RESILIENCE THROUGH CHANGE:
PRINCIPLES IN ORGANIZATIONAL PLANNING & DESIGN

Sumegha Shah, AIA, RA, LEED AP BD+C
Project Architect, Associate
PERKINS+WILL

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Sumegha is an architect at the Perkins+Will Atlanta office with 12+ years of experience education projects ranging from K-12 to Higher Education projects including student life, academic and housing projects as well as the particular needs medical and health science buildings. Her work supports agile learning environments through thoughtful planning and technical design that enables technology and enhances learning and collaboration. Sumegha is part of the global Perkins + Will Resilience lab which focuses on researching, developing and adapting strategies to increase the resilience of our buildings and our communities.

Resilient Design

Building + Communities that can survive, recover, grow and thrive when facing acute shock events or long-term stressors, through a combination of diversity, foresight and the capacity for self- organized and learning.

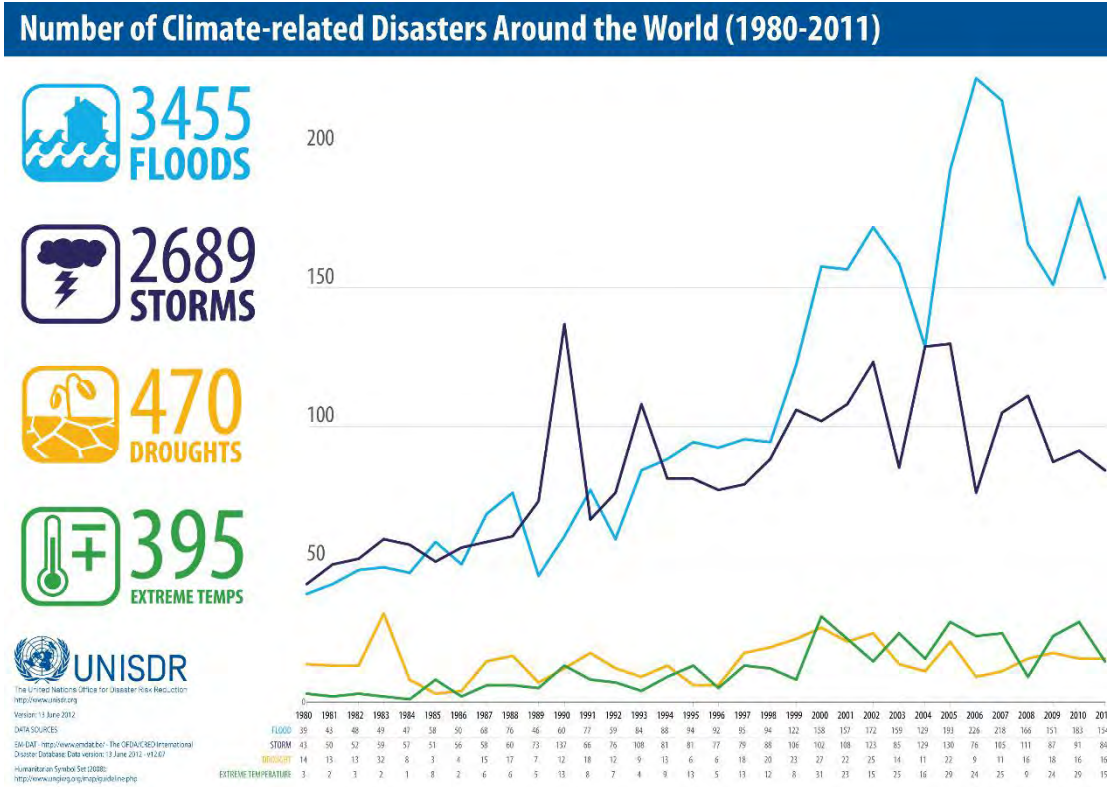
WHY RESILIENT DESIGN

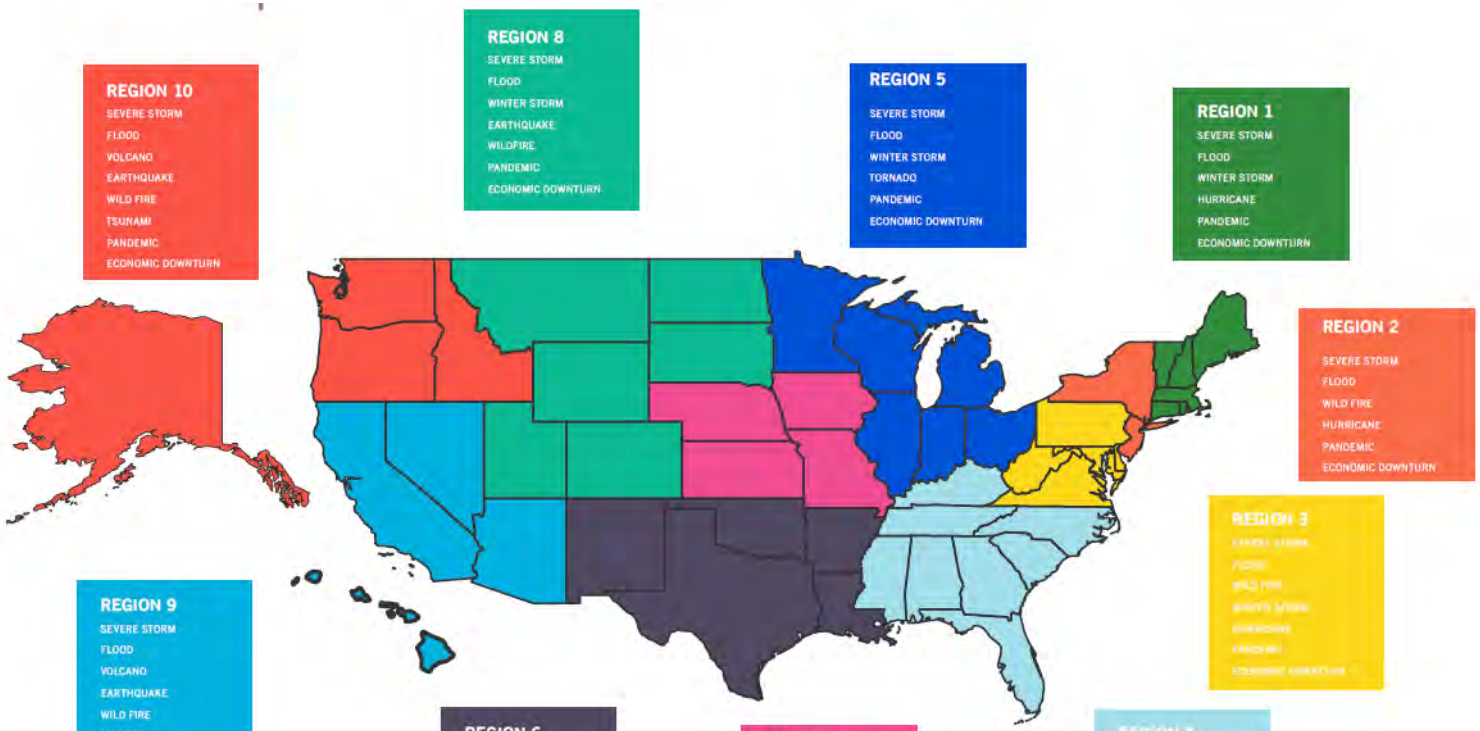
INCREASED OCCURRENCE /

of extreme natural events, acute events and on-going chronic issues.

INCREASED AWARENESS OF AND DEMAND /

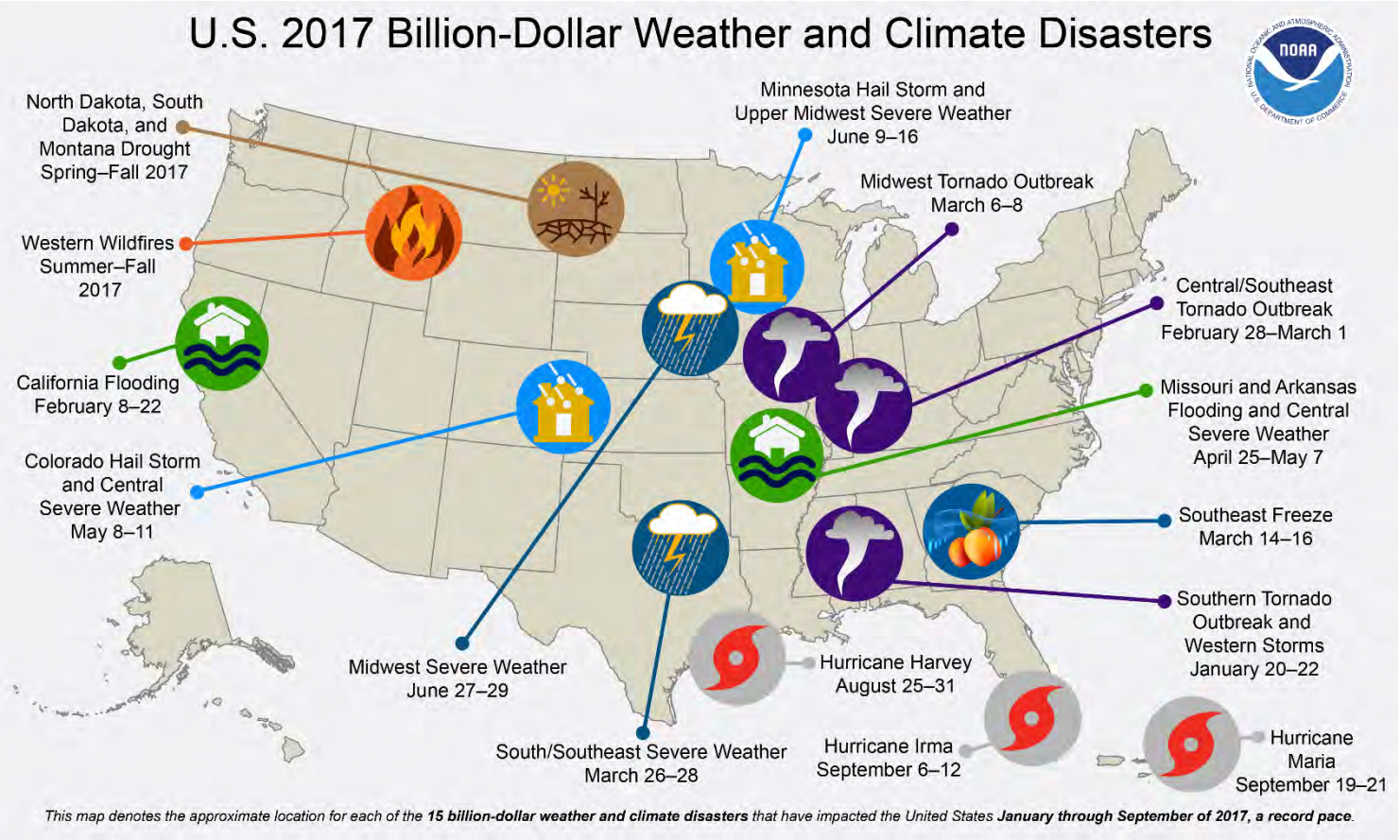
for resilient solutions by residents, business owners, and leaders at all levels in areas recently affected by acute events and those most likely to be affected in the future.





