The National Academies of
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MANAGING MESSY, COMPLEX PROJECTS: OPERATIONALIZING COMMUNITY RESILIENCE

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UNIVERSITY OF MARYLAND PROJECT MANAGEMENT SYMPOSIUM

MAY 10, 2018

A PRESENTATION IN THREE ACTS

Act I

The setting: what we did—a messy, complex project called Resilient America

Act II

Behind the scenes: how we did it

Act III

Lessons Learned: recipe for the not-so-secret sauce

OVERTURE

THE NATIONAL ACADEMIES

The National Academies of Sciences, Engineering, and Medicine are a private, non-profit organization. The National Academies are the nation's pre-eminent source of independent, high-quality, objective advice on science, engineering, and health matters.

We are a powerful convener, able to bring together diverse stakeholders to foster exchange between and among sectors, and promote creative thinking in finding resilience solutions.

BOTTOM LINE FIRST: TAKE HOME MESSAGES FOR PROJECT MANAGEMENT

- Be dogged: you need a vision **and** a plan
- Go Deep: know your stuff
- Money does not fall out of the sky
- Teamwork (enough said)
- You can't control everything: luck and timing
- Pack your best: bring flexibility, grit, and humor
- Enjoy the ride

Act I: Setting the Stage
who, what, where, why, when…

THE RESILIENT AMERICA PROGRAM

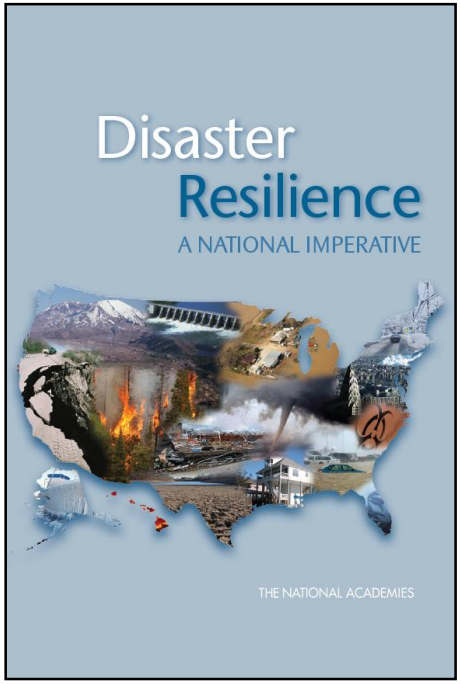
Once upon a time…

RESILIENT AMERICA: HOW IT ALL BEGAN…

Resilience is "the ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse events."

4 Pillars of Community Resilience

1. Understand and communicate disaster risk
2. Identify or develop ways to measure disaster resilience
3. Build and strengthen partnerships with diverse community stakeholders
4. Share and get access to information, tools, data, and experts needed to build resilience



The foundation of the Resilient America Roundtable is the NAS 2012 report, *Disaster Resilience: A National Imperative*. All of the RAR work is based on the principles identified in this report.


What does Resilience mean to me? Here in my community?

WHY RESILIENT AMERICA: A VISION TAKES SHAPE

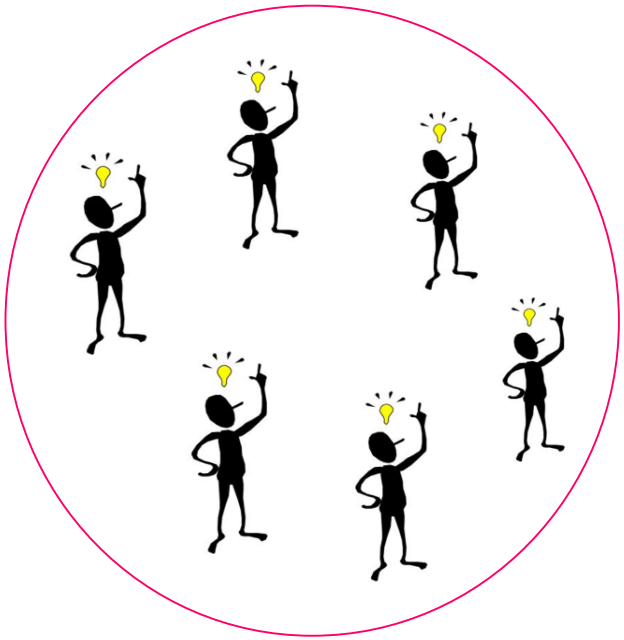
- Costs of natural disasters and other disruptions are rising
- Greater networks and connections ➔ more opportunities for widespread impacts
- Federal or top-down programs to build resilience get mixed results
- Bottom-up approaches are needed, but hard to implement alone
- Communities want to protect their quality life, their property, and their people.

