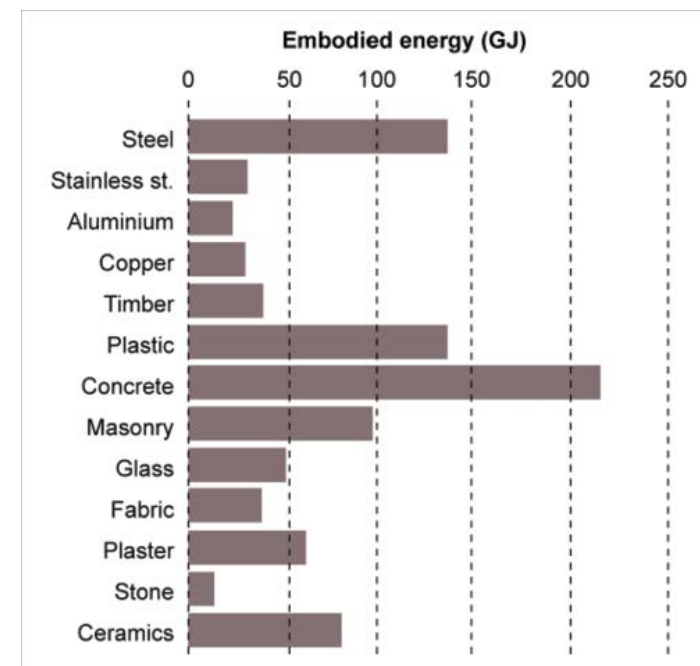
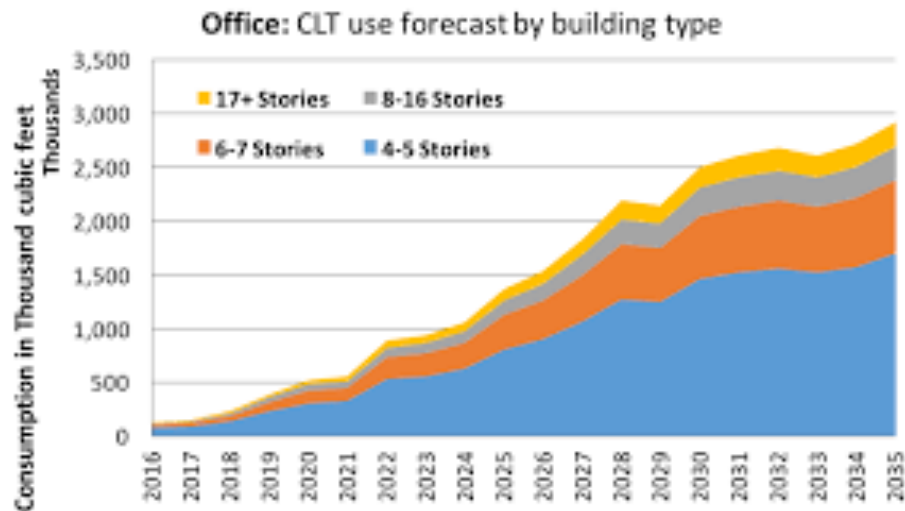
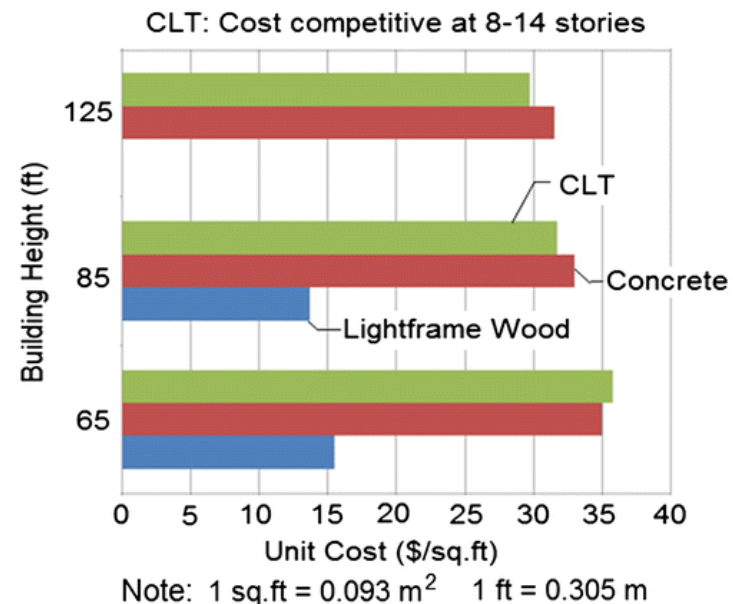
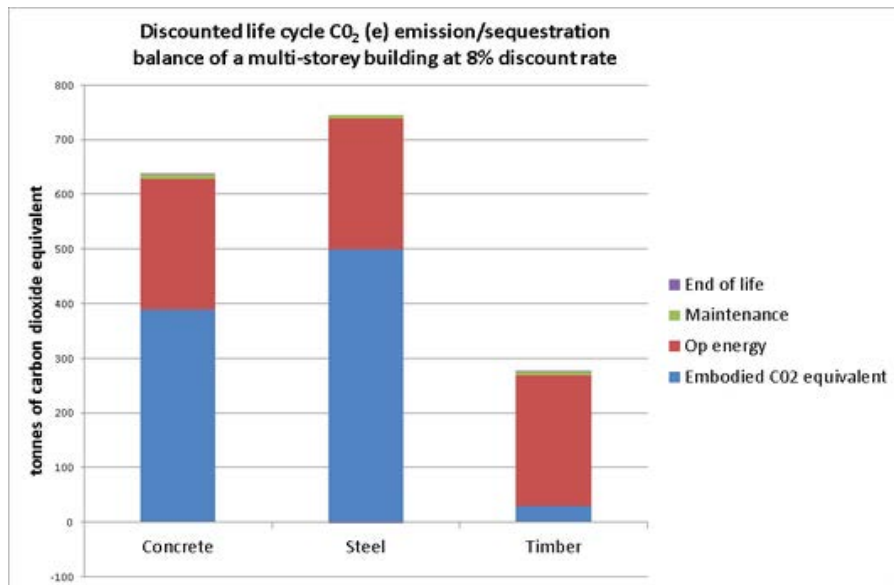