Family Readiness Kit, American Academy of Pediatrics, 2016

THE COST FACTOR



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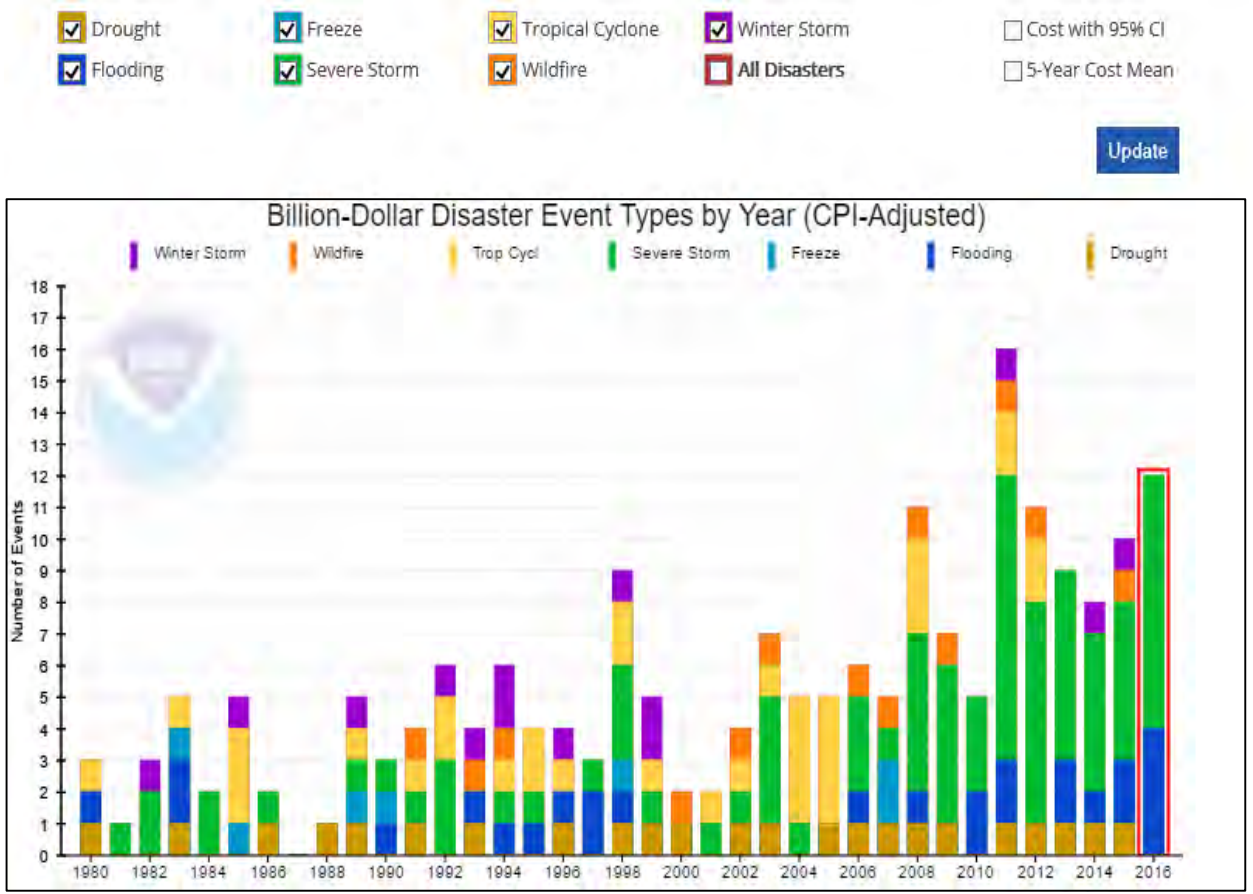


RESILIENCY PROCESS:
3 QUESTIONS TO CHANGE WORLDVIEWS

1. What are the climate projections in your project location?

2. What are its vulnerabilities as a result of those projections?

3. How does your design solution address those vulnerabilities?

WHAT IS RESILIENCY PLANNING?

PLANNING PROCESS

Plan’s DNA

PLANNING PROCESS

Information
Gathering

PLANNING PROCESS

Identify
Vulnerabilities

Shocks and Stressors workshop

PLANNING PROCESS

Identify Patterns

PLANNING PROCESS

Establish Proof

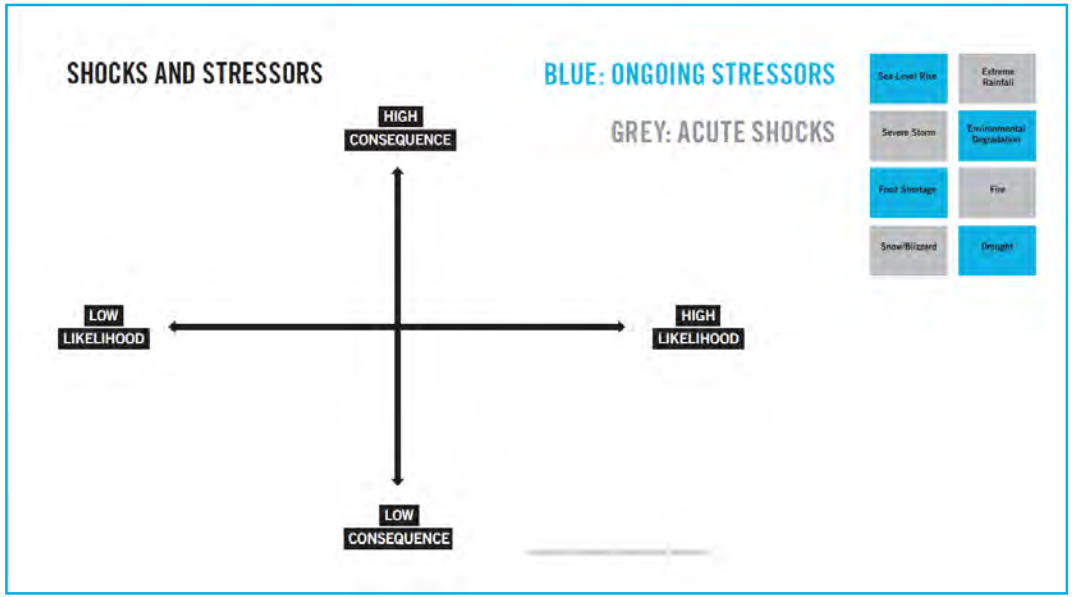
SEE Exercise outcomes

PLANNING PROCESS

Implementation

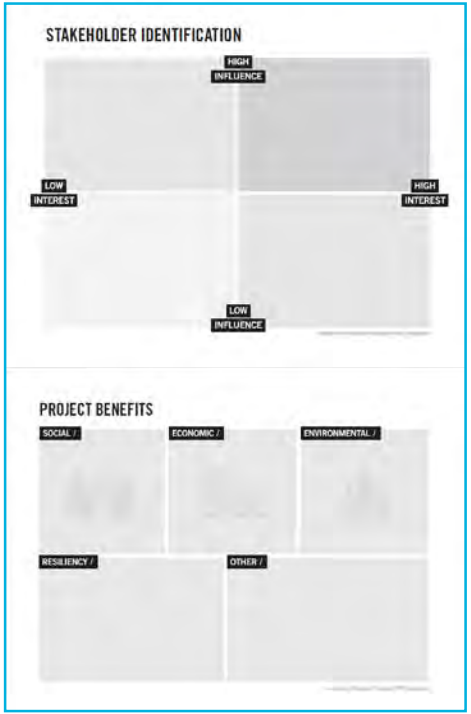
THREE STEPS…

1.



2.

3.



1 & 3 Sourced from Rockefeller Foundation NDRC Academies

RESILIENCY TOOLKIT
1. SHOCKS AND STRESSORS

ARKANSAS TECH UNIVERSITY

CAMPUS MASTER PLAN: RESILIENCY WORKSHOP #1

MARCH 2, 2017

POLK STANLEY WILCOX ARCHITECTS

PERKINS +WILL

TRADITIONAL ISSUES ON CAMPUS

Think before, between, and beyond…

- Campus police patrol and control operations.
- Shelter in place provision.
- CCTV & swipe-cards.
- Recycling programs.
- Flooding and surface water damage.
- Deferred maintenance.

ADDITIONAL PHOTOS

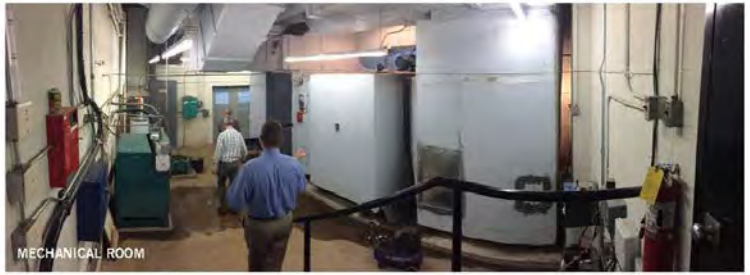

ACCESSIBLE ENTRY


RENOVATED CLASSROOM (1ST FLOOR)

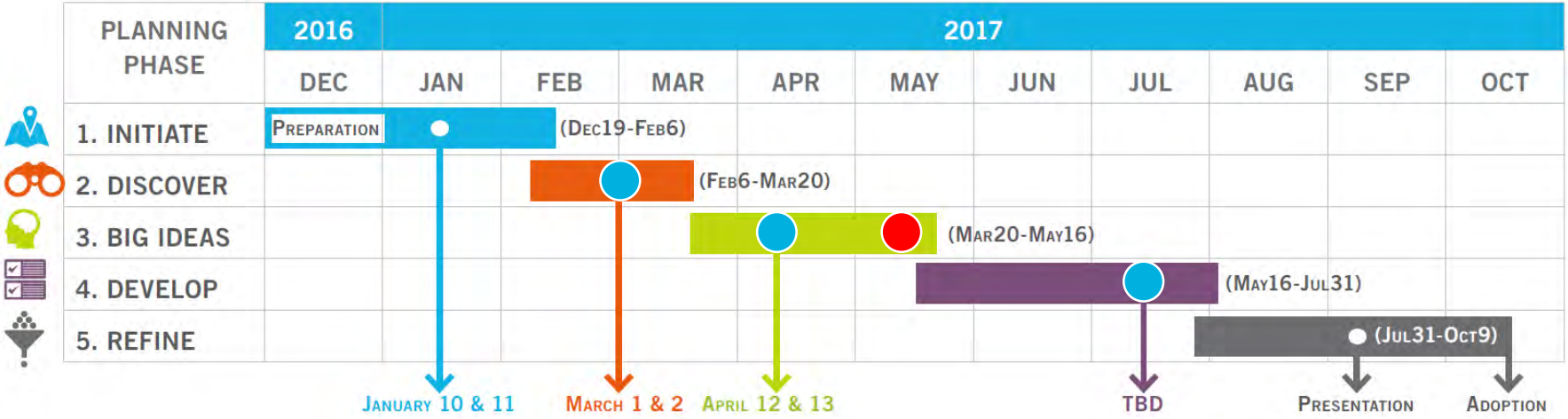

RESTROOM


3RD FLOOR LOBBY


ORIGINAL CLASSROOM (3RD FLOOR)


MECHANICAL ROOM

PROJECT SCHEDULE



○ = Symposium (On-campus Workshop / Project Meetings / Presentations)

(DATE) = Target work phase dates (note: dates are approximate and work phases will have some overlap)

● = Resiliency Workshop

● = Design Team Internal Charrette

UNDERSTANDING CHALLENGES

CHRONIC STRESSORS

Lingering impacts from repeated exposure to social, environmental, and economic problems

ACUTE SHOCKS

Quick impacts from extreme social, environmental, and economic events

CHRONIC STRESSORS

Lingering impacts from repeated exposure to social, environmental, and economic problems

SOCIAL

- Disease
- Low education
- Language barrier
- Limited diversity

ECONOMIC

- Insufficient Operating Funds
- Lack of Endowment
- Unemployment

ENVIRONMENTAL

- Air pollution
- Coastal erosion
- Drought
- Water scarcity

ACUTE SHOCKS /

Quick impacts from extreme social, environmental, and economic events

SOCIAL

- Bias crime
- Civil unrest
- Terrorism
- Infrastructure failure
- Fuel supply disruption

