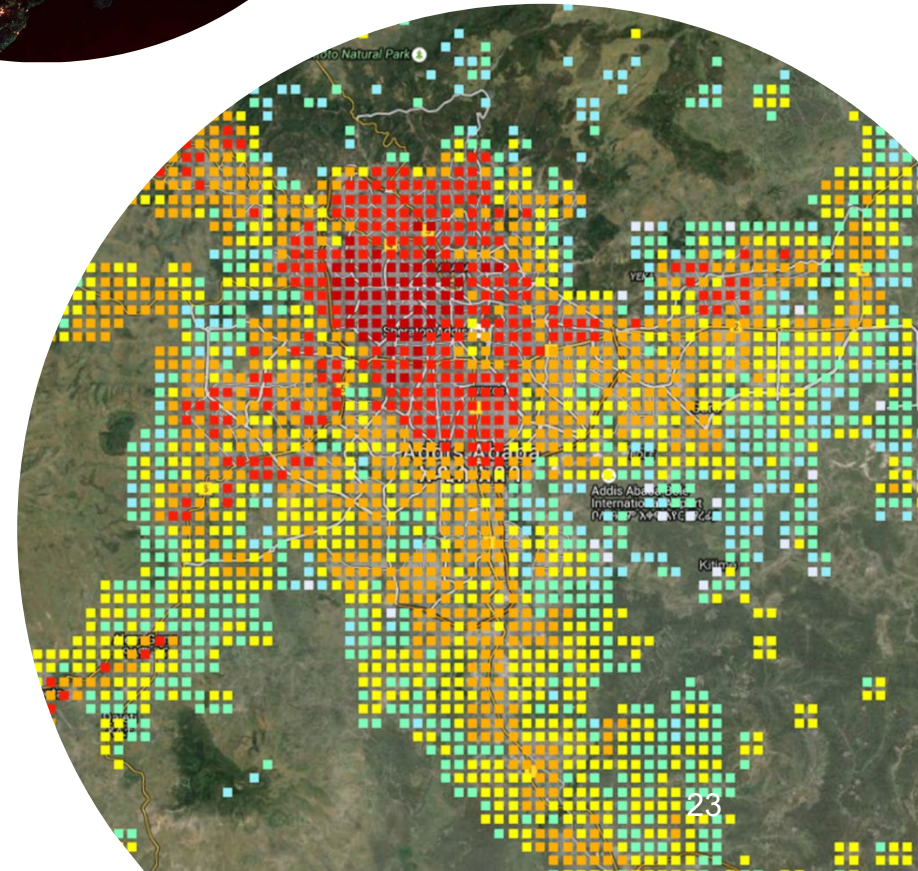
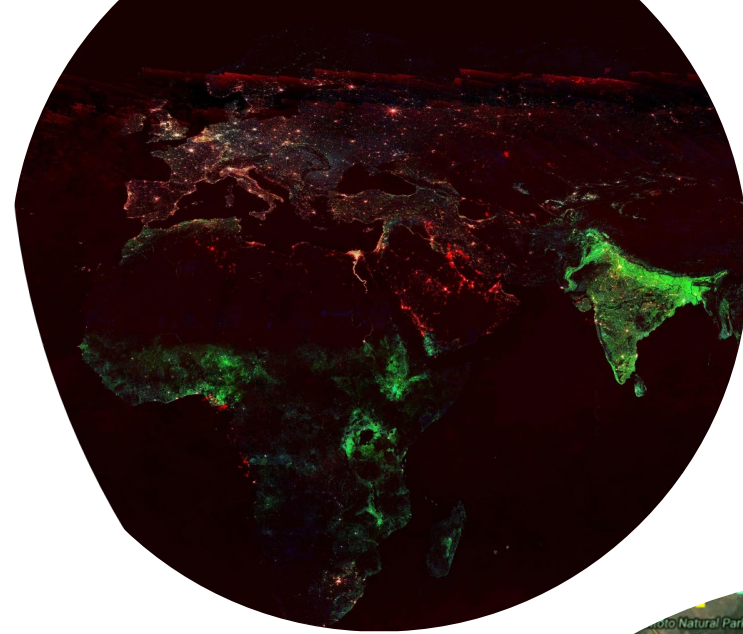