Resilience is the New Sustainability



Evan Reis, SE

Sustainability has largely been defined in terms of CARBON



Resilience Is Different than “Green Design”



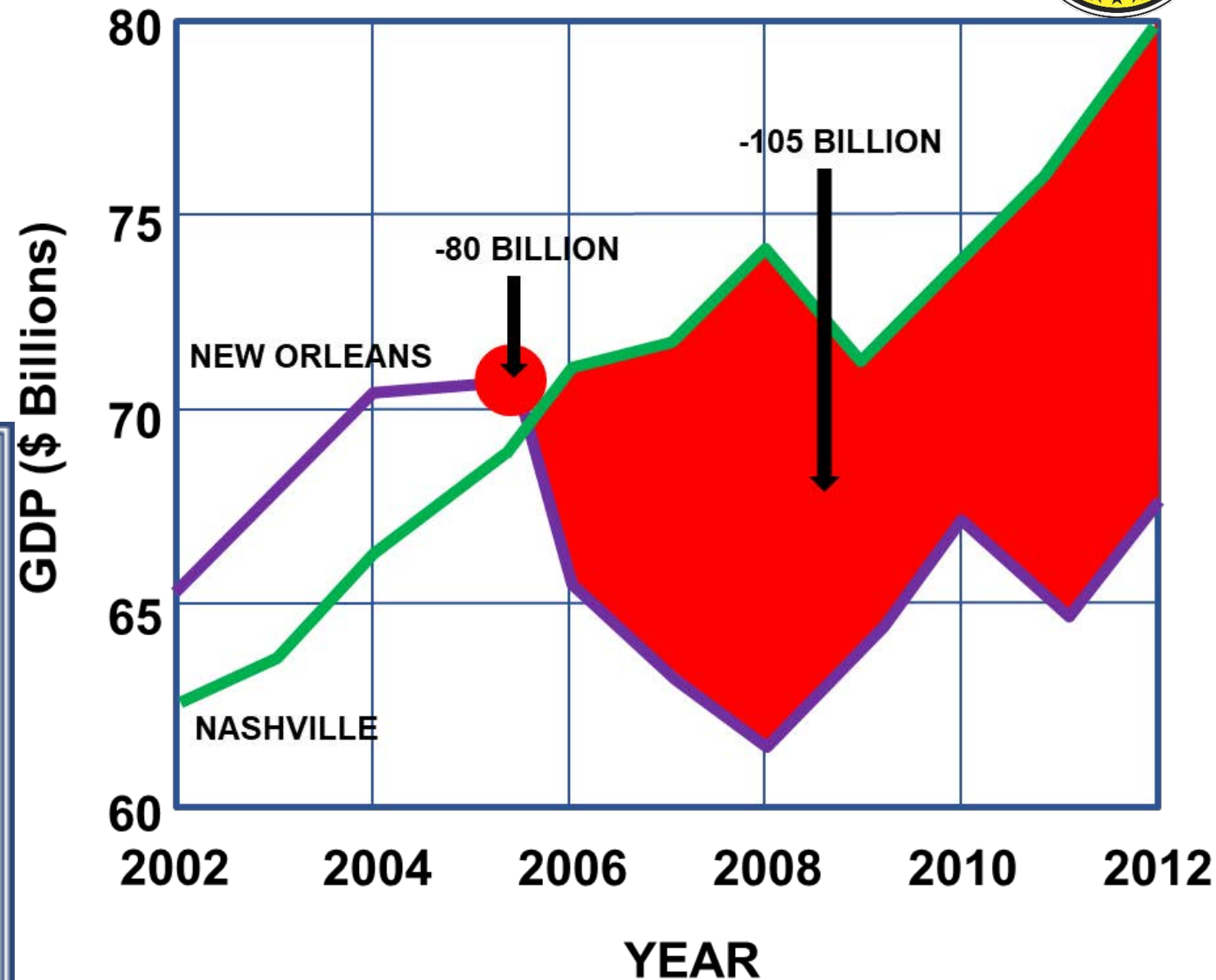
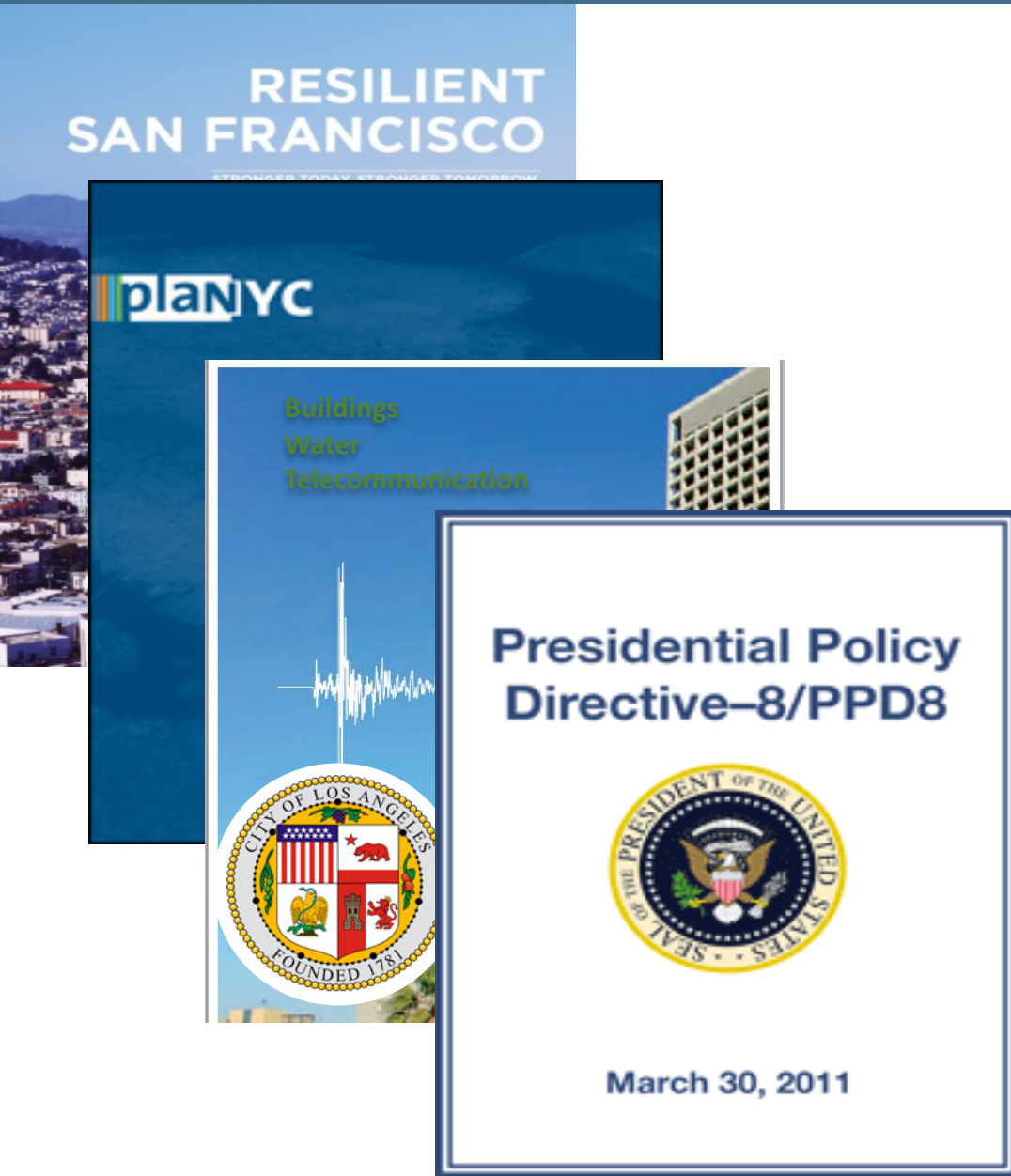
LEED certified buildings in Superstorm Sandy were designed to have a low impact on the environment...