ECONOMIC /

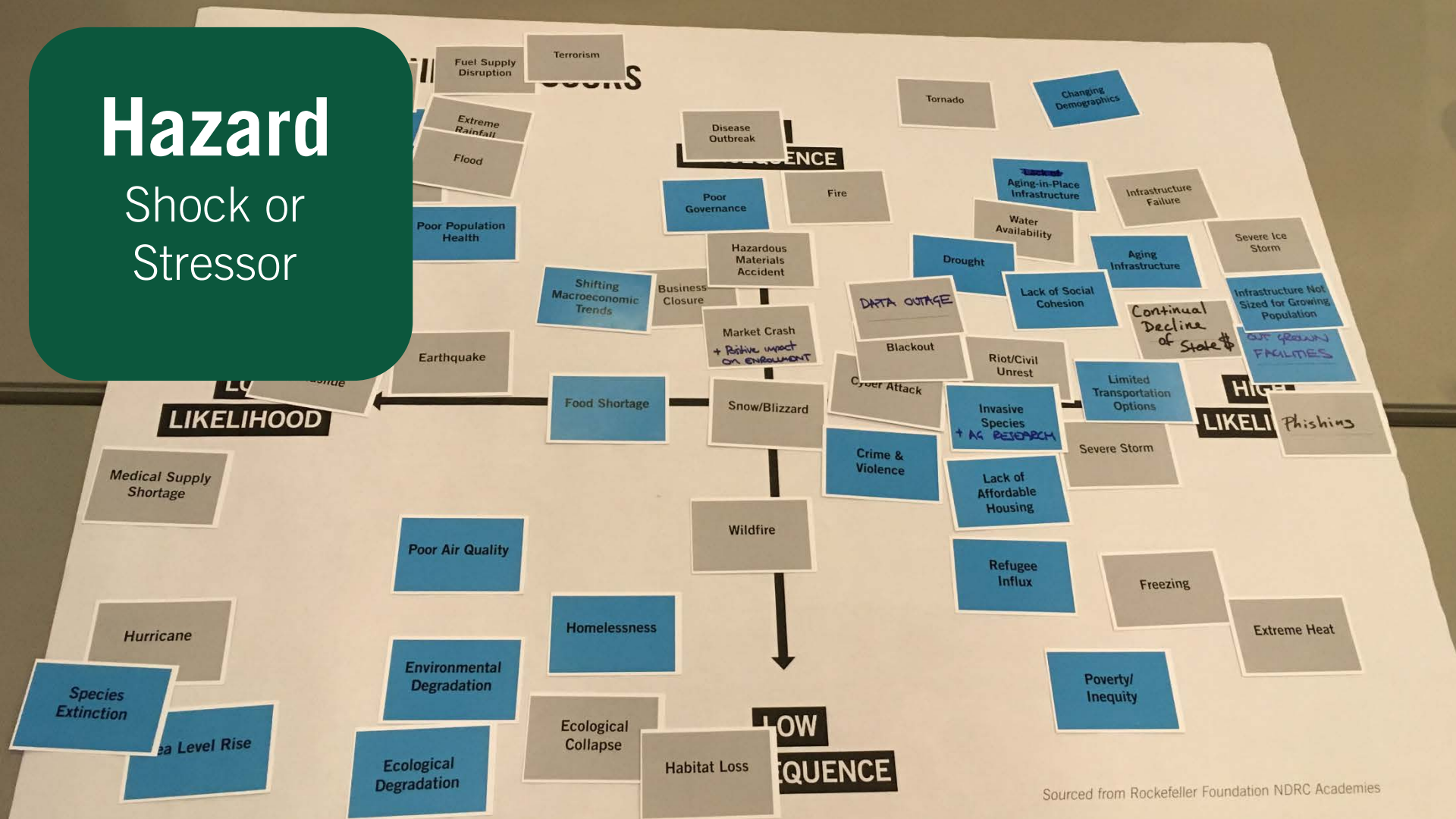
- Loss of Donor Support
- Cyber attack
- Business closure
- Zero-out budget decision by legislature

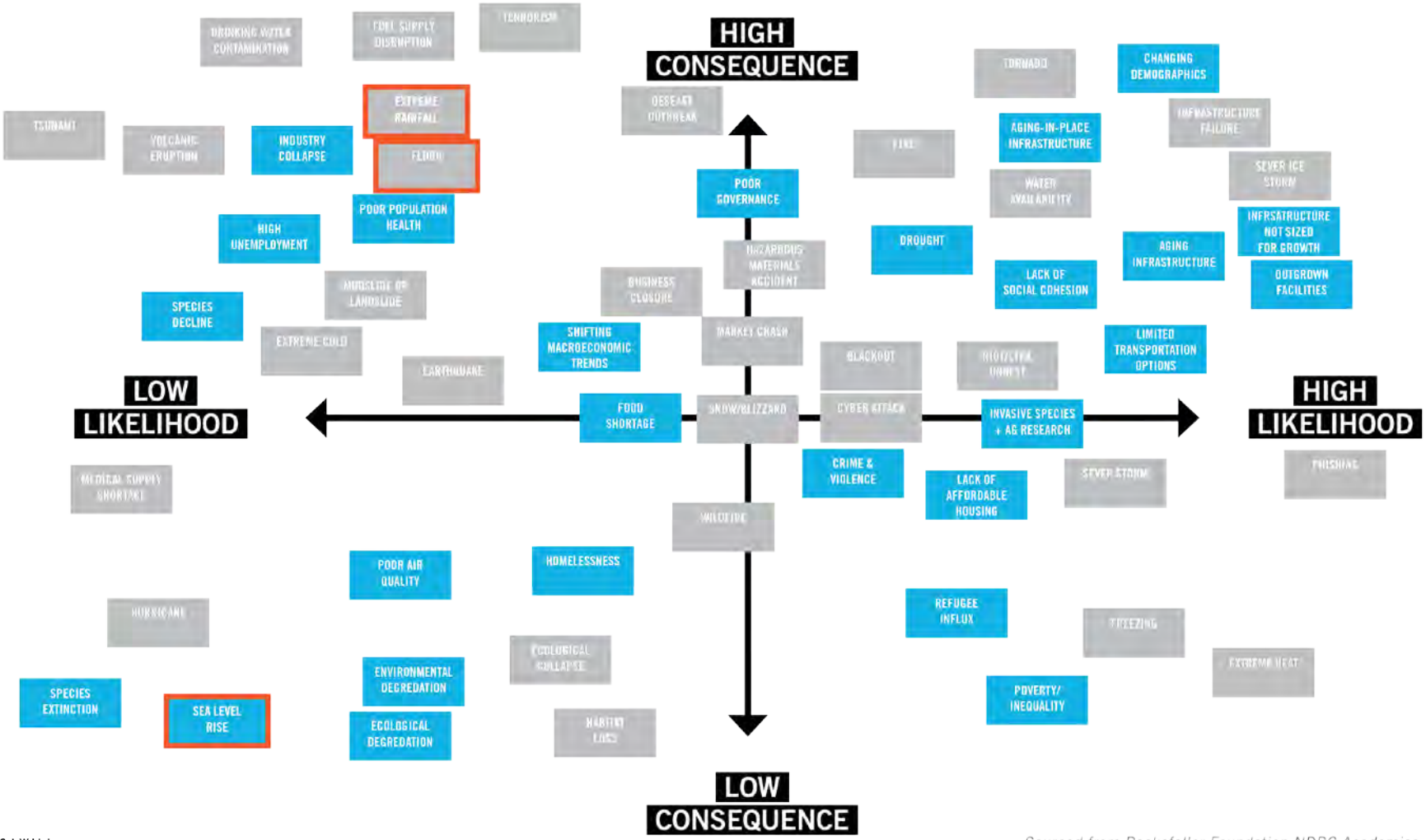
ENVIRONMENTAL /

- Extreme rainfall
- Severe storm
- Fire
- Snow/blizzard
- Severe ice storm

Hazard

Shock or Stressor





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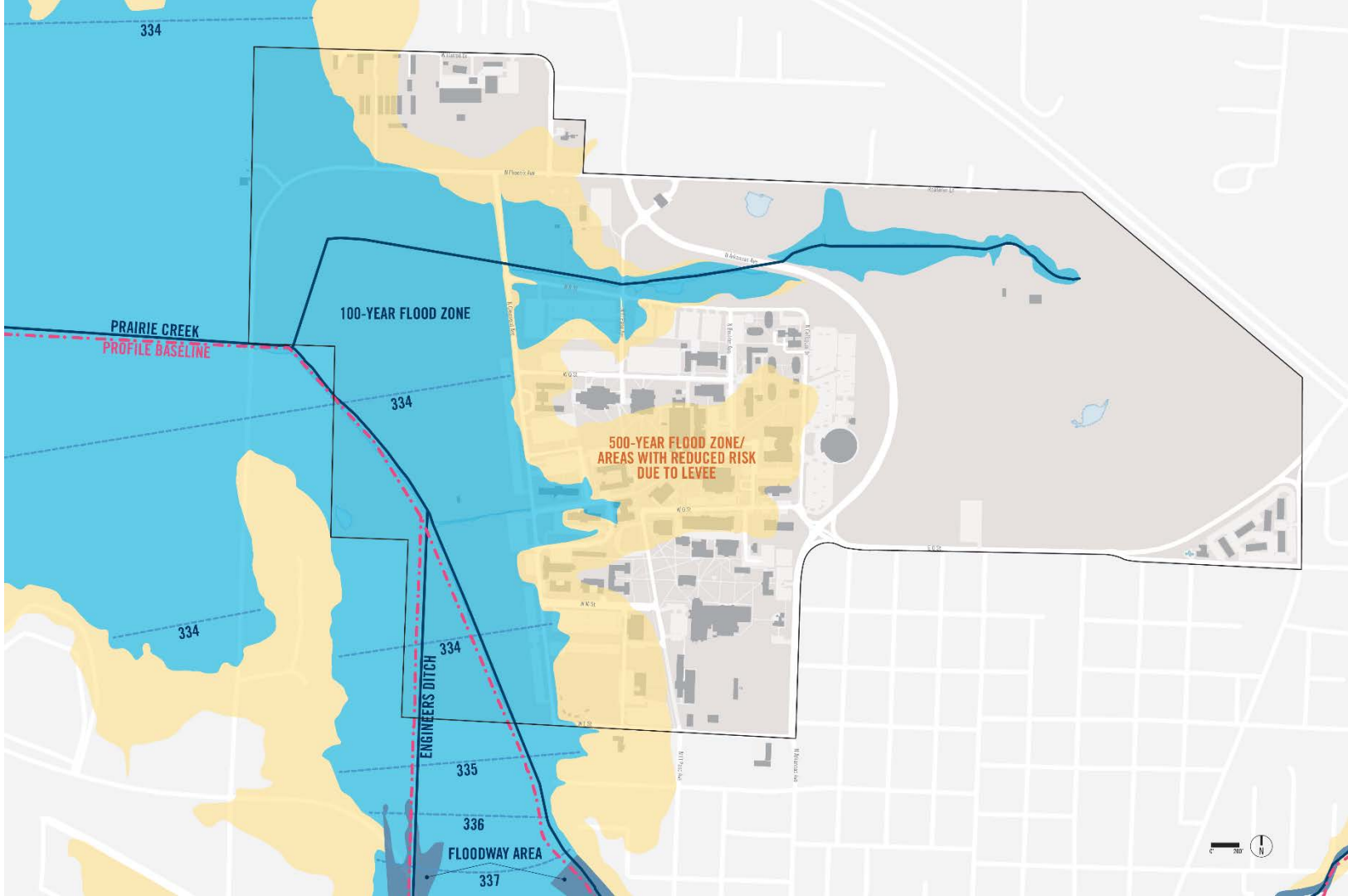
Sourced from Rockefeller Foundation NDRC Academies