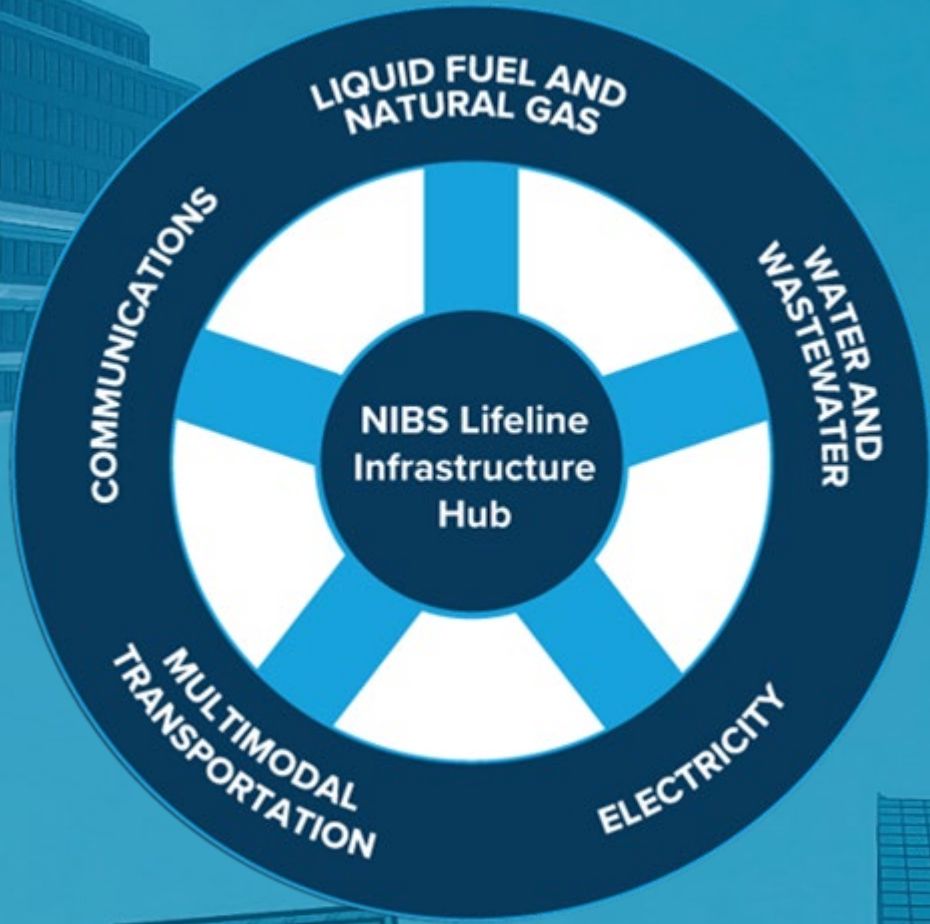
What I do in my real job ...

- Over 40 years in natural hazards risk management
- President & CEO of ImageCat, an international risk management firm working for government agencies, the insurance industry, private utilities & NGOs
- Strong advocate of the use of new and emerging technologies for disaster mgt. & response, especially remote sensing technologies

May 23, 2024

Building Innovation Conference 2024

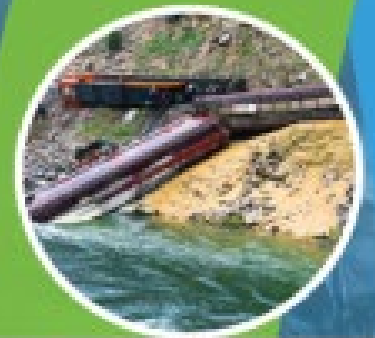




- I'm also a strong advocate of lifeline infrastructure resilience
 - Chaired ASCE Technical Council on Lifeline Earthquake Engineering (TCLEE), 1990-1991
 - Chaired multi-agency panel (FEMA & NIST) to develop a plan for assembling & adopting seismic design standards for public and private lifelines in the U.S., 1992
 - Chaired ASTM Subcommittee on Seismic Fragility Formulations for Water Transmission Systems, 2002-2003
 - Created the Technical Committee on Advanced Technologies for the SEI Division of ASCE, 2016
 - Appointed the Inaugural Chair of the NIBS Advisory Panel for the Lifeline Infrastructure Hub, 2024

Lifeline Infrastructure Hub

A public-private partnership to assist the nation with community resilience and recovery after disasters



Electricity

Liquid Fuel &
Natural Gas

Communications
(including cybersecurity)



