THE AMERICAN INSTITUTE OF ARCHITECTS
SUSTAINABILITY:

RESILIENCE

AIA

1.12.16 | Rachel Minnery, FAIA
The Science behind Resilient Built Environments

Environmental Science

Social Science

Building Science
Next Hurricane Season
25 Years from Now
Built Environment Interdependencies:

REGIONAL
- Leadership

BUILDINGS
- Housing
- Commercial (grocery, pharmacy, etc.)
- Not-for-Profit
- Schools
- Hospitals & Healthcare Facilities

INFRASTRUCTURE
- Energy (power, gas, fuel, steam)
- Telecommunications
- Transportation / Movement
- Solid Waste
- Water
- Sanitary
- Storm water

RESOURCES
- Food Supply
- Parks

VITALITY
- Recreation / Exercise
- Social Networks and Support
Integrated Participatory Process

The role of the architect

- Economic Prosperity for All
- Natural Resources
- Disaster & Climate Resilience
- Social Equity
- Health, Safety & Wellness
SHOCKS & STRESSES.

AIA
**Shocks**

- Infrastructure failure
- Hurricanes
- Earthquakes
- Wildfires
- Heat waves
- Blizzard
- Health epidemics

**Stresses**

- Flooding
- Tornadoes
- Acts of terrorism
- Civil unrest
- Dam failure
- Subsidence
- Liquefaction

- Affordable housing
- Aging population
- Environmental degradation
- Sea level rise
- Growing wealth gap
- Drought
- Species extinction

- Aging infrastructure
- Population growth
- Unemployment
- Melting polar ice caps
- Global warming
- Food scarcity
- Increasing pollution
AIA RESILIENCE PROGRAMMING.
PUBLIC SAFETY  Damaged buildings can pose a lingering public threat for days or weeks following a disaster

ROLE OF THE ARCHITECT  In 1972, the AIA formally recognized the role of architects in emergency response

SAFETY ASSESSMENT EVALUATIONS  Hundreds of architects have volunteered to provide thousands of assessments since 2011 alone

Safety Assessment Volunteer in Action: Michael Lingerfelt, FAIA Posts a Damage Assessment Placard, Tuscaloosa, AL
RECOVERY COSTS

- Loss of habitability
- Developing new building codes
- Mold remediation(s)
- Insurance assessments
- Repair options
- Insufficient flood insurance coverage
- Future insurance premium increases
- Flood “proofing”
- Homeowners insurance coverage
- Identifying the cause of flood damage
- City rebuilding requirements
- Flood elevation certificates
AIA NY Post–Sandy Initiative

Transportation & Infrastructure
Waterfront
Critical & Commercial Buildings
Housing

Building Better, Building Smarter: Opportunities for Design and Development
May 2013
Policy Incompatibilities

- Repair Guidelines
- Zoning Code
- Building Code
- ADA
- Flood Insurance
Framework for Resilience

- EDUCATION OF ARCHITECTS
- COMPONENT INNOVATION & SUPPORT
- ADVOCACY
- PRACTICE-BASED RESEARCH
- POLICY-FOCUSED RESOURCES
- PARTNERSHIPS
CURRENT RESILIENCE PROGRAMS

**Education of Architects**

**TRAININGS** such as the Safety Assessment Program (SAP) and HURRIPLAN Resilient Coastal Design training

**RESILIENCE TRACK** at AIA Convention 2015

**DESIGN GUIDANCE** defining best practices in resilience

**CONTINUING EDUCATION** on Resilient Design to advance the practice
CURRENT RESILIENCE PROGRAMS

Practice Based Research

UNDERSTANDING RISK. Create vulnerability and risk assessment tools for architects

MEASURE IMPACT. Create evaluation and measurement tools for mitigation strategies.

CASE STUDIES. Identify and catalog leading examples of resilience qualities

SERVICE LIFE ASSESSMENT. Change performance values to consider full impact
CURRENT RESILIENCE PROGRAMS

Policy Opportunities

INCENTIVIZATION. Identify and advocate for incentivizes for resilient design, construction and operations.

RESPONSIBLE DEVELOPMENT. Encourage involvement of members in developing land use and zoning regulations.

PROMOTE RESILIENCY PLANNING. Encourage members to work with their communities on a resilience plan.

PROMOTE ADOPTION OF MODEL BUILDING CODES in all jurisdictions.

ENCOURAGE TRANSPARENCY of building performance information.

ENACT NATIONAL GOOD SAMARITAN LEGISLATION.
CURRENT RESILIENCE PROGRAMS

Partnerships

100 RESILIENT CITIES INITIATIVE. Support components in named cities

RESILIENCE BUILDING COALITION. Lead the Design, Construction & Building Operations industry to adopt a joint industry statement in support of resilient communities

AIA CEO Robert Ivy at the CGI Annual Meeting
100 Resilient Cities

- Health & wellbeing
- Economy & society
- Leadership & strategy
- Infrastructure & environment

“Helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century.”
Industry Statement on Resilience

RESILIENCE IS DEFINED BY:
“Drawing upon the work of the National Research Council, we define resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.”
Resilience Coalition

- **Problem-Seeking.** develop a vision with consensus on resilience performance goals and associated outcomes
- **Solution Development.** to uncover the programmatic challenges and related barriers to implementation
- **Coalition Building.** to build a foundation for future innovation, share knowledge and expertise in climate and hazard resilience
WHAT IS A RESILIENT BUILDING?
Understanding Resilience

Buildings and communities are subjected to destructive forces from fire, storms, earthquakes, flooding, and even intentional attack. The challenges facing the built environment are evolving with climate change, environmental degradation, and population growth. Architects have a responsibility to design a resilient environment that can more successfully adapt to natural conditions and that can more readily absorb and recover from adverse events. The AIA supports policies, programs, and practices that promote adaptable and resilient buildings and communities.