...but not for the environment to have a low impact on them.

Superstorm Sandy

Deaths	>200 in 7 countries
Buildings damaged or destroyed	380,000 in NY, NY, CT
Estimated cost	\$71 billion in NY & NJ.
Insured losses	\$16 billion to \$22 billion.
Estimated business losses	\$25 billion
Homes without power	8.5 million
Debris generated	> 10 million cubic yards

• Trends Toward Resilience



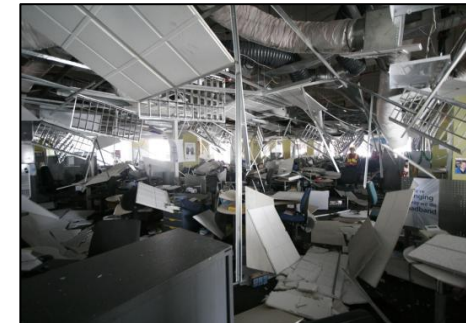
• Misconceptions – Code vs. Reality



A code-compliant building is meant to prevent collapse, not to prevent injuries, limit damage or permit quick recovery.



Architectural and mechanical components can account for more than 70% of a building's property losses.



Lost revenue and business interruption costs can exceed the value of the building itself.



• Consequences of Miscommunication



Christchurch Earthquake, NZ – 2010 & 2011



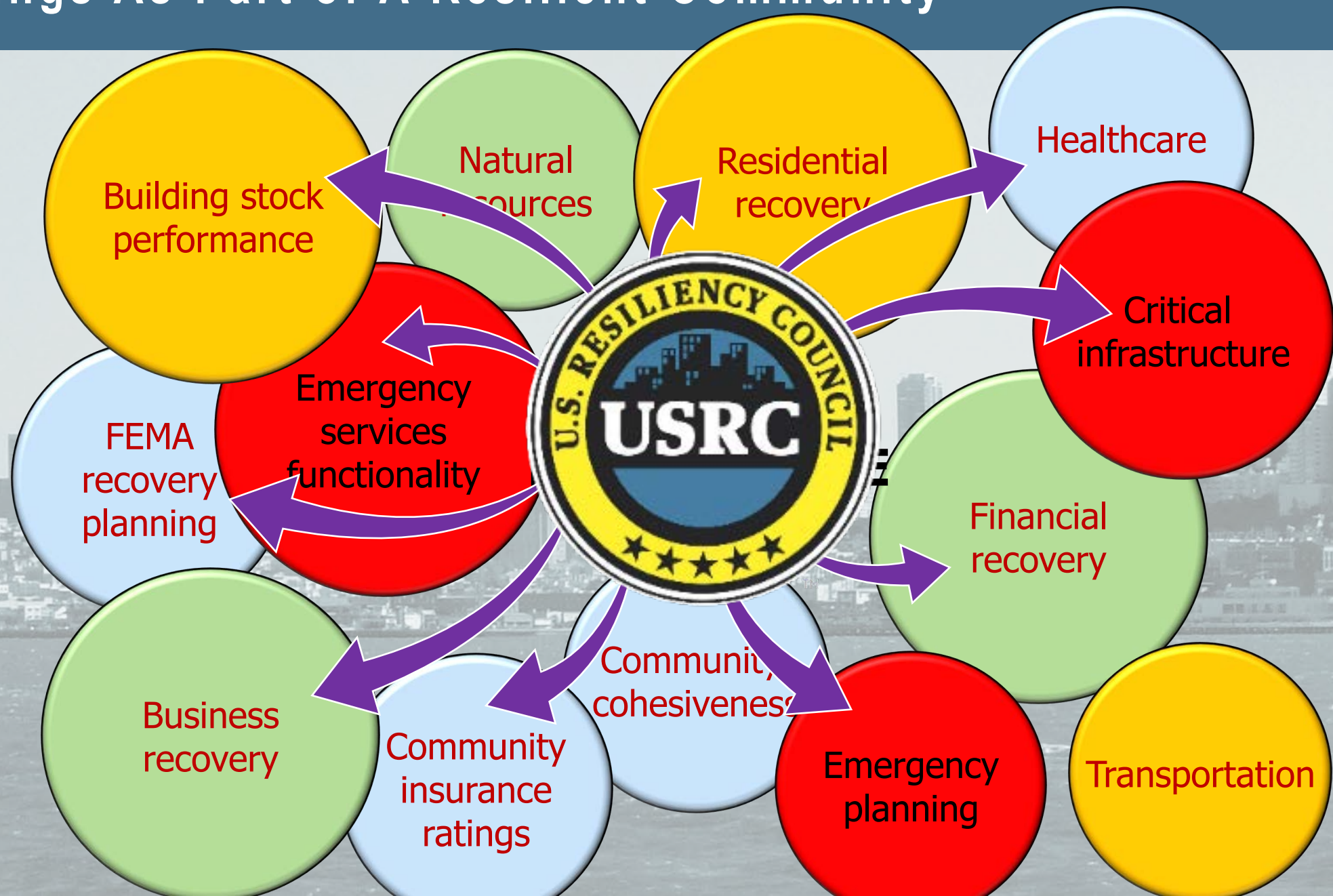
**“Design Level and
Max. Credible Events”**

Only 2 buildings collapsed

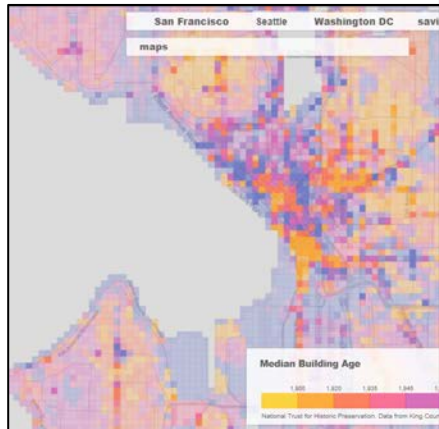
**50% of buildings in
downtown had to be
demolished**