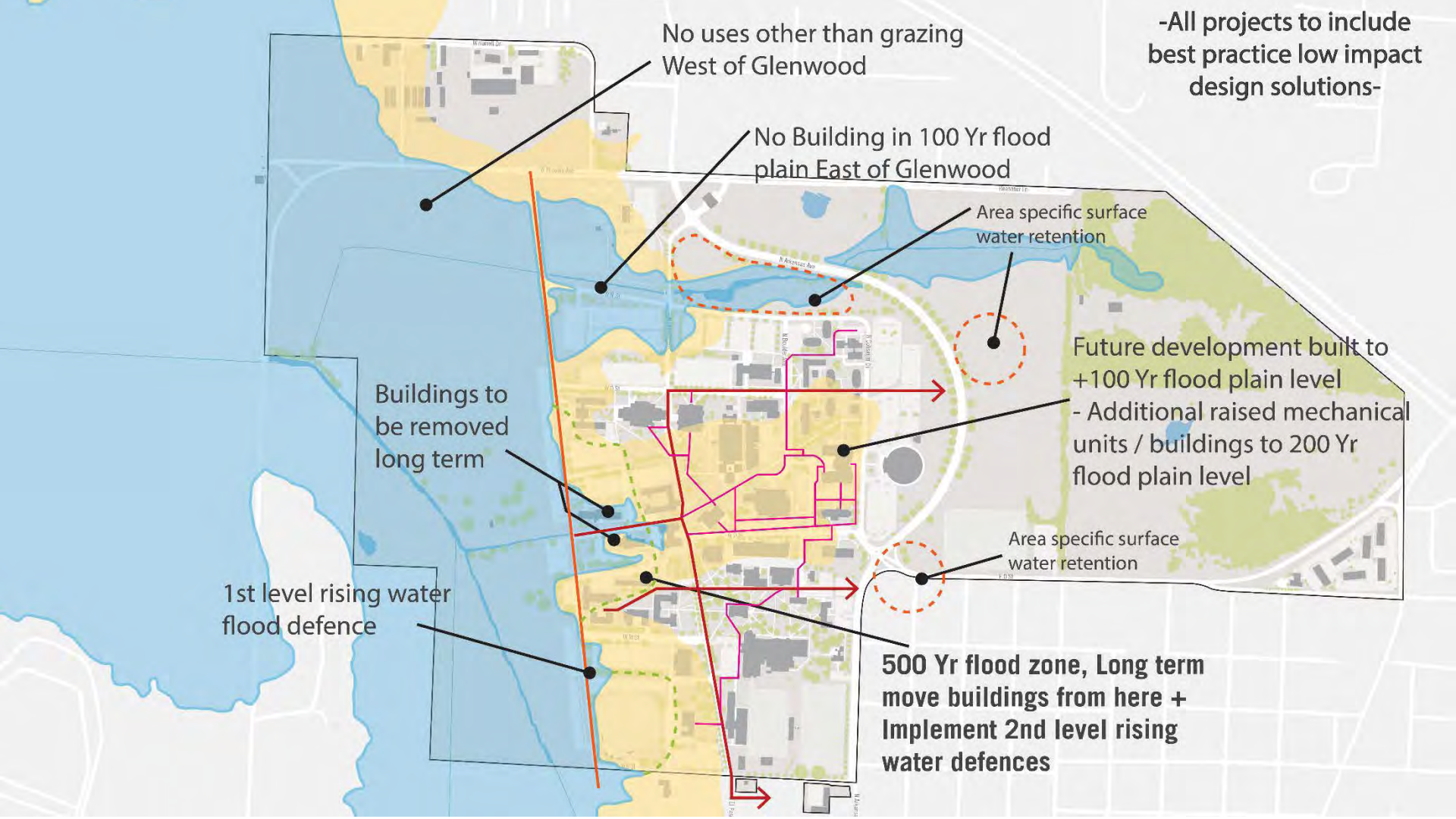
PERKINS+WILL

STORM WATER

- Torrential rainfall on August 15, 2017, caused flooding on the Tech campus as well in areas around Russellville.
- A total of 2.78 inches fell in the early morning, predominately in the 5:30 a.m. – 7 a.m. time period.

East Entrance to Campus at O Street and Arkansas Ave.


GO TECH

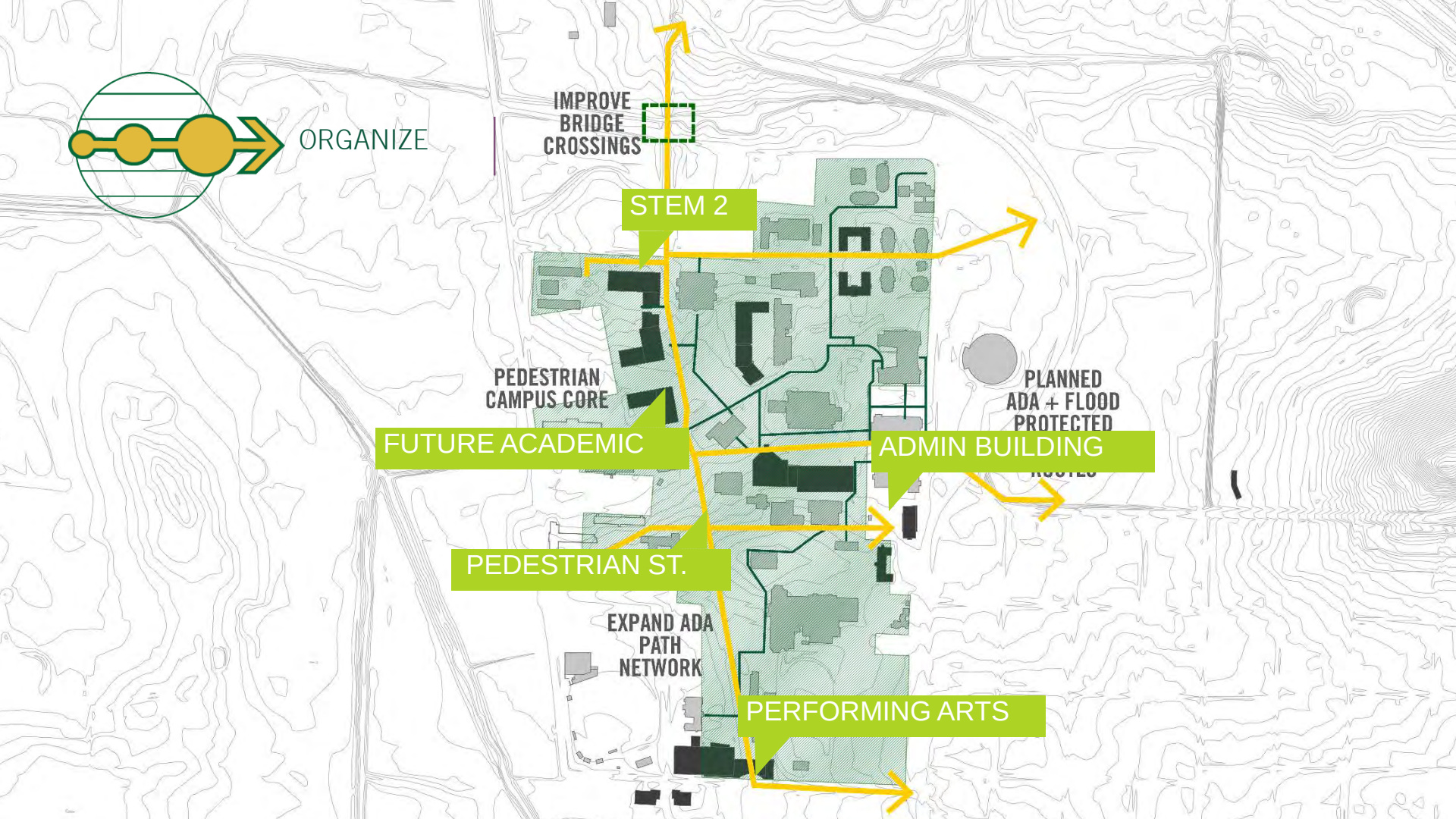

-All projects to include best practice low impact design solutions-
No uses other than grazing West of Glenwood
No Building in 100 Yr flood plain East of Glenwood
Area specific surface water retention
Future development built to +100 Yr flood plain level
- Additional raised mechanical units / buildings to 200 Yr flood plain level
Buildings to be removed long term
Area specific surface water retention
1st level rising water flood defence
500 Yr flood zone, Long term move buildings from here + Implement 2nd level rising water defences

ORGANIZE

Accessible Routes

- Target completion of an accessible circulation backbone of paths on campus
- Combine with removal of parking within campus core
- Include storm water management techniques ensuring accessibility during flood events

ORGANIZE


IMPROVE BRIDGE CROSSINGS
STEM 2
PEDESTRIAN CAMPUS CORE
FUTURE ACADEMIC
PLANNED ADA + FLOOD PROTECTED
ADMIN BUILDING
PEDESTRIAN ST.
EXPAND ADA PATH NETWORK
PERFORMING ARTS

ORGANIZE

Evacuation Routes

ORGANIZE

Evacuation Routes

ORGANIZE

Evacuation Routes

RESILIENCY TOOLKIT
2.VULNERABILITY ASSESSMENTS

RISKS =

Hazard
Shock or
Stressor

X

Consequence
Exposure or
Vulnerabilities

SHOCKS + STRESSORS

Six shock and stressor groups were identified as potentially being most critical to the ATU campus locations.