Water & Waste Water

Multimodal
Transportation

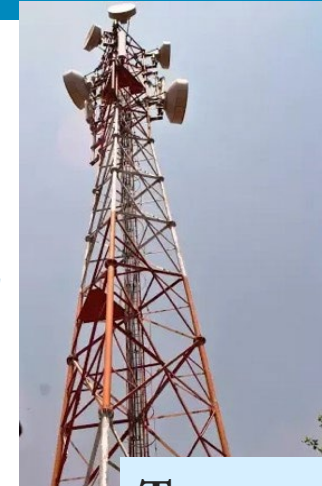
Support Recovery after disasters



To restore water service, you need electricity

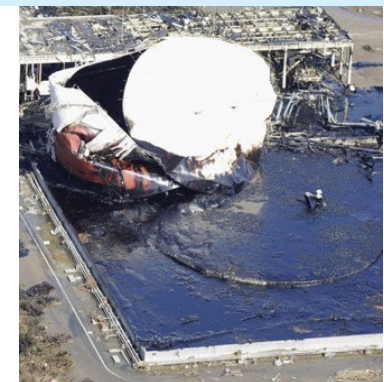
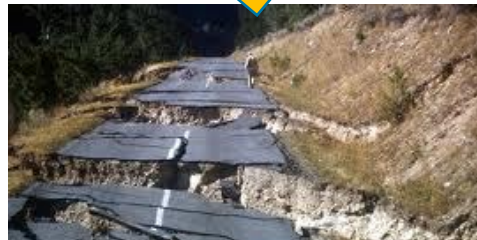


To restore fuel supplies and communication, you need electricity



To restore electric service, you need to reopen roads

To reopen roads, you need to restore fuel supplies



NIBS Lifeline Infrastructure Hub Objectives



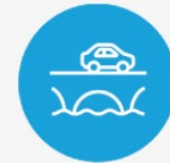
SERVE

in a coordinating role to forge and engage public-private partnerships across lifeline sectors for natural hazards, including hurricanes, earthquakes, tsunamis, floods, wildfires and future extreme weather events



UNDERSTAND

the fundamentals of lifeline infrastructure systems, plus identify gaps and cost-effective ways to mend gaps in lifeline resilience



PRIORITIZE

investments and improvements, in the technical and policy realms, that are most needed for lifeline infrastructure in all communities to improve disaster resilience and modernization

NIBS Lifeline Advisory Panel

Mr. Ron Eguchi
Founder & Chair
ImageCat, Inc.



Dr. Sissy Nikolaou
co-Chair
NIST



Dr. Kent Yu
BSSC Chair
SEFT Consulting Group



Dr. Dan Kaniewski
MMC Board
Marsh McLennan



Dr. Iris Tien
BSSC Board
Georgia Tech



Dr. Natalie Enclade
MMC Board
BuildStrong America



Dr. JQ Yuan
NIBS Staff
NIBS



Ms. Yumei Wang
NIBS Advisor
Oregon Geology & Mineral



Lifeline Hub Inaugural Meeting



American Society of Civil Engineers (ASCE)
Applied Technology Council
BuildStrong America
CA Davis Engineering
CB&I Storage Tank Solutions LLC
Central U.S. Earthquake Consortium
Chevron
CIRRMA-ONESVIE-PUCMM
City of Portland Environmental Services
Department of Homeland Security, Science & Technology Directorate
US Department of Transportation
DeSimone Consulting Engineering
DHS S&T
FEMA
Georgia Institute of Technology
Georgia Power Company
Guy Carpenter
IEM
ImageCat, Inc.
Moulton Niguel Water District

National Emergency Management Assoc
National Institute of Building Sciences
National Institute of Standards and Technology (NIST)
National Science Foundation
NAVFAC - EXWC
NYC Department of Buildings
Pacific Gas & Electric Company
Portland State University
Science & Technology Directorate, DHS
Senate Homeland Security and Governmental Affairs Committee
Seft Consulting Group LLC
Southern California Edison
STV
T&I Committee
Texas A & M University
U.S. EPA
University of Delaware
University of Illinois at Urbana-Champaign
University of Pittsburgh
Wavelength Infrastructure

Mission of Lifeline Infrastructure Hub

A public-private partnership to assist the nation with community resilience and recovery after disasters.