RESILIENT AMERICA: A PLAN TAKES SHAPE

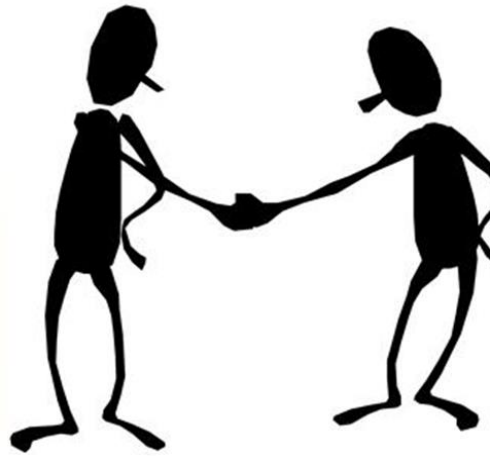
- Test how theoretical pillars of the report can be applied in community decision making for resilience
- Test how science, data, & analysis fit into decision making at the community scale
- Gauge the appetite for expert volunteers to provide insights and assistance on community resilience efforts
- Test how a network of resilience experts would benefit efforts to build resilience in communities

Document and share lessons, approaches, successes and challenges with other communities around the country

BASIC APPROACH: MULTI-STAKEHOLDER COLLABORATION



Convene



Collaborate

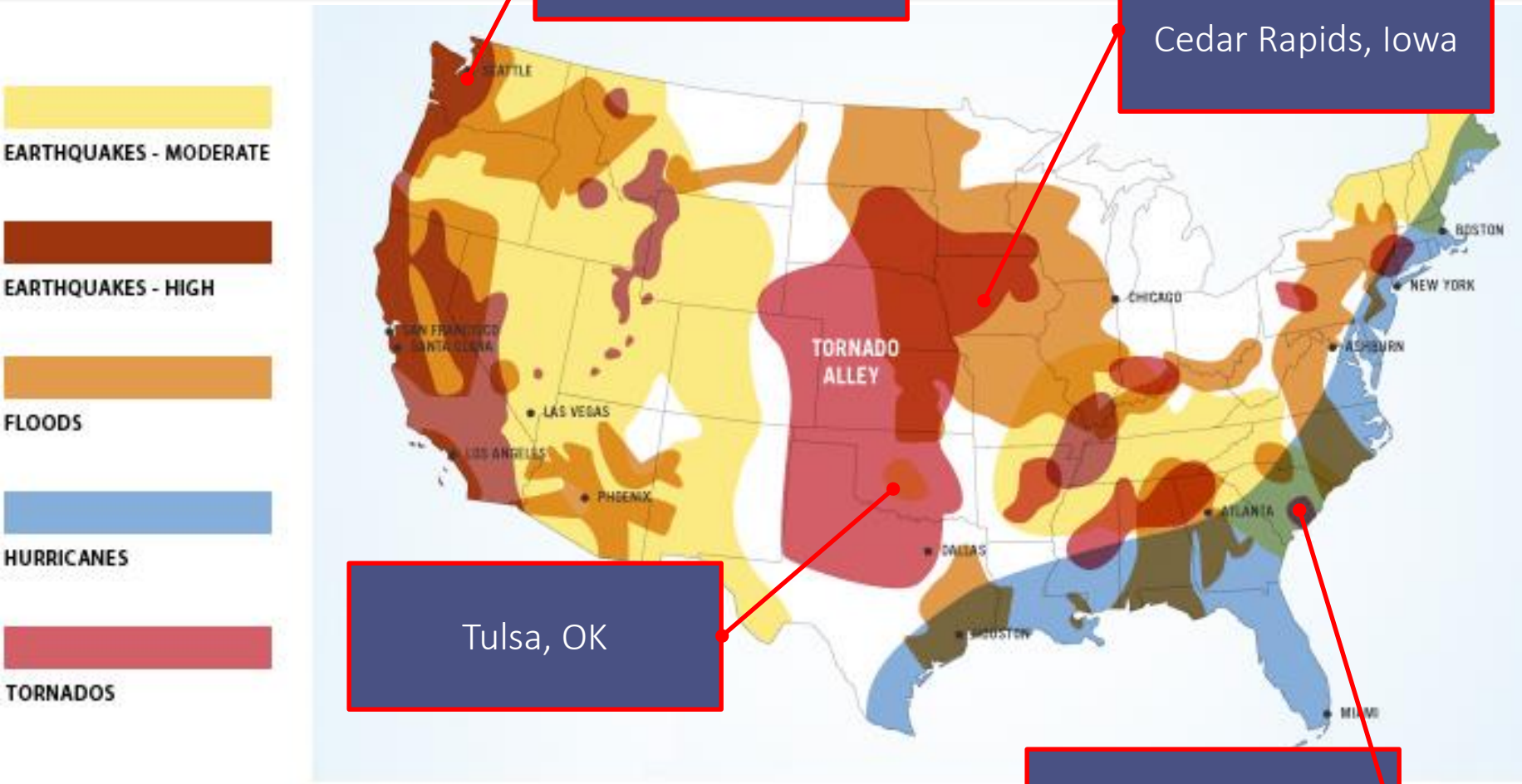
Impact

WORK PLAN AND STRUCTURE: RESILIENT AMERICA

- Membership: volunteer experts from academia, federal agencies, NGOs, and the private sector
- Average annual budget: $1.8 million ($1.2 low; $2.7 high)
- Annual activities: 2 executive meetings, 6-10 workshops/expert meetings, community meetings and focus groups, conference presentations, and meeting facilitation
- Deliverables and Projects: consensus studies, convening activities, and expert consultations

Where…

WHERE


Seattle, Washington
Cedar Rapids, Iowa
Tulsa, OK
Charleston, SC
EARTHQUAKES - MODERATE
EARTHQUAKES - HIGH
FLOODS
HURRICANES
TORNADOS
SEATTLE
SAN FRANCISCO
SANTA ELENA
LAS VEGAS
LOS ANGELES
PHOENIX
TORNADO ALLEY
CHICAGO
DALLAS
HOUSTON
ATLANTA
MIAMI
ASHBURN
BOSTON
NEW YORK

CEDAR RAPIDS AND CHARLESTON

Cedar Rapids, IA

Partner: Linn County/City of Cedar Rapids

General Topic: Risk Communication for Flood Resilience

Goal: use measures to enhance flood resilience in the areas of 1) disaster preparedness capacity within the business/nonprofit sectors and among vulnerable populations and 2) risk communication.

Charleston, SC

Partner: Charleston Resilience Network

General Topic: Flood Resilience

Goal: use measures and a community engagement process to build diverse stakeholder partnerships, improve risk communication around flooding, and connect flooding resilience to broader community resilience.

SEATTLE AND TULSA

Seattle, WA

- Partner: Puget Sound Regional Council
- General topic: Climate Resilience in the Central Puget Sound region
- Goal: help local decision makers identify ways to adapt to and mitigate against their future climate risks

Tulsa, OK

- Partner: City of Tulsa/Office of the CFO