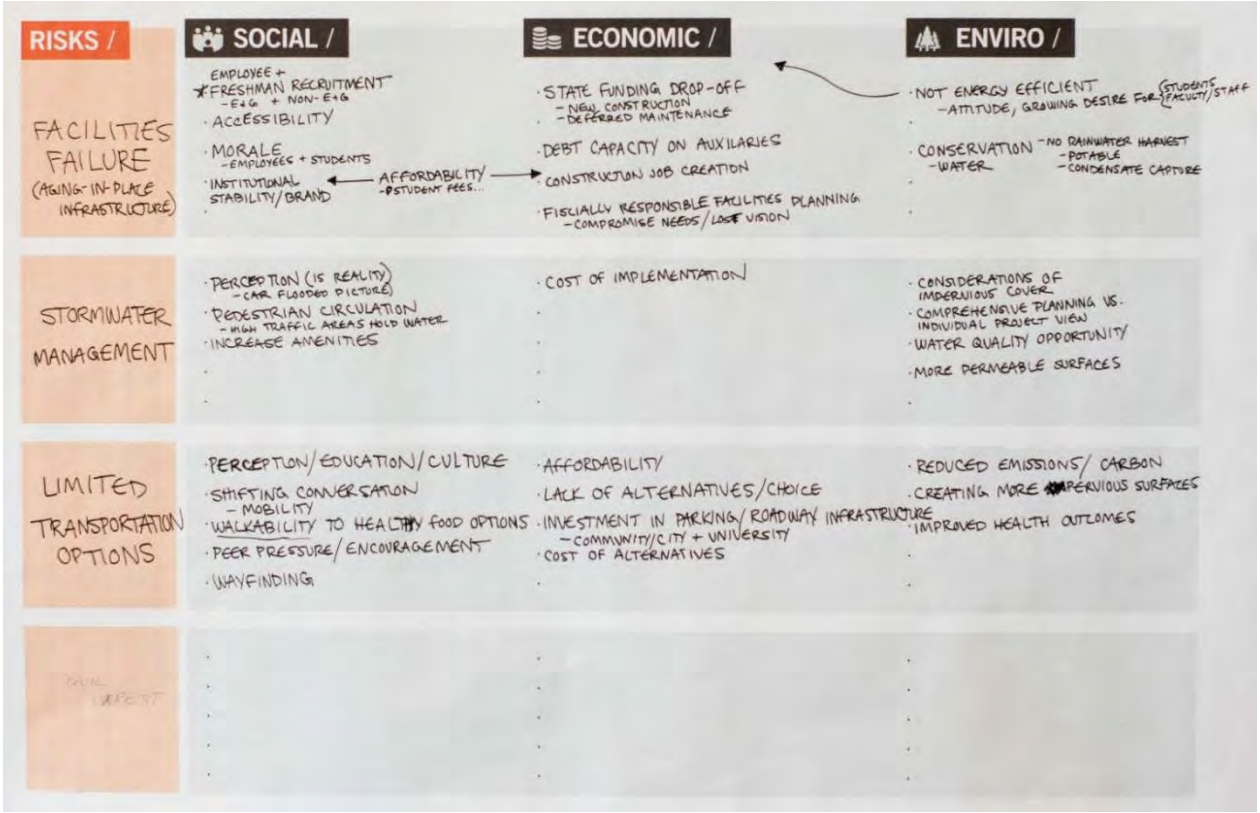

HIGH CONSEQUENCE
LOW LIKELIHOOD
HIGH LIKELIHOOD
LOW CONSEQUENCE

S-E-E MATRIX EXERCISE

SOCIAL

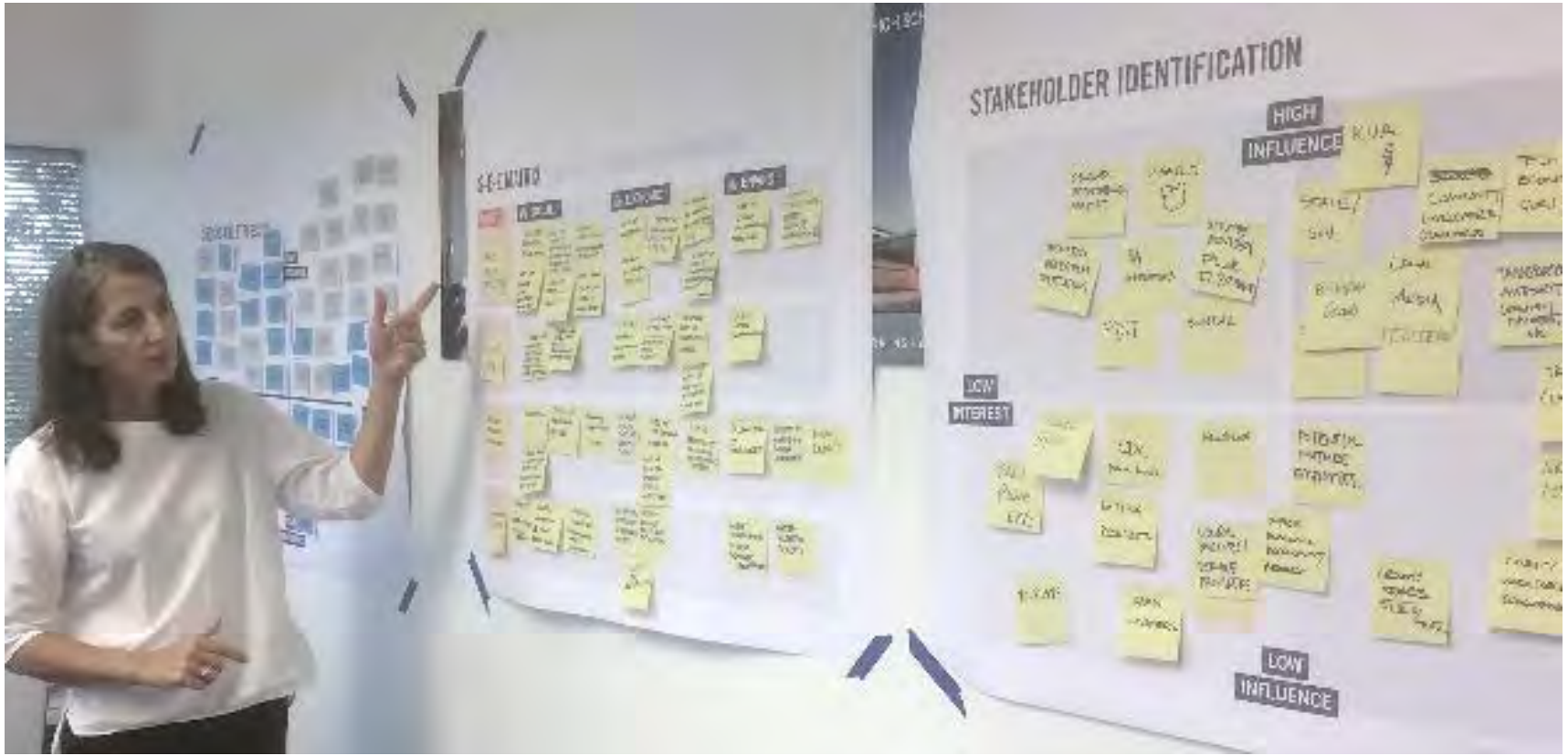
ECONOMIC

ENVIRONMENTAL



RESILIENCY TOOLKIT
3.STAKEHOLDER ENGAGEMENT

STAKEHOLDER IDENTIFICATION



Who?

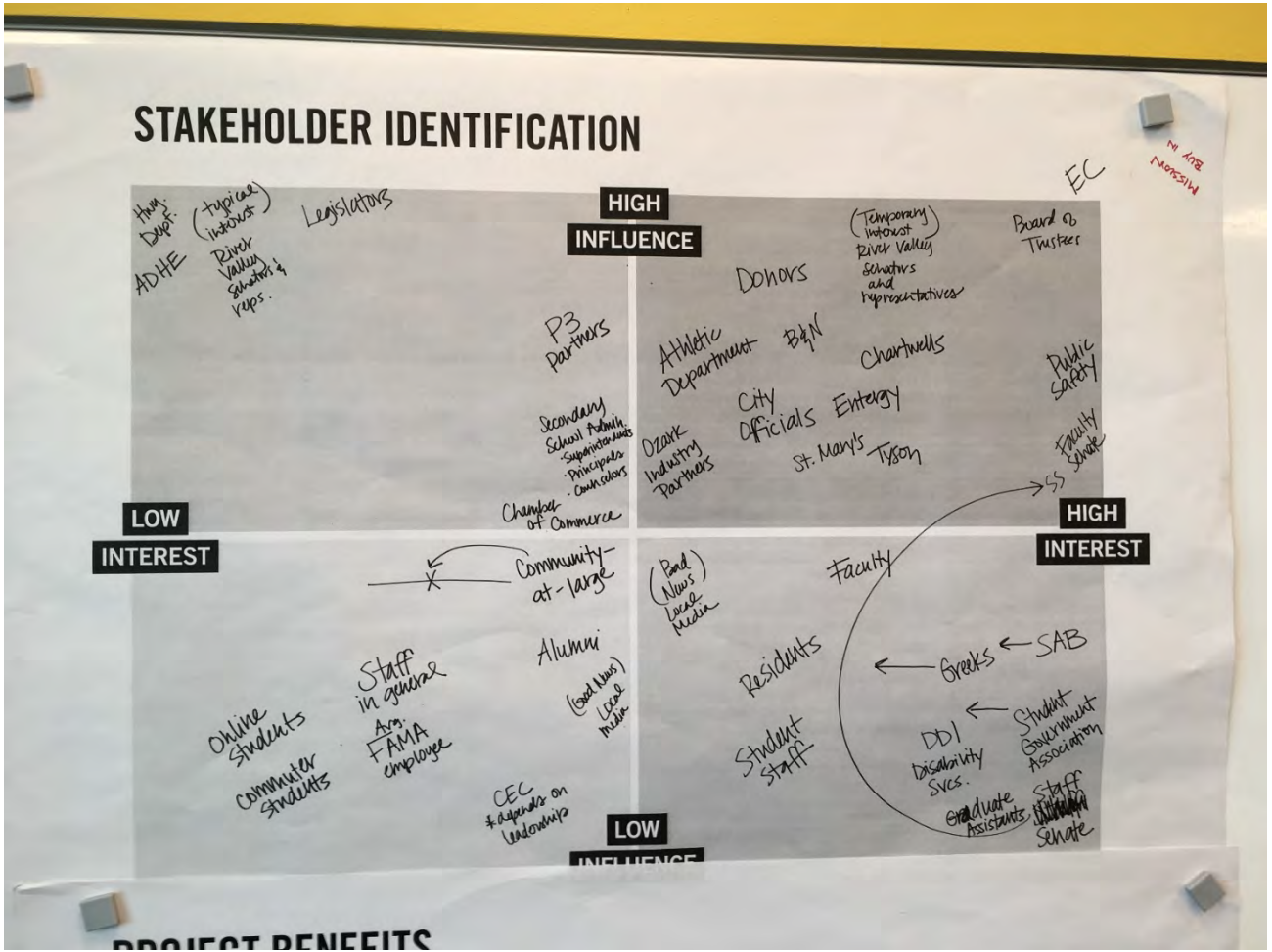
Values
Interest
Influence

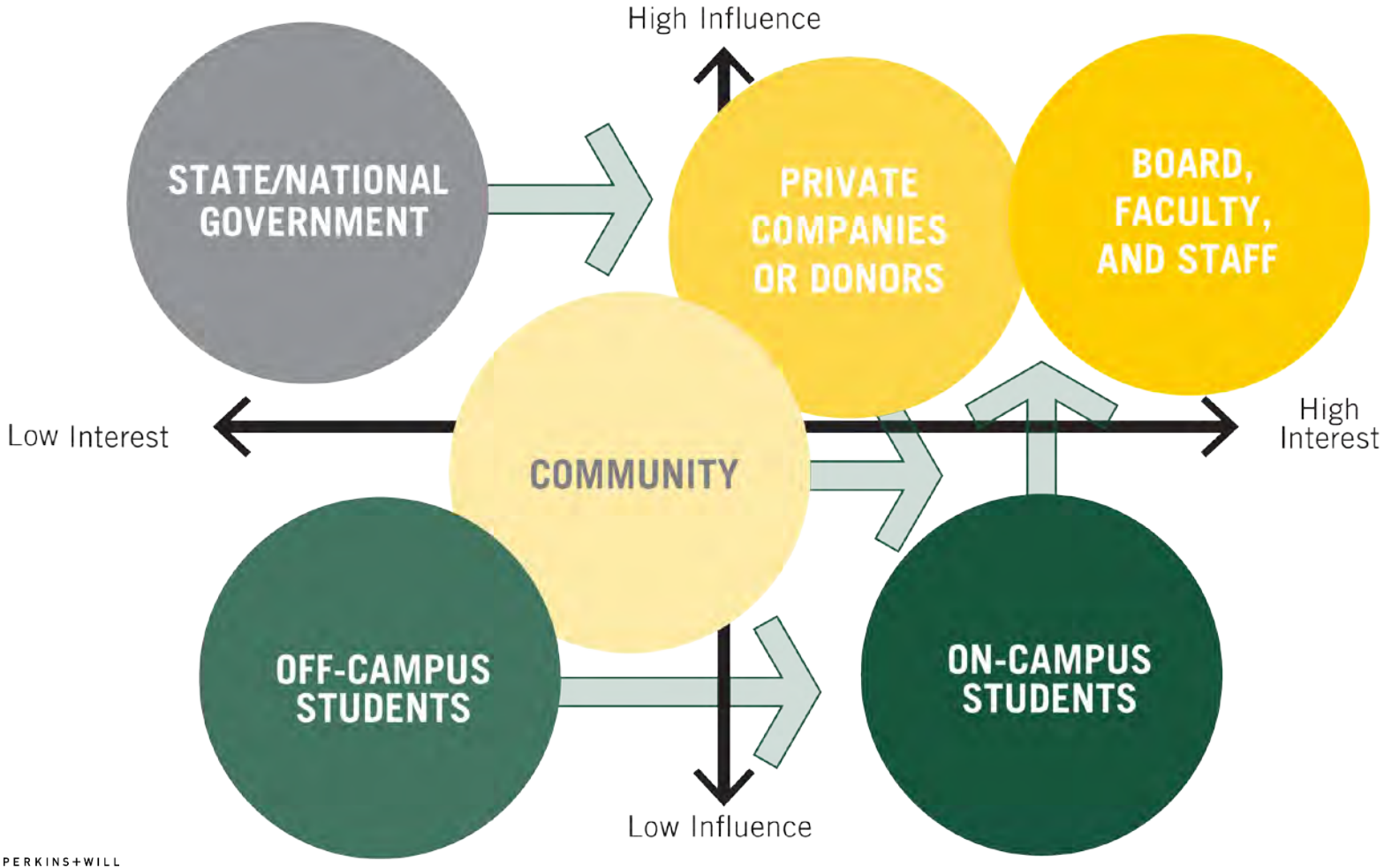
What?

Message

How?