Applied Research



Technical guidance, advancing codes and standards



Industry leadership and advocacy



Outreach and education



Resilience investment and incentivization

Dr. Daniel Kaniewski

Managing Director, Marsh McLennan
CFIRE Chair



Top risk concerns by time horizon



Near-term (2 years)



Longer-term (10 years)





Millions of homes are underinsured against natural disasters as construction costs keep rising

CNBC, May 2019

Natural disasters expose huge insurance protection gap

The Actuary, Jan 2021

In soaked California, few homeowners have flood insurance

CP24, Jan 2023

Hurricane Ian's toll is severe. Lack of insurance will make it worse.

New York Times, Sep 2022



The US Is Currently Underinsured Against Natural Hazards

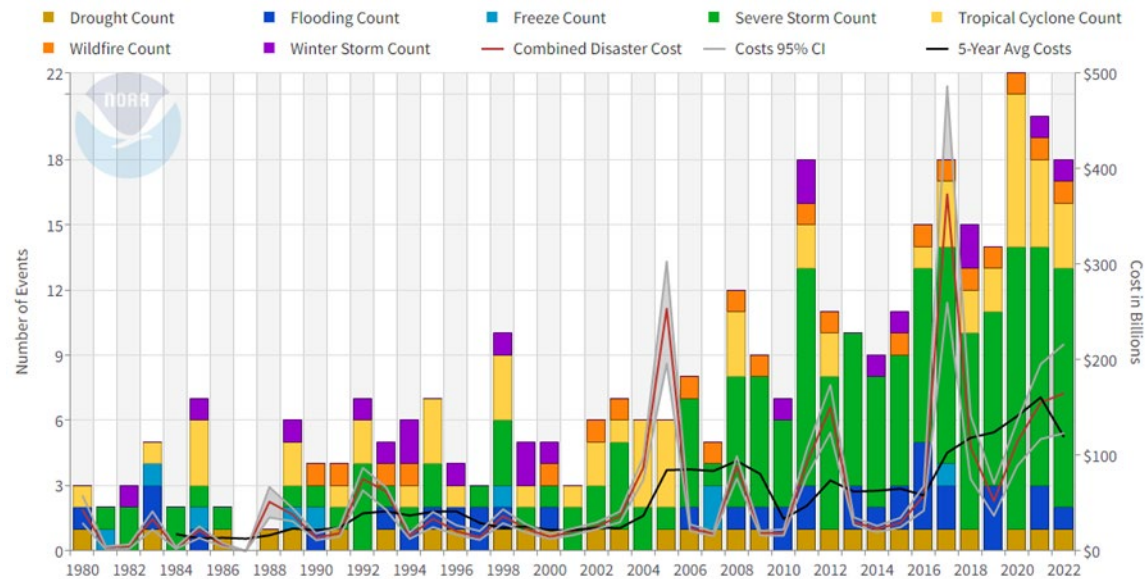


Market Context for Catastrophe Insurance

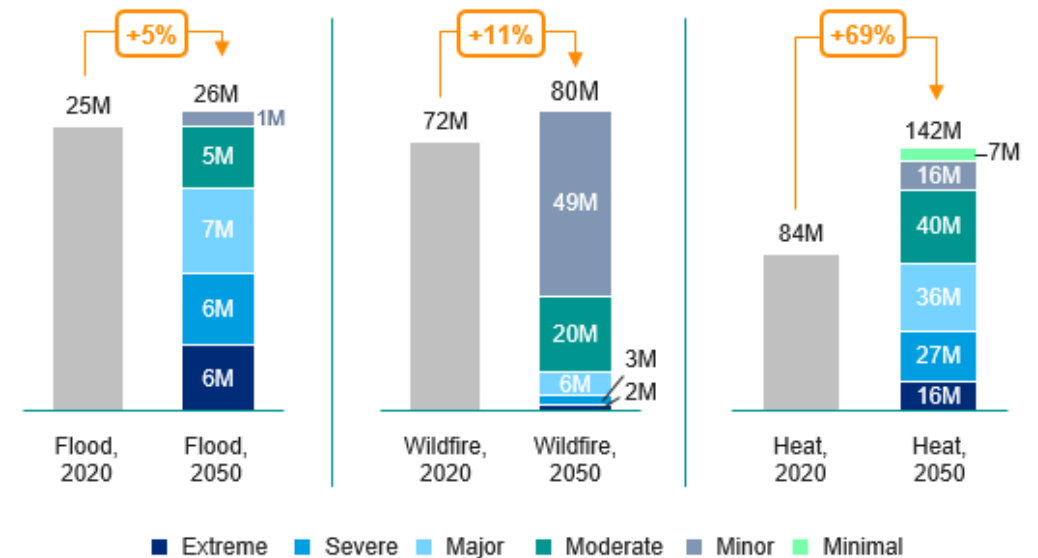
- **Insurance is a vital source of adequate and available funds** that help individuals and communities finance post-disaster recovery and rebuilding
- However, **there is a large and widening protection gap**, as millions exposed to disaster risk are uninsured or underinsured
- For example, even though floods are the most frequent and costly disaster (with 10% of US households at high risk), **only about 4% of households have flood coverage**
- Although the gap is a pressing issue, **mayors are balancing fiscal challenges from competing needs and need cost-effective solutions**
- As a result, many **communities don't receive disaster relief in a timely manner and aren't incentivized or financed to enhance their resilience**