**Were expectations met?
Depends on who you ask!**

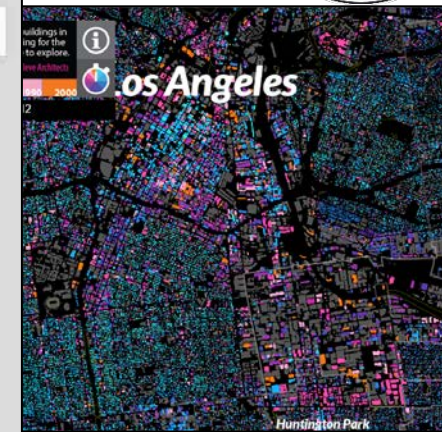
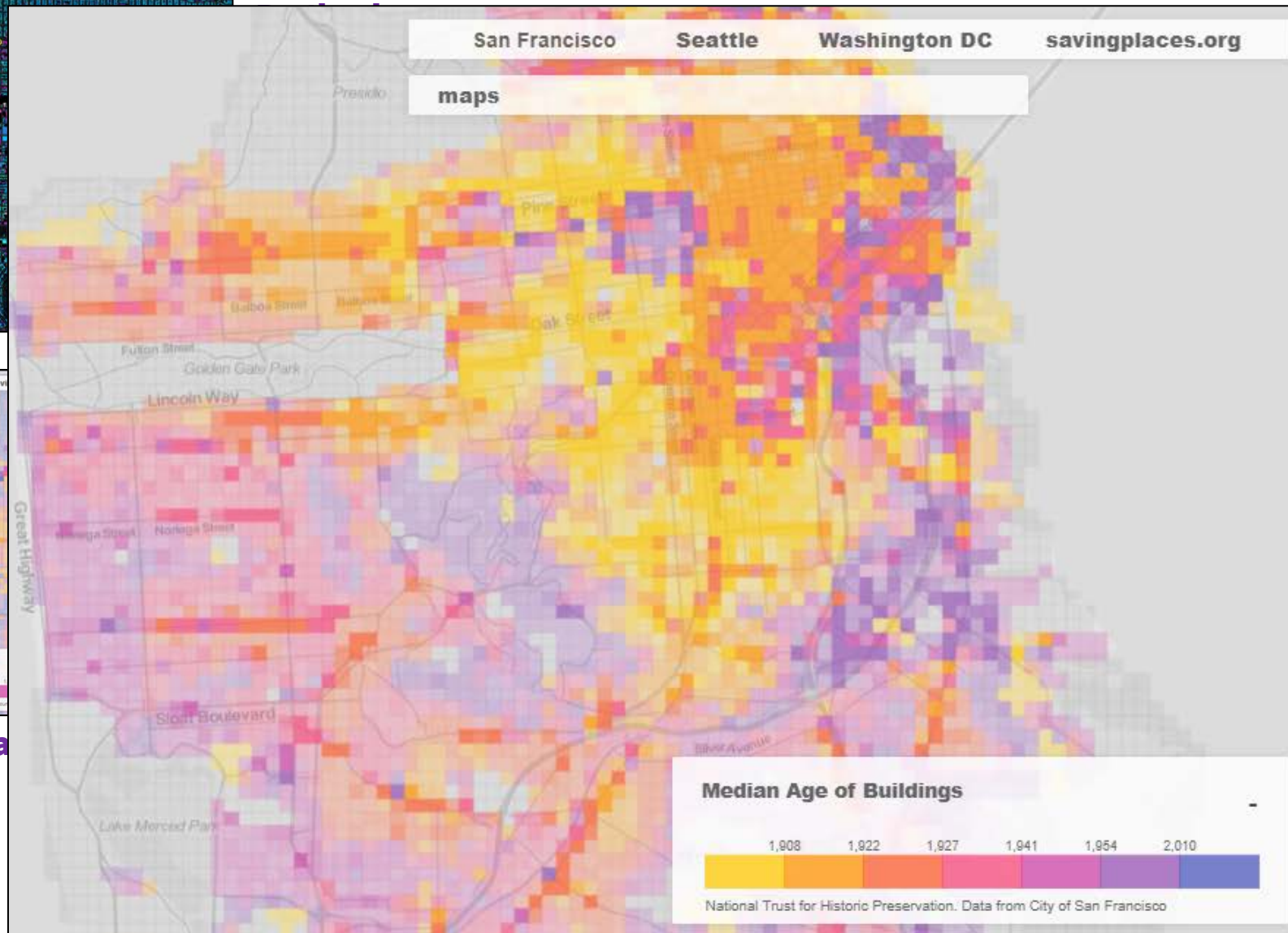
• Buildings As Part of A Resilient Community