Stage to Engage
Outreach Plan
Communications
Feedback
Integration


STAKEHOLDER IDENTIFICATION
HIGH INFLUENCE
LOW INFLUENCE
LOW INTEREST
HIGH INTEREST
Hum. Dept.
(Typical) Instruct
ADHE
River Valley Senators & Reps.
Legislators
P3 Partners
Secondary School Admin. -Superintendents -Principals -Counselors
Chamber of Commerce
Donors
(Temporary) Interest River Valley Senators and representatives
Board of Trustees
EC
Athletic Department
B&N
Chartwells
Public Safety
City Officials
Entergy
Ozark Industry Partners
St. Mary's
Tyson
Faculty Senate
Community-at-large
(Bad News) Local Media
Faculty
Online Students
Commuter Students
Staff in general
Asst. FAMA employee
Alumni
(Good News) Local Media
Residents
Greeks
SAB
Student Staff
DDI Disability Svcs.
Student Government Association
Graduate Assistants
Staff Senate
CEC
*depends on Leadership
PROJECT BENEFITS



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Sourced from Rockefeller Foundation NDRC Academies

Resiliency is about continuing to work to solve complicated problems which will require:

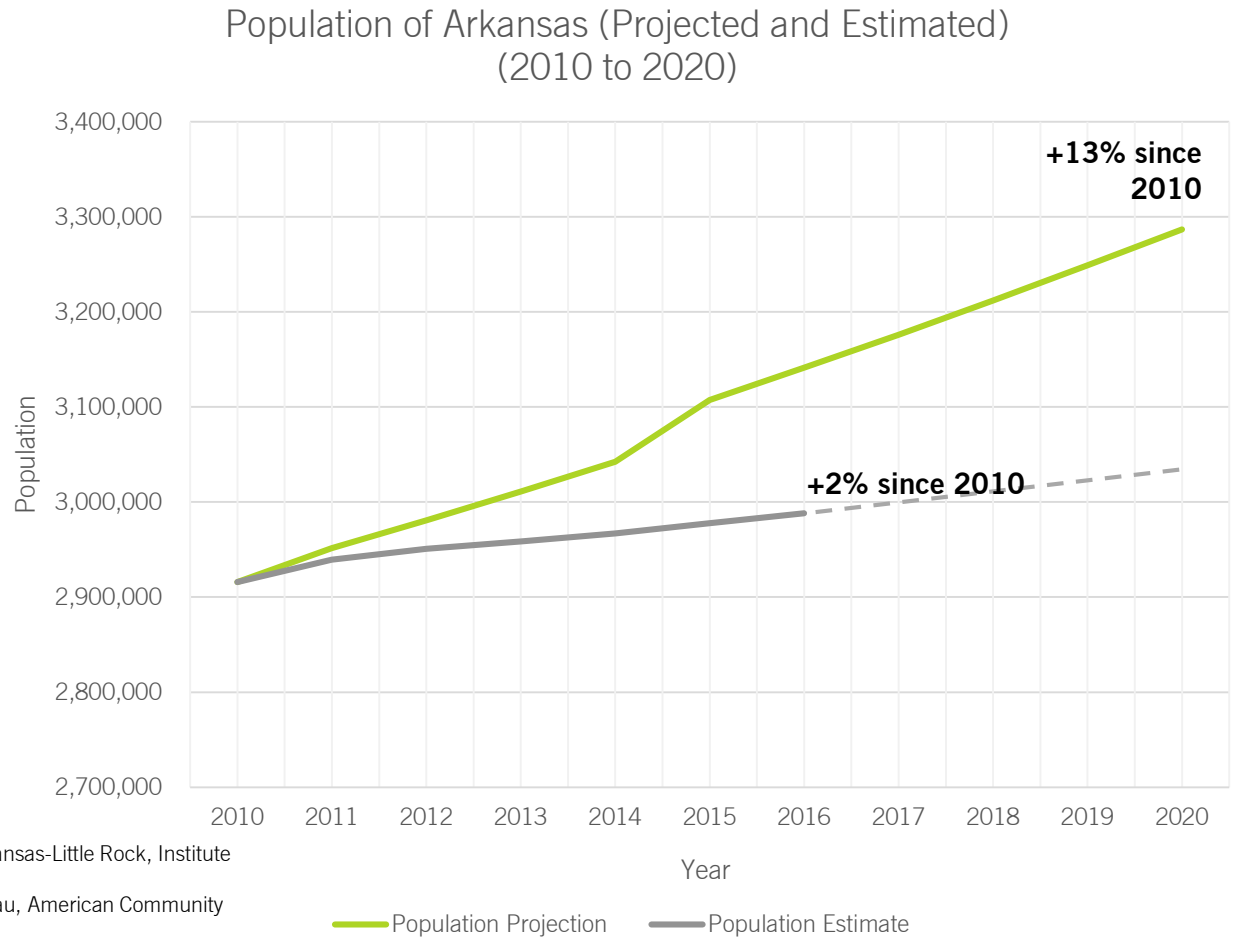
Continued discussion necessary with:

- The Highways Department
- City of Russellville
- Corps of Engineers

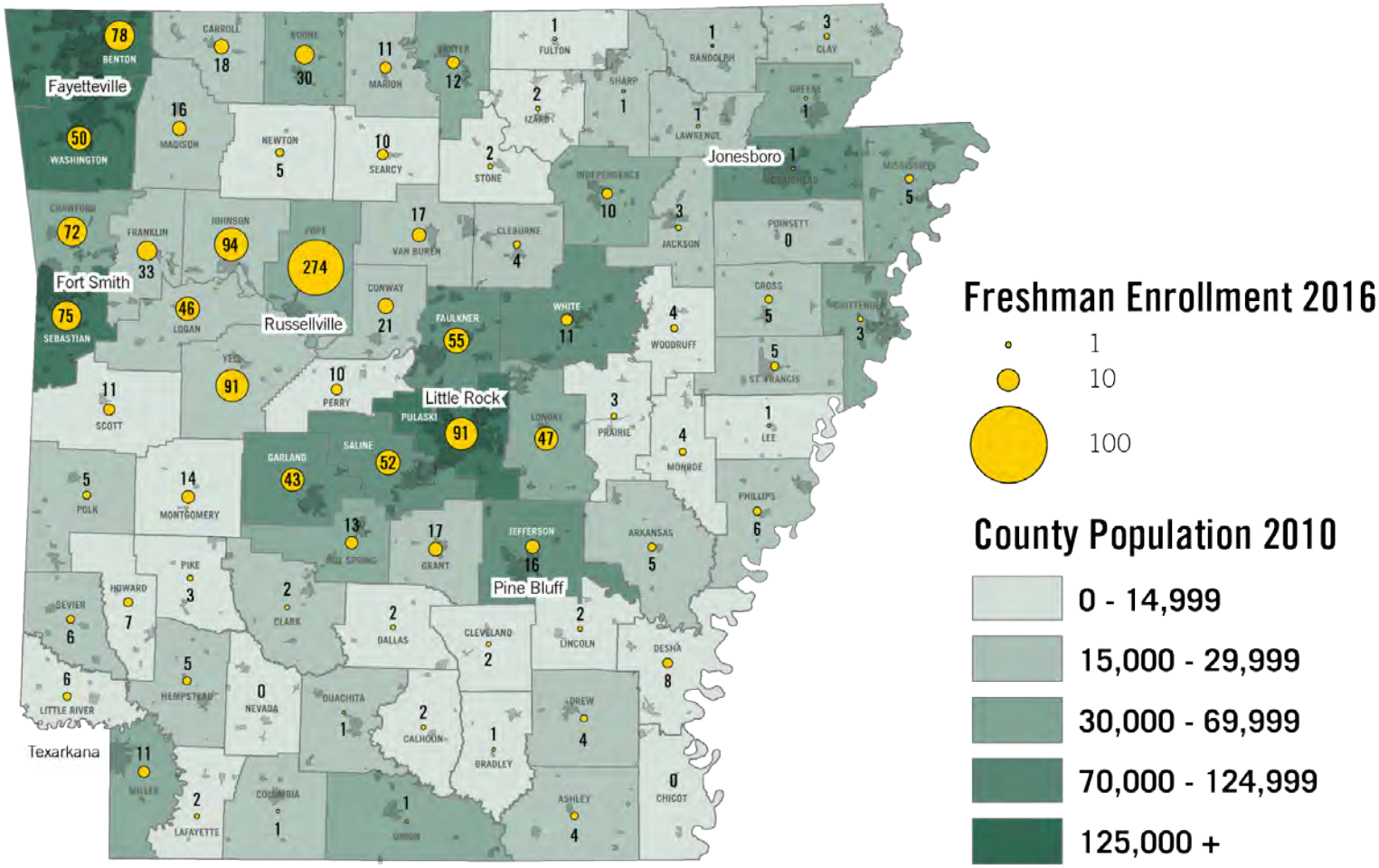
Evaluation of every project to understand how it can contribute to reducing flood risk

RESILIENCY TOOLKIT
BENEFIT:COST ANALYSIS

1/ What are the Social, environmental, and economic projections in your project location?



Data Sources
Projections: University of Arkansas-Little Rock, Institute for Economic Advancement
Estimates: U.S. Census Bureau, American Community Survey, 1-year Estimates



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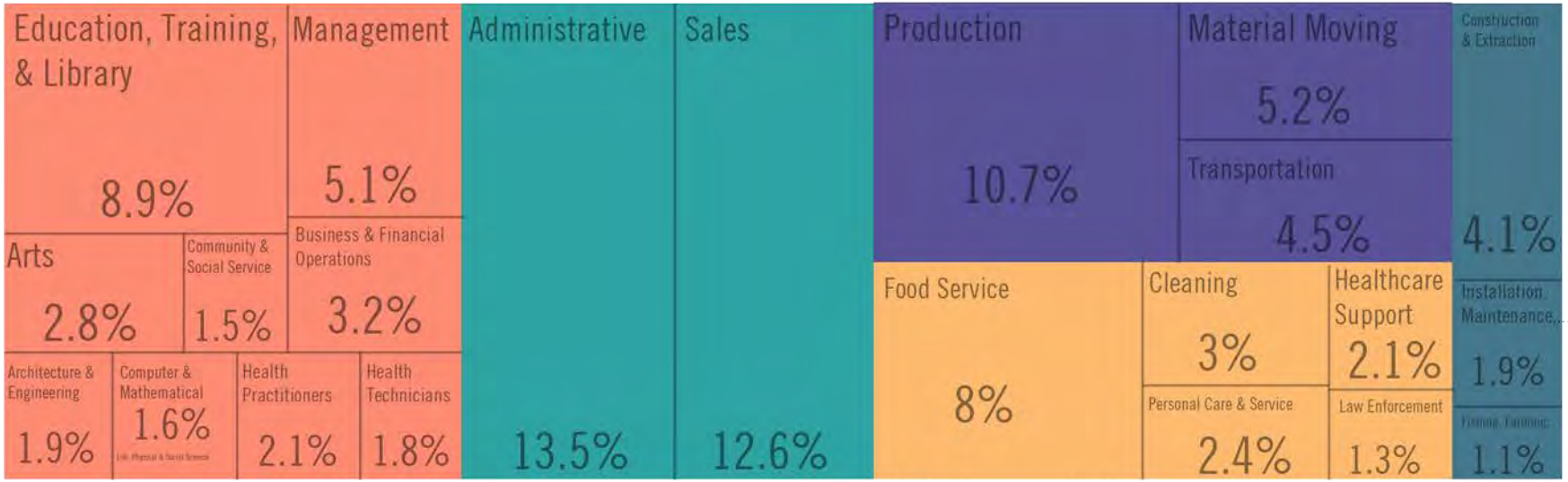
ECONOMIC DEVELOPMENT



https://datausa.io/profile/geo/russellville-ar/

RESILIENCE PRINCIPLES

Diversity / Designing with **complementary perspectives** enriches outcomes.

Redundancy / Designing for robustness **reduces the likelihood of failures.**

Nested Scales / Designing with an understanding of the **relationships across scales** enables greater leverage.

Adaptive Capacity / Designing with the assumption of innate change minimizes disruptions and encourages longer-term viability.

Foresight / Designing with broad interests and over longer timeframes enables understanding of trends **and anticipation of risks.**

Self-Organization / Designing that encourages the development of interconnections between environments and their occupants leads to stronger overall systems.