As Climate-Linked Disaster Grows in the US, Physical Risk to Properties Is Expected To Multiply

US Billion-Dollar Disaster Event
1980-2021, CPI adjusted



Number of US Properties at Risk for Disasters
2020 vs. 2050, 145M Properties Analyzed



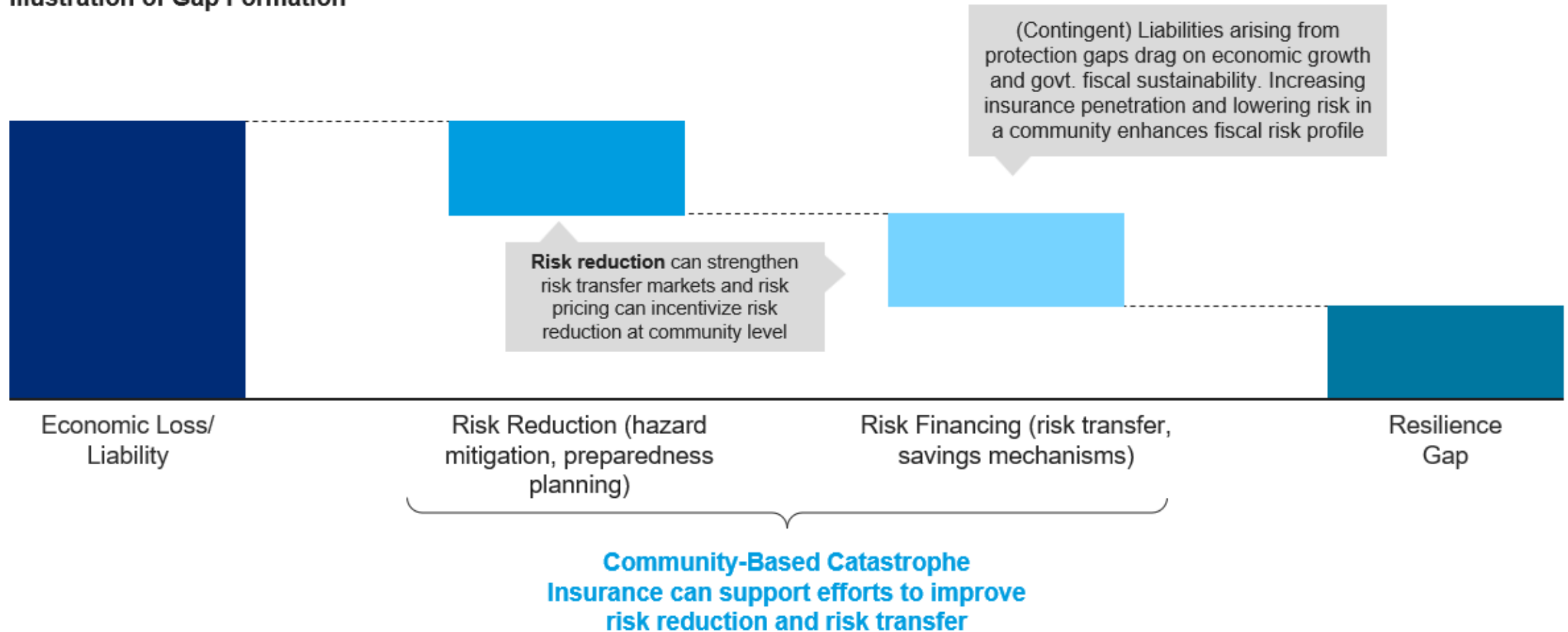
Over the last 40 years, the frequency and cost of billion-dollar climate disasters has soared in the US