- In most US cities, up to 90% of building stock was not built to modern codes

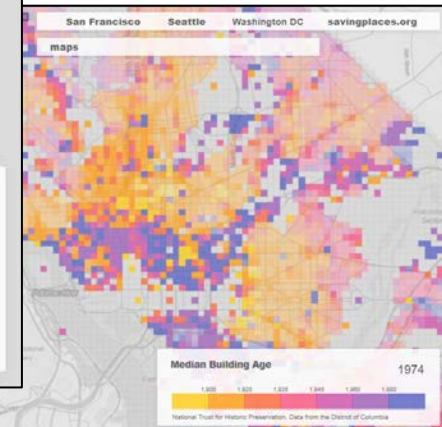


Sea

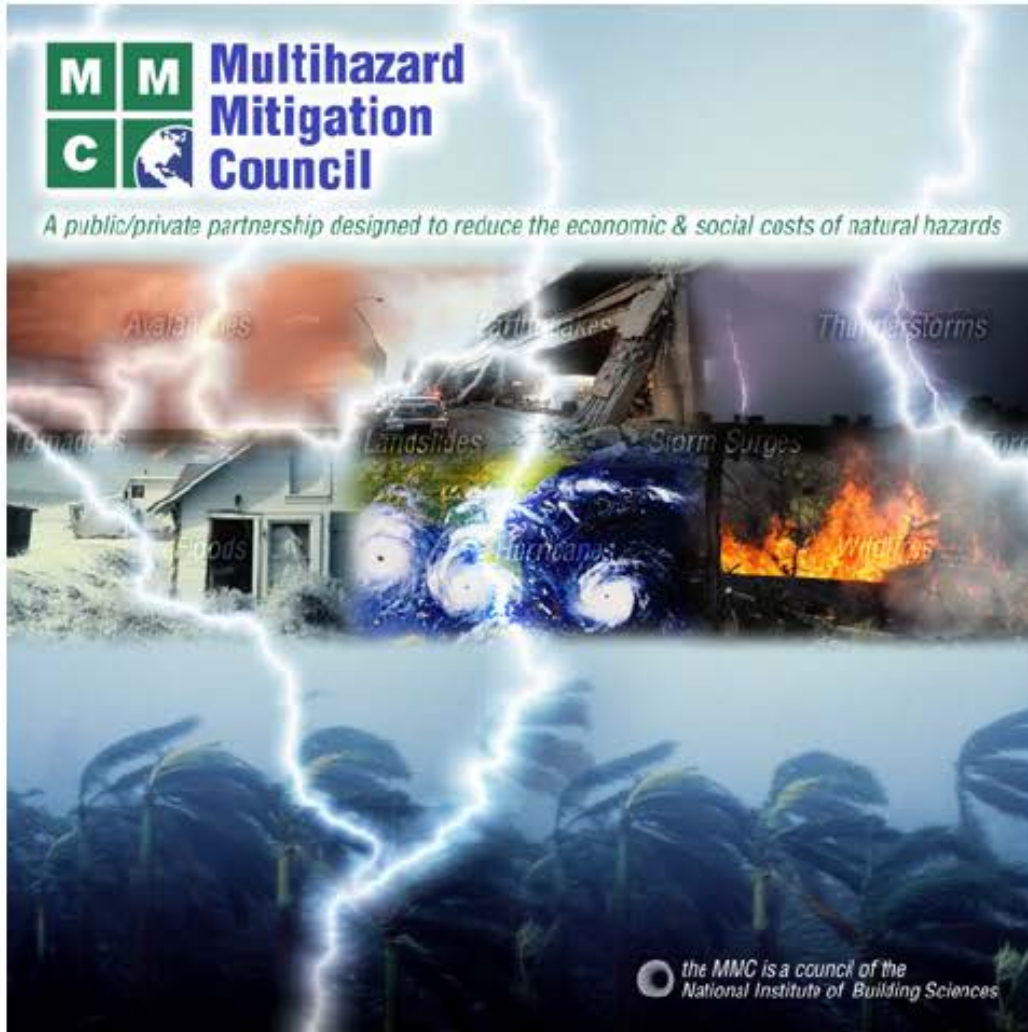


Los Angeles

Washington DC



Benefits of Mitigation and Enhanced Design



Federal grants can save the nation, on average, \$6 in future disaster costs, for every \$1 spent on hazard mitigation.

Investments in hazard mitigation measures that exceed 2015 model building codes can save the nation, on average, \$4 for every \$1 spent.

Implementing these strategies would prevent 600 deaths, 1 million injuries and 4,000 cases of (PTSD) in the long term.

In addition, designing new buildings to exceed the 2015 codes would result in 87,000 new, long-term job.

• Every Day Rating/Ranking Systems



GOVERNMENT SAFETY RATINGS		
Frontal Crash	Driver Passenger	★★★★★ ★★★★★
Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat Rear seat	★★★★★▲ Not Rated
Star ratings based on the risk of injury in a side impact. ▲ Safety concern; Visit www.safercar.gov or call 1-888-327-4236 for more details.		
Rollover		★★★★★
Star ratings based on the risk of rollover in a single vehicle crash.		
Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.		
Source: National Highway Traffic Safety Administration (NHTSA).		
www.safercar.gov or 1-888-327-4236		



- **VISION -**

- *A world in which people have the information they need about how buildings will perform in natural disasters*

- **MISSION –**


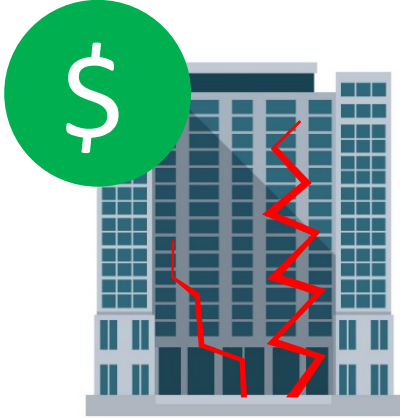

- *Educate, advocate, and organize to promote better tools for assessing and communicating building performance*
 - *Implement rating systems that describe the performance of buildings during earthquakes*

- **ROLES AND RESPONSIBILITIES -**

- *Educate the public to increase market demand for better performing buildings.*
 - *Develop consensus among diverse stakeholders and technical experts.*
 - *Promote integrity, stability, consistency and transparency of rating systems.*

• US Resiliency Council performance metrics



USRC BUILDING RATING SYSTEM			
	SAFETY	DAMAGE	RECOVERY
	★★★★★ Blocking exit paths unlikely	Minimal Damage (<5%)	Immediate to Days
	★★★★★ Serious injuries unlikely	Moderate Damage (<10%)	Within days to weeks
	★★★★ Loss of life unlikely	Significant Damage (<20%)	Within weeks to months
	★★★ Isolated loss of life	Substantial Damage (<40%)	Within months to a year
	★ Loss of life likely	Severe Damage (40%+)	More than a year

CODE BASED DESIGN

RESILIENCE BASED DESIGN



**+0-5%
Cost**

**Modern
Codes**

Sample of buildings with USRC earthquake ratings



CASA ADELANTE - SF

- 9-Stories
- Low income housing
- 20% formerly homeless population
- Resiliency cost: 0.24%

Safety ★★★★★

- Conditions unlikely to cause injuries

Damage ★★★★★

- The mean repair cost is less than 10% of building replacement cost.

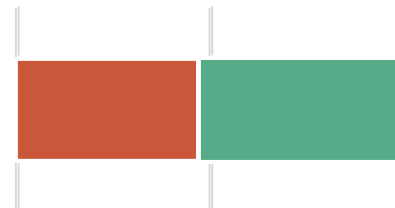
Recovery ★★★★★

- The median recovery time to regain basic function is less than one month.