DICKENSON COUNTY OVERVIEW

- 334 Square Miles
- Population: 15,000
- 45 Residents Per Square Mile
- 21% Population Living in Poverty
- Poorest County in Virginia

  (134 Out of 134)
- Unemployment rate 9.2%

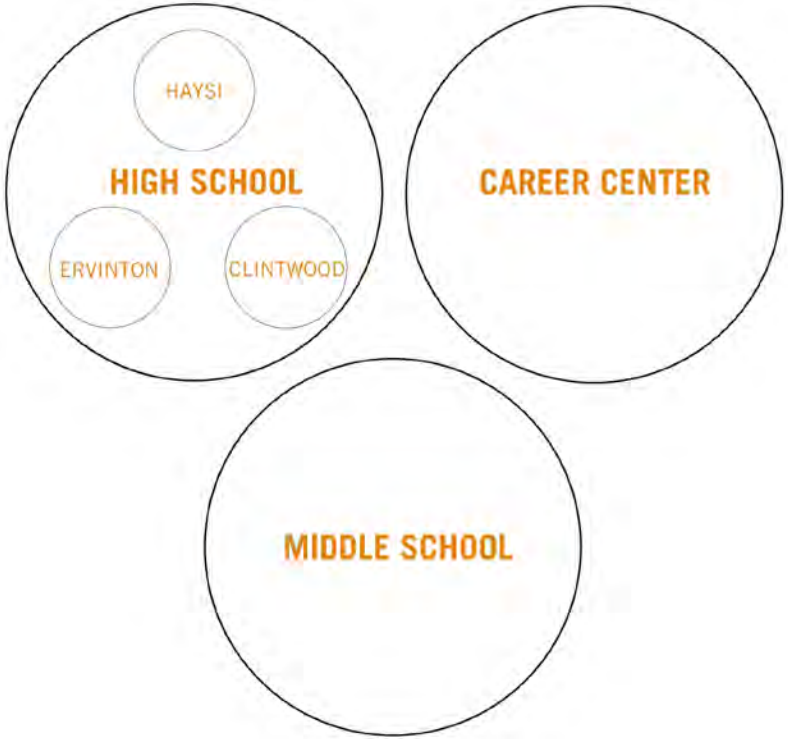
  National rate 5.2%
- Recent Job Growth -4.33%

  National Rate 1.59%


Brad Deel
Drone Photography

UNIFIED CAMPUS PLAN

3 Schools in 1



RESILIENCE PRINCIPLES

Redundancy / Designing for robustness **reduces the likelihood of failures.**

Redundant infrastructure systems that serve the community in time of need.

Foresight / Designing with broad interests and over longer timeframes enables understanding of trends **and anticipation of risks.**

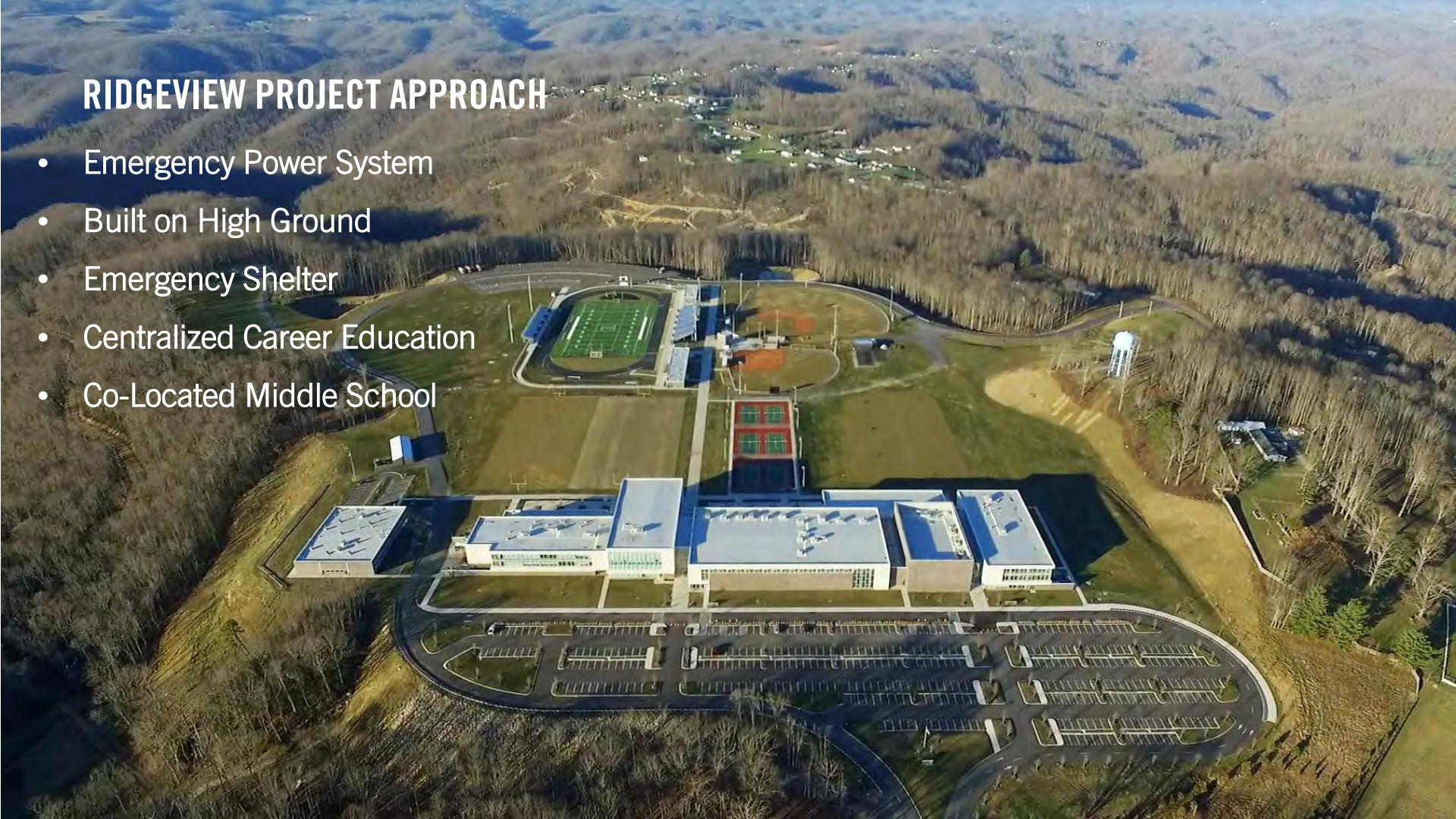
Assess and anticipate risks of natural disasters and responding appropriately. Understanding the job market and providing specific marketable skills.

Nested Scales /
Designing with an understanding of the **relationships across scales** enables greater leverage.

Develop a facility that serves students and teachers but the larger community as well, both in times of need and in times of community events.

RIDGEVIEW PROJECT APPROACH

- Emergency Power System
- Built on High Ground
- Emergency Shelter
- Centralized Career Education
- Co-Located Middle School



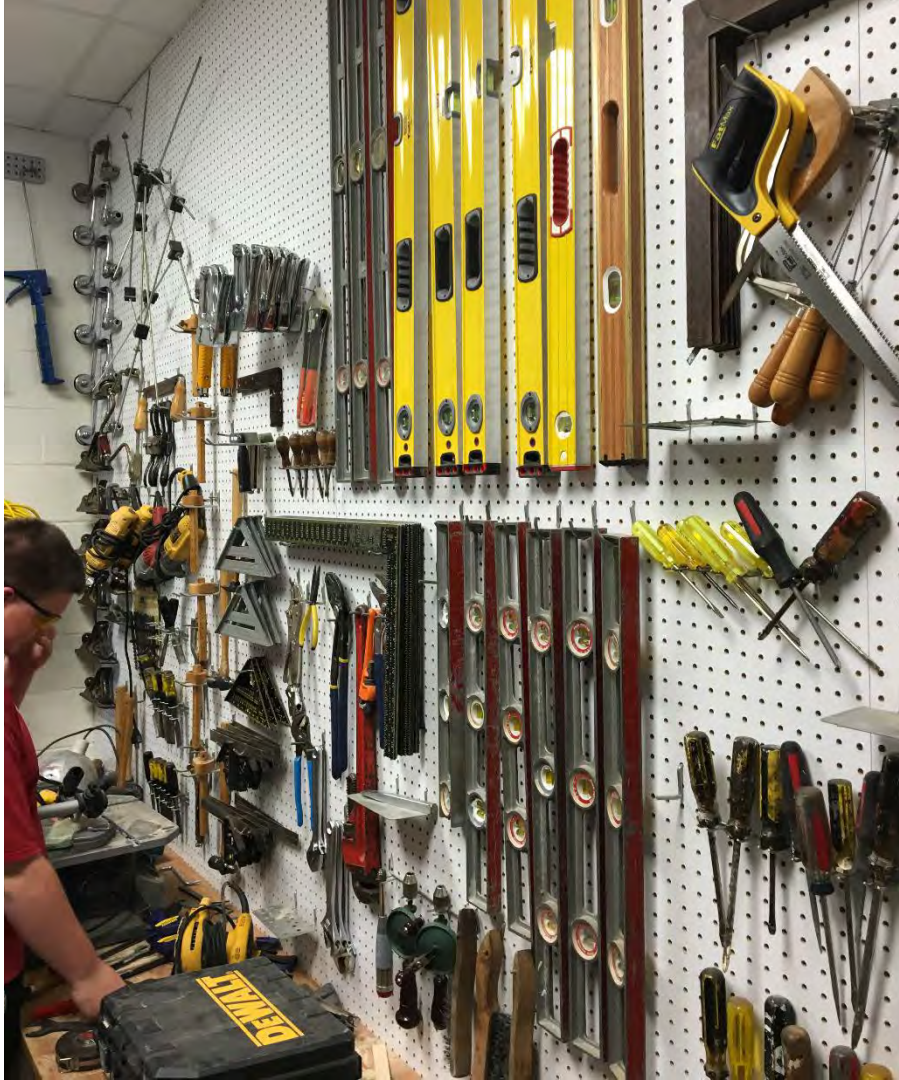
CURRICULUM PLANNING

Embedded Career Programs

- Auto Mechanics
- Auto Body
- Welding
- Carpentry
- Masonry
- Cosmetology
- Graphic Design
- Drafting
- Culinary Arts
- Health Science
- Nursing
- Computer Science

CAREER READINESS

CAREER READINESS



CAREER READINESS

EVOLUTION

TRADITIONAL PARADIGM:

Instructor
- Sage on the stage
- I teach, you learn
- Actor

Student
- Subordinate
- Empty vessel / Sponge
- One in a group
- Renewable Resource

Technology
- Tool

Libraries
- Stacks / books

FUTURE PARADIGM:

Instructor
- Guide by the side
- We create knowledge together
- Director

Student
- Colleague
- Co-creator of content
- Member of team
- Targeted sale

Technology
- Enabler

Libraries
- Media Centers/ Starbucks / smart phones

“65% OF TODAY’S GRADE SCHOOL KIDS WILL END UP AT JOBS THAT HAVEN’T BEEN INVENTED YET.”