1. **Hazard:** poses a threat to safety

   Hazards such as hurricanes, tsunamis, earthquakes, tornadoes, blizzards, drought, and wildfires are responsible for injury, death, and property damage as well as social and economic disruption. These events are no longer a one-off, once in a lifetime event; particularly when we look at the impacts of climate change.

2. **Risk:** quantifies hazard threat

   Risk defines the likelihood of occurrence and intensity of the hazard. Determining the level of “acceptable risk” is critical to designing for the associated level of building performance. It is important to ask: What is the projected lifespan of the building? What are the building’s critical functional requirements before, during, and after a hazard strikes? And how long is it acceptable for the building to be out of service due to the impacts of a hazard?

3. **Vulnerability:** personalizes risk

   Vulnerability assesses the capabilities and interdependencies of individuals and communities associated with risk. A resilient building in a vulnerable community isn’t truly resilient. Infrastructure, utilities, food supply and services are all necessary for adequate functionality.

4. **Mitigation:** reducing negative impact

   Mitigation measures are often developed in accordance with lessons learned from prior incidents. Measures may include zoning and building codes, or floodplain buyouts as well as efforts to educate governments, businesses, and the public on measures they can take to reduce loss and injury. Mitigation is most successful when policies and decision-making support appropriate development, land use, site selection, and adoption of model building codes.

5. **Resilience:** inherent durability or flexibility

   When working within the built environment, it’s important to have foresight: incorporating changing environmental, social, and economic conditions into projects. This requires designs that are tough as well as flexible; providing the ability to not only bounce back, but forward.

6. **Adaptation:** accommodating needs throughout service life

   Hazards aren’t the only threat. It is critical to acknowledge the changing conditions in the physical, economic and social environment as well. Communities are ultimately successful when they are adaptable to change.
Location, Location, Location. Infrastructure, Land Use, and Development

**EXISTING BUILDINGS** must be addressed. The majority of our future built environment already exists.

**LAND-USE REGULATION** is a prerequisite for sound building codes.

**POPULATION GROWTH** and development continue to expand and its resource base is dwindling.

**URBANIZATION** has consumed natural buffers.
RESILIENCE RATING SYSTEMS
LEED Pilot Credits | Resilient Design

Assess Hazards

- **CHOOSE 1**
  - Climate Change Assessment
  - Emergency Planning
  - CREDIT IPpc98
    Assessment & Planning for Resilience (1 POINT)

- Design for Top 3 Hazards
  - CREDIT IPpc99
    Design for Enhanced Resilience (1 POINT)

- **CHOOSE 2**
  - Thermal Resilience
  - Back-Up Power
  - Access to Potable Water
  - CREDIT IPpc100
    Passive Survivability & Functionality During Emergencies (1 POINT)
**Intent:**

To encourage designers, planners and building owners/operators to proactively plan before design commences for the potential impacts of natural disasters or disturbances as well as address issues that impact long-term building performance such as changing climate conditions.
Intent:
Design and construct buildings that can resist, with minimal damage, reasonably expected natural disasters and weather events.

IPpc99: Design for enhanced resilience
Intent:
To ensure that buildings will maintain reasonable functionality, including access to potable water, in the event of an extended power outage or loss of heating fuel.
# RELi Resiliency Action List

## Communities

## Neighborhoods

## Buildings

## Homes

## Infrastructure

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### RELI RESILIENCY ACTION LIST (FULL)

**For Communities, Buildings, Homes + Infrastructure**

*An Action List + Strategic Resource Incorporated into the Green + Resilient Property Underwriting Standards.*

**CS Living Design + Capital Markets Partnership + AREA Research + University of Minnesota Architecture**

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### RELI ACTION LIST CSLivingDesign.org / RELI

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### PANORAMIC APPROACH

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### RISK ADAPTATION + MITIGATION FOR ACUTE EVENTS

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**For Field Interpretation:**

MAY 2012 | ORIGIN AUG 2009

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Community Resilience | NIST

SIX-STEP GUIDE TO PLANNING FOR COMMUNITY RESILIENCE

1. FORM A COLLABORATIVE PLANNING TEAM
   - Identify leader
   - Identify team members
   - Identify key stakeholders

2. UNDERSTAND THE SITUATION
   **Social Dimensions**
   - Characterize social functions & dependencies
   - Identify support by built environment
   - Identify key contacts
   **Built Environment**
   - Identify and characterize built environment
   - Identify key contacts
   - Identify existing community plans
   **Link Social Functions & Built Environment**
   - Define clusters

TOWARD A MORE RESILIENT COMMUNITY
An Overview of the Community Resilience Planning Guide for Buildings and Infrastructure Systems

National Institute of Standards and Technology
U.S. Department of Commerce
THANK YOU.

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WWW.AIA.ORG/RESILIENCE
DIALOGUE.
THANK YOU.

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Moving Forward

1. **UNDERSTAND RISK.** Use reliable data and research on hazards and climate projections in Vulnerability Assessments; educate architects on performing Vulnerability and Risk Assessments. Where reliable data is not accessible, support the collection and distribution of it within the profession and among the public.

2. **COMMUNICATE RISK.** Identify and communicate risks to members, clients, peers and communities.

3. **ENGAGE IN EFFECTIVE DEVELOPMENT AND LAND USE POLICIES** that protect individuals, build the economy, and enrich communities and the environment.

4. **STREAMLINE DESIGN REVIEW AND APPROVAL PROCESSES** so innovation is not synonymous with delay.

5. **ADDRESS RISK.** Provide guidance beyond baseline life-safety codes that recognizes the importance of fortifying property for individual and community resilience.