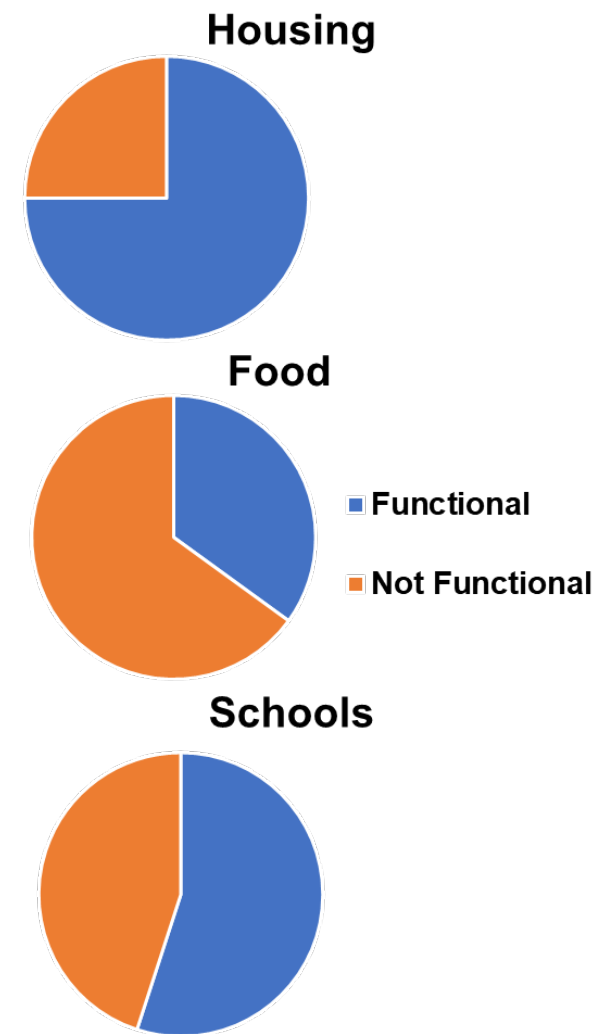
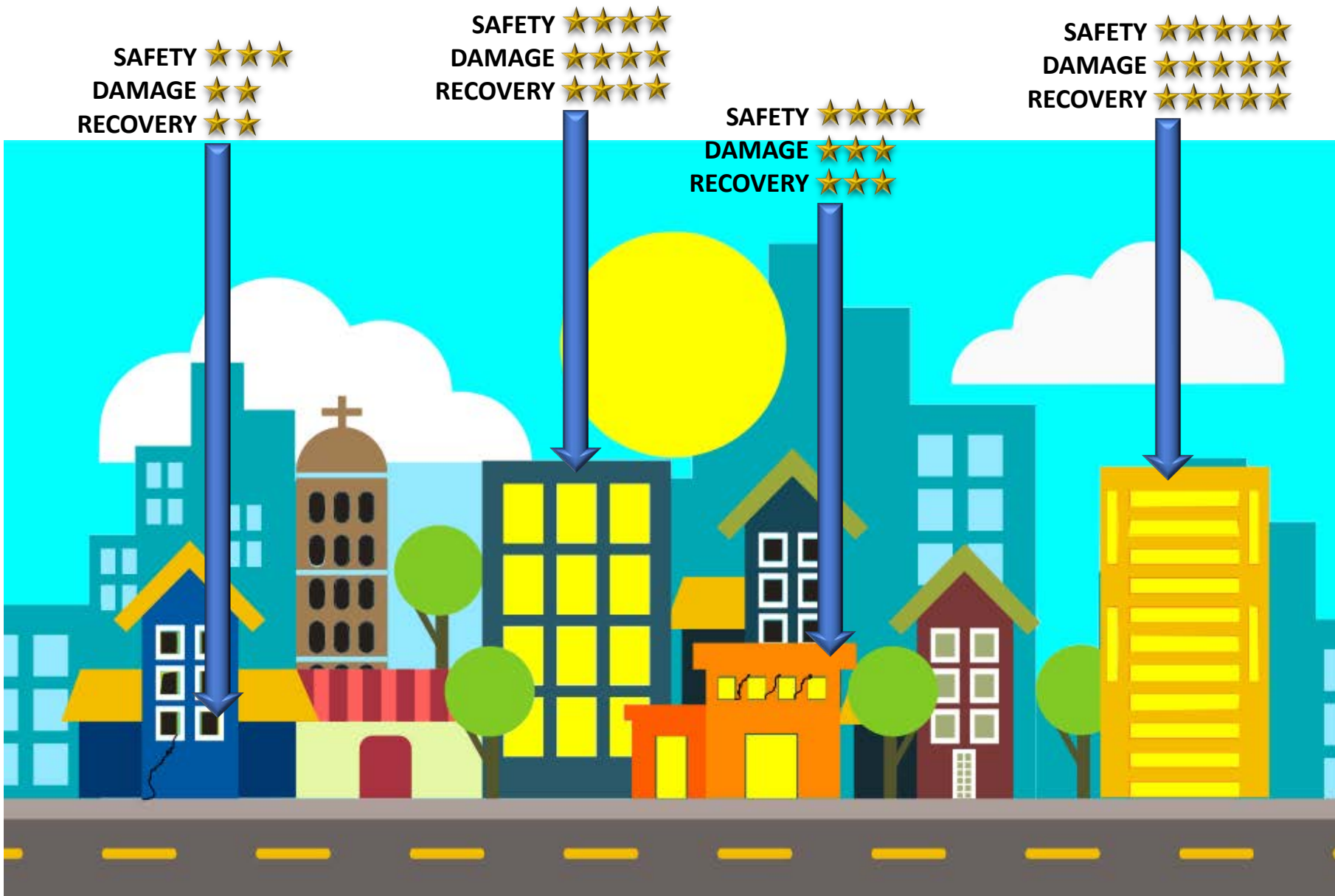
Measurable Benefits of Retrofit Ordinances



If soft story retrofits complied with USRC Certified Rating



Community Design Guidelines



The USRC Mission: Fear + Hope and a Plan



Fear vs Action Curve



planned or under construction.