The need for resilience and risk mitigation plans will grow as more properties become at higher risk of disasters

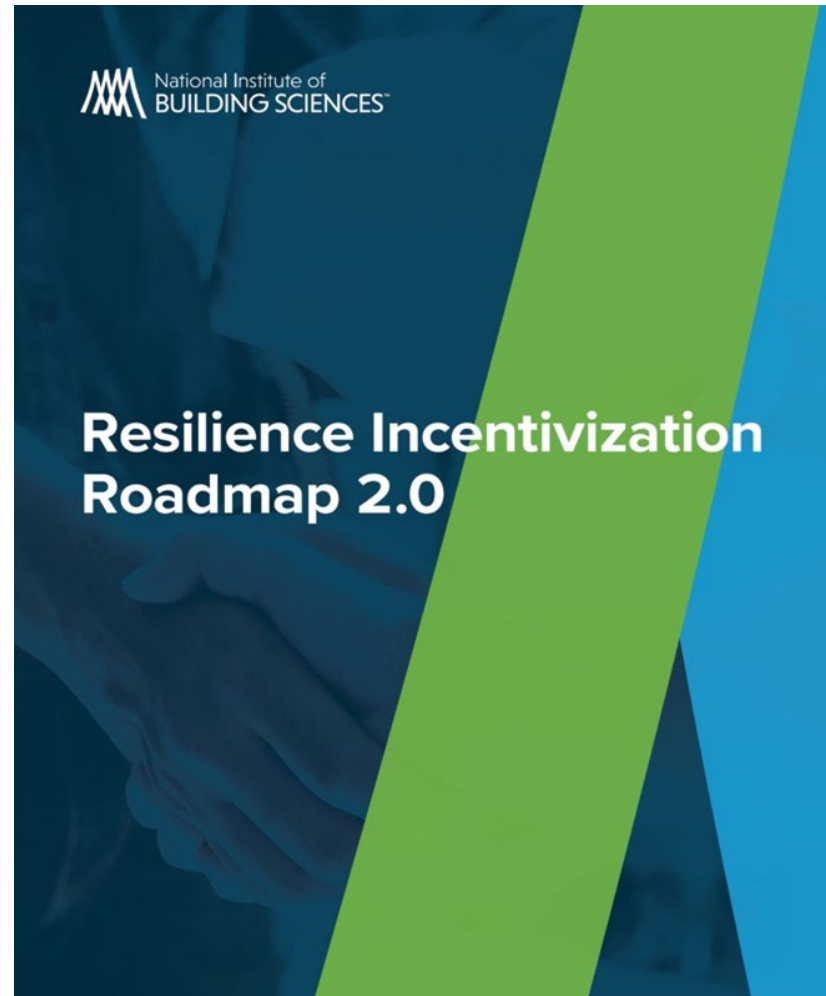
Channels for Communities to Close Resilience Gap

Pair risk reduction (hazard mitigation) with risk transfer (insurance)

Illustration of Gap Formation



Resilience Incentivization Roadmap 2.0



A report by

Committee on Finance, Insurance and Real Estate
Multi-Hazard Mitigation Council
National Institute of Building Sciences

Chair:

Daniel Kaniewski, PhD

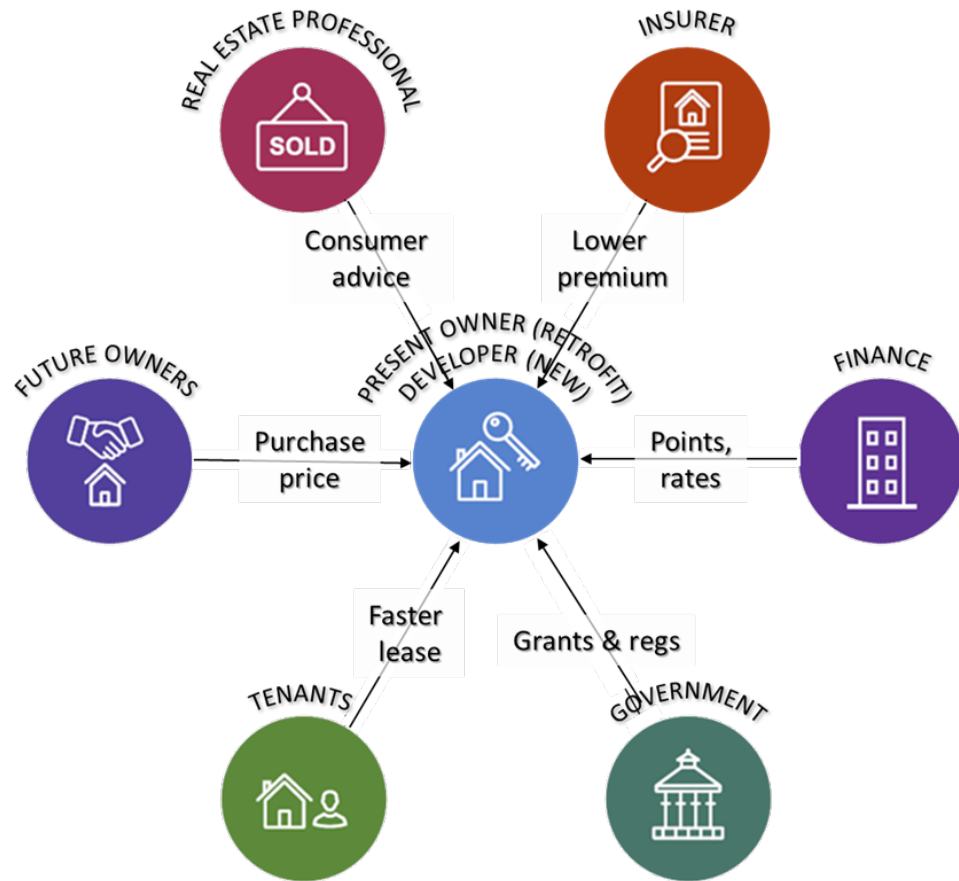
Prepared by:

Keith Porter, PhD
Sean Beckett, PhD
Sean Kevelighan
Jeff Dunsavage
Jiqui (JQ) Yuan, PhD

Sponsored by:

Fannie Mae

Resilience Incentivization Roadmap 2.0



Co-beneficiaries can help pay

Chapter 1: Background and Approach

Chapter 2: Technical and Business Case for Resilience

Chapter 3: Roadmap to the Technical and Business Case

Chapter 4: What Developers Need

Chapter 5: Role of Insurers

Chapter 6: Finance and Investor Incentives

Chapter 7: Real Estate Agents

Chapter 8: Government, Public Assistance and Policy

Chapter 9: Conclusions, Recommendations, and Next Steps



FEMA and HUD regulatory changes

The agencies have recently updated regulations

FEMA Individual Assistance Program

On January 19 announced its most significant updates to the Individual Assistance program in the last 20 years. The Interim Final Rule includes quicker access to needed funds, expanded eligibility for property and home repairs, and an easier application process for survivors to jumpstart their recovery from disasters.

Immediate cash payment of \$750 for households with serious needs will help cover immediate expenses related to sheltering, evacuation and meeting basic household needs.

Removes the requirement that survivors apply for a U.S. Small Business Administration (SBA) loan prior to seeking FEMA assistance.

Insured survivors are now eligible for financial assistance for deductibles and/or above limit losses, up to \$42,500.

The program changes were effective March 22.

HUD Federal Flood Risk Management Standard

A final rule announced on April 22 protects new and rebuilt homes funded by HUD from flood damage by requiring them to be elevated 2 feet above the local flood level. The final rule also enlarges the flood zones where the elevation requirement applies.

The new elevation requirement begins to take effect June 22.

Enacted Stafford Act amendments

FEMA can leverage its authorities to incentivize resilience

Community Disaster Resilience Zones

FEMA has designated communities most in need of hazard mitigation assistance, as identified by a risk analysis tool that considers such factors as social vulnerability, natural hazards loss exposures, and lack of resilience.

CDRZ-designated communities are eligible for technical assistance and an increased federal share for Building Resilient Infrastructure and Communities (BRIC) grants, up to 90% (from the current 75%).

FEMA Public Assistance incentive measures

The President may provide incentives to a State or Tribal government to invest in measures that increase readiness for, and resilience from, a major disaster by recognizing such investments through a sliding scale that increases the minimum Federal share to 85 percent.

The background features a low-angle, upward-looking view of a modern building's facade, characterized by sharp geometric lines and a grid of windows. This image is overlaid with a solid blue color. A large, thin white circle is centered on the page, framing the main title. A subtle white grid pattern is also visible across the blue background.

Open Discussion



Thank You