- General Topic: Economic Resilience
- Goal: explore and understand the relationship between sales tax generation and local economic resilience

On Teamwork: who's involved?

BUILDING THE TEAM

- Experts: social scientists, engineers, risk managers, private sector business operators, academics, public sector decision makers, federal agencies, and more
- Community members, businesses, decision makers
- Diverse stakeholders: Private sector, public sector, NGOs, academia, individuals
- Some of our partners and collaborators: FEMA, NOAA, MACF, Zurich Insurance, Dewberry, USGS, DHS, NACo, NADO, Fraunhofer, Munich Re, WEF….

SOME MEASURES OF SUCCESS

1. Do the four resilience pillars in the report apply in real-life decision making?
2. Is there an appetite for expert volunteers' insights and assistance on community resilience efforts?
3. Can science, data, & analysis fit be used in decision making at the community scale?
4. Is there a role for a larger network of resilience experts to build resilience in communities?

INDICATORS OF PROGRAM SUCCESS

- ✓ Catalyst: communities want to *do* something, but can't figure out where or how to start
- ✓ Convener: we bring value as a competent, neutral, objective convener
- ✓ Connector: we extended our network to the communities (and they did the same) and everyone is more strongly connected to others doing similar work
- ✓ Corroborator: the Academies help lend credibility to and corroborate actions that communities want to take to increase resilience

Considerations for next time

- **Expensive**: this level of intensity takes millions of dollars a year
- **Exhausting**: energy-intensive for staff and volunteers
- **Engaging**: building relationships and trust takes a long time.

WHAT WE LEARNED- TOP 5

5. There is no single definition of resilience. Communities define resilience based on their own goals and the challenges they face.

4. Building community resilience requires the participation of diverse local stakeholders, especially local government.

3. The process for building resilience – cultivating relationships, identifying challenges and priorities, engaging the entire community in discussions, etc. – is itself an important act of strengthening resilience.

2. Novel approaches yielded positive and unexpected results.

1. Communities will use scientific information in decision making if it is available in formats they can use and understand.