• The Role of Incentives in Resilient Design



Many stakeholders benefit from more resilient buildings

- **Cities:** benefit from communities that can recover more quickly. **Expedited permitting**
- **Counties:** more resilient buildings preserve the critical tax base after a disaster. **Tax breaks**
- **State and Federal Government:** save on emergency housing assistance following a natural disaster and post disaster public assistance costs. **Mitigation grants**
- **Lenders:** better performing buildings reduce risk of borrower default. **Mortgage discounts**
- **Insurers:** reduced building damage results in lower claims liability. **Insurance discounts**

• USRC 2019 Initiatives



U.S. Resiliency Council
Getting-to-Silver Initiative



U.S. Resiliency Council
Shelter-in-Place Initiative



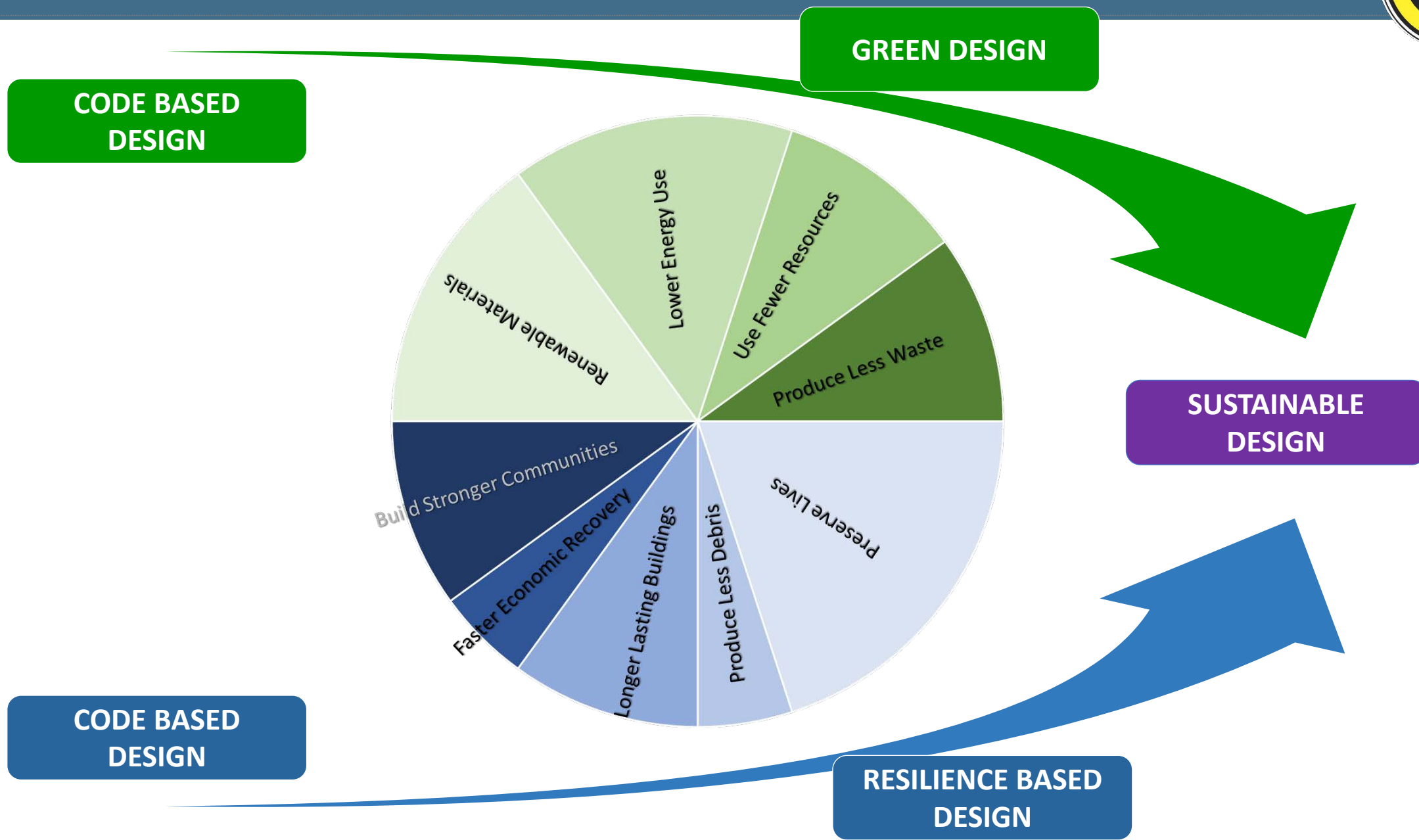
FannieMae®



U.S. Resiliency Council
Resilience Advantage Mortgage



• Convergence of A/E Design Goals



• Increasing Market Demand for Better Performance

San Francisco



Tenants pay 0% for enhanced seismic designs, but will pay 15% to 20% more for modern systems, LEED rating, etc.



Tokyo



In Tokyo, 1970's buildings are being torn down, because new buildings with the latest anti-seismic features command rents 40% higher.



Thank You!



For more information on The USRC, Ratings and Membership

www.usrc.org

www.usrc.org/membership