United States Department of Labor:
Futurework - Trends and Challenges for Work in the 21st Century

DESIGN THAT FACILITATES RESILIENT LEARNING

CONNECTIVITY / SPACES THAT SHARE

- STUDENT CENTERED LEARNING 
- COLLABORATION 
- SMALL LEARNING CLUSTERS 
- TRANSPARENCY + SAFETY 
- SPACE THAT PERFORM 

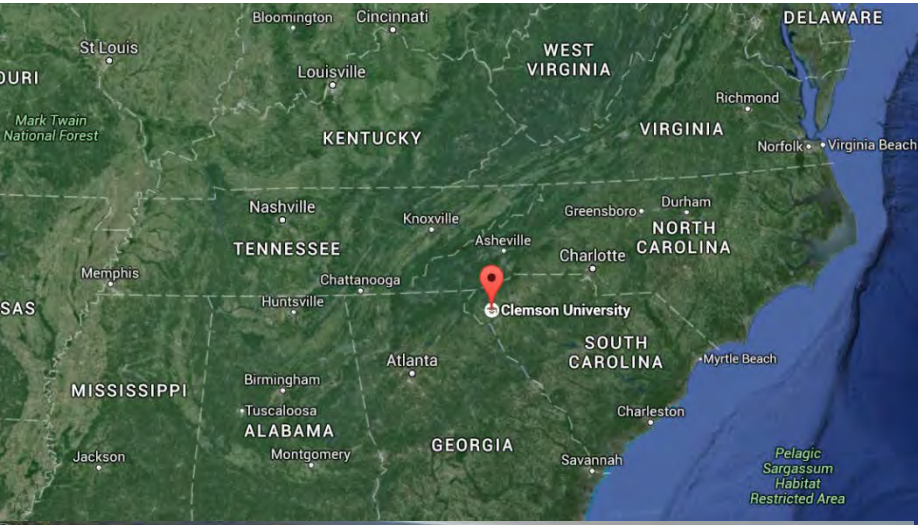
FLEXIBILITY / SPACES THAT TRANSFORM

- AUTHENTIC + DIFFERENTIATED LEARNING 
- FURNITURE FOR MULTIPLE LEARNING STYLES 
- FACILITY FLEXIBILITY 
- SUSTAINABILITY + WELLNESS 
- DIVERSITY IN LEARNING 

CREATIVITY / SPACES THAT INSPIRE

- STUDENT CONNECTIVITY + ENGAGEMENT 
- REAL WORLD READINESS 
- TECHNOLOGY + MOBILITY 
- SCHOOL CULTURE + BRAND 
- OUTDOOR LEARNING 

CLEMSON, SOUTH CAROLINA



SOCIAL

- Lack of Cohesion & Collaboration

ECONOMIC

- Aging Infrastructure
- Shifting Macroeconomic Trends
- Lack of business partnerships

ENVIRONMENTAL

- Rural Location

SOCIAL

- Infrastructure failure

ECONOMIC /

- Business closure

PLANNING PROCESS

- Extensive, well-planned process, with significant faculty involvement
- Potential uses
  - Classrooms
  - Creative Inquiry (undergraduate research)
  - Research and special projects
  - Academic resource areas
  - Simulation space for advanced analytics
  - Industry connections

INDUSTRY PARTNER NEEDS AND RESPONSES

- Graduates Who Have Ideas And Know How To Sell Ideas
- Cross-disciplinary Expertise
- Communication Skills
- Basic Financial Skills
- Teamwork
- Global Experience
- Ability To Be Life-long Learners

PERKINS+WILL

RESILIENT EDUCATION TRENDS

What are the critical skills our undergraduate students need?

- Technical depth in a particular field
- Creativity and innovation
- Entrepreneurial outlook
- Communication skills
- Ability to work well as a member of a diverse team
- Global knowledge and experience
- Commitment to lifelong learning

New facility must support

RE-ENVISIONING THE CAMPUS CORE

PROGRAM SUMMARY

SPACE CATEGORY:

• CORE SPACE + SUPPORT (LOBBY, CAFÉ, ACADEMIC RESOURCE, CONCIERGE)	6,395 NSF
• FLEX SPACE + SUPPORT (MEETING RMS, CLASSROOMS, VISUALIZATION, PROJECT ROOMS, LABS)	28,877 NSF
• OFFICE SPACE + SUPPORT (ADMIN, ACADEMIC, INDUSTRY)	6,920 NSF
• BUILDING SUPPORT (LOADING, WASTE, RECYCLING, STORAGE)	2,250 NSF
• ROOF TERRACE (EVENTS, OUTDOOR SEATING)	5,228 NSF
TOTAL NET SQ. FT.	~50,050 NSF
TOTAL GROSS SQ. FT.	~77,000 GSF

AUDIOVISUAL AND INFORMATION TECHNOLOGY

- 73 spaces with AV
- 4372 pieces of hardware
  - 354 types
  - 65 different vendors
- 191 large-screen, high-resolution, touch monitors
- 3D displays
- 12 video walls
  - 8'x 5' to 32' x 9'
- 4 networks
  - 2 x 10G → 2+ x 100G
- 3D laser projection in auditorium - 13' x 8' screen
- Videoconferencing
- Lecture capture in classrooms and studios
- Collaboration software
  - Solstice
  - Bluejeans
  - Bluescape

STATE-WIDE TECHNOLOGY ECOSYSTEM

PERKINS+WILL

RESILIENCY TOOLKIT

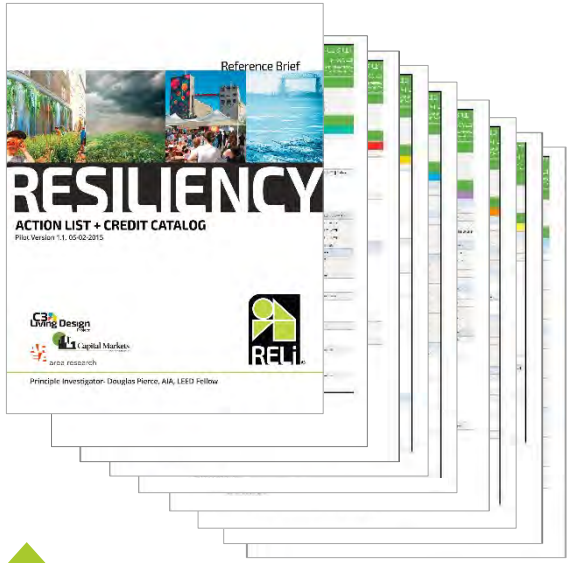
RELI

REFERENCE-ABLE BY GOVERNMENTS

CITED IN “STANDARDS AND FINANCE TO SUPPORT COMMUNITY RESILIENCE” BY OMB

PRECEDES LEED 2016 PILOT CREDITS

RELi RESILIENCY ACTION KIT



3 PART KIT

C3livingdesign.org / RELi

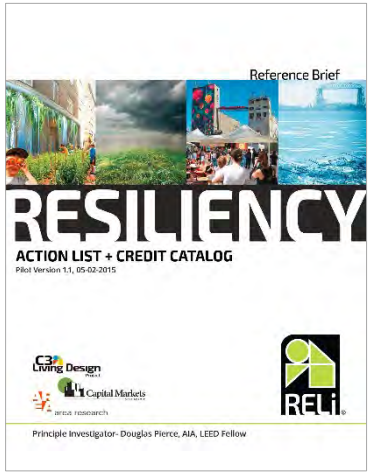
ACTION LIST
Summary /
60+ Actions

PROJECT TALLY
Tracking /
Excel Spreadsheet

CREDIT CATALOG / On-Line Reference Brief
Comprehensive /
200+ Actions and How-To-Use

PERKINS+WILL

RELi REFERENCED ACTIONS



Unique RELi Prerequisites / Credits
Hazard Preparedness, Social Cohesion, Regional Economics

ANSI Integrative Process Standard (MTS Developed)
Integrative Living Design Planning Process (University of Minnesota)

Red Cross Ready Rating Program for disaster preparedness
FEMA 141 Guide: Emergency Management Guide for Business + Industry
U.S. Small Business Administration + Prepare My Business.Org

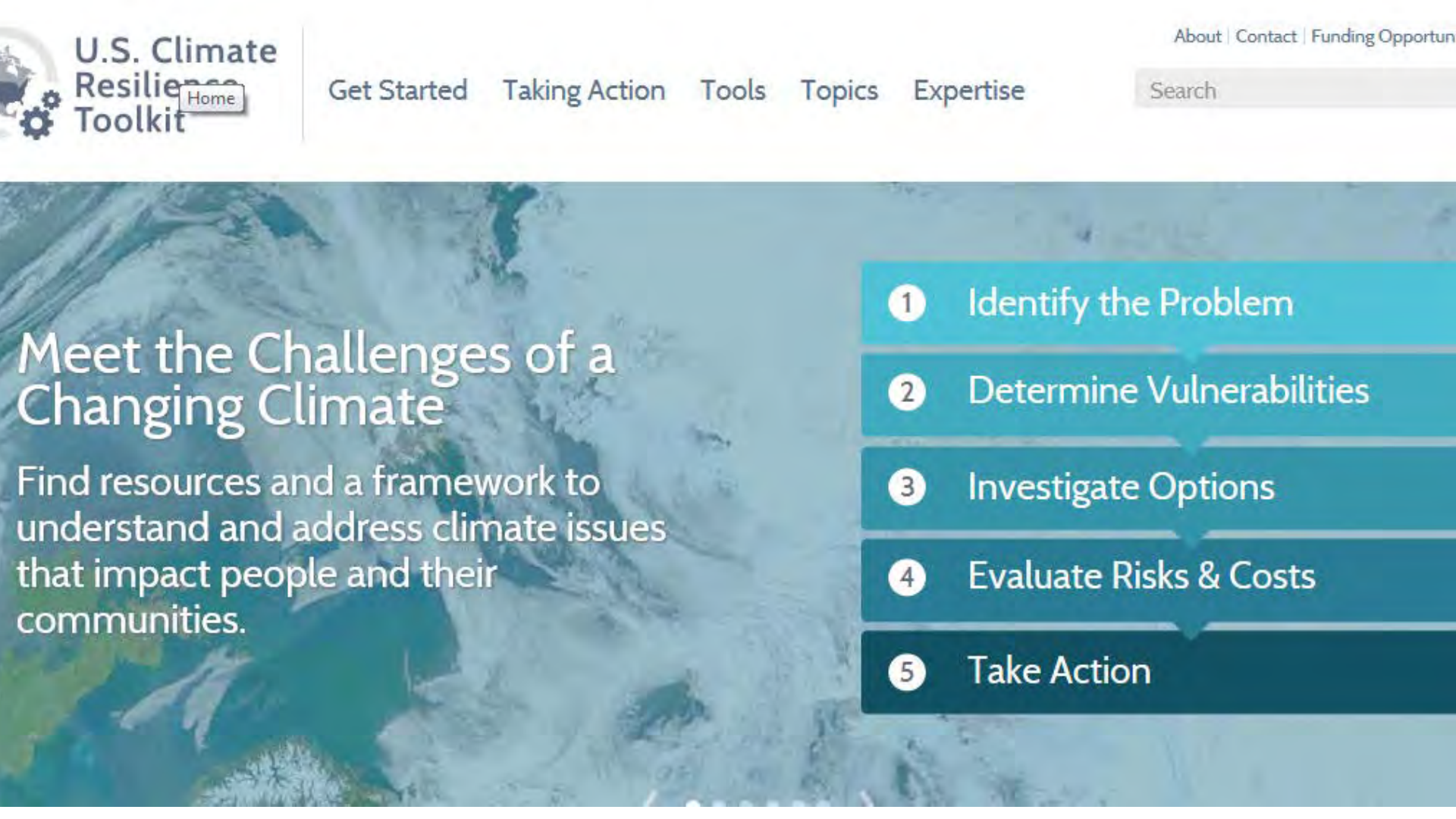
Fortified for Safer Business Standard V1.0
Urban Green Building Resiliency Task Force, June 2013 Proposals (NYC)
EPA Vulnerable Zone Indicator System + EnviroFacts
Nuclear Regulatory Commission / Academy Of Sciences

Envision Sustainable Infrastructure Rating System V2.0
Center for Active Design
Sustainable Sites Rating System V2
LEED V4 and V2009 / NC, ND + Schools
Energy Star / 2030 Palette

C3LivingDesign.org / RELi

PERKINS+WILL

RESILIENCY TOOLKIT
CLIMATE MODELING


U.S. Climate Resilience Toolkit
Home
Get Started
Taking Action
Tools
Topics
Expertise
About | Contact | Funding Opportun
Search
Meet the Challenges of a Changing Climate
Find resources and a framework to understand and address climate issues that impact people and their communities.
1 Identify the Problem
2 Determine Vulnerabilities
3 Investigate Options
4 Evaluate Risks & Costs
5 Take Action

RESILIENCY OUTCOMES + OPPORTUNITIES

PLANNING PRINCIPLES:

- Mobility + clarity
- Gateways + community connections
- Clustering + collaboration
- Health and wellbeing of occupants and use
- Insurance premiums
- Business continuity
- Mitigating certain climate events
- Less reparation after an event
- Reducing pollution and waste
- Energy independence

THANK YOU. QUESTIONS?

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