Act II: Building the Program

How we Did it

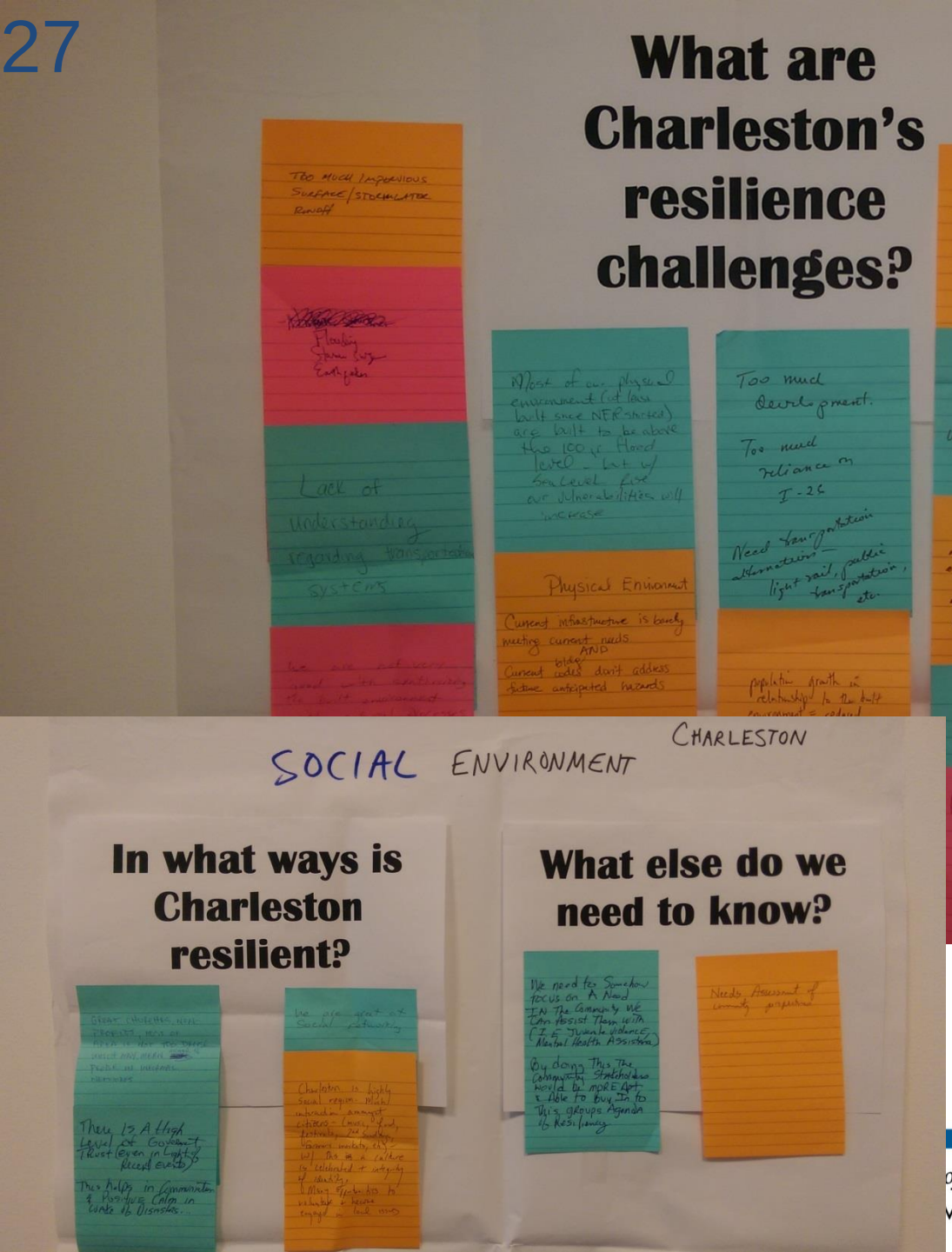
BASIC COMPONENTS OF OUR APPROACH

- Information and Evidence
- Teamwork, Talent, Trust
- Money and Resources
- Time

Information and the evidence base

INFORMATION AND EVIDENCE

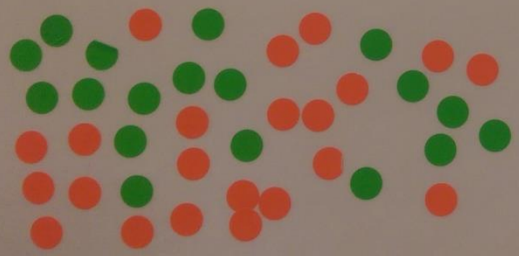
- Learn all you can
- Know your facts
- Build your evidence base
- Understand the limitations of the information and evidence base you have
- Be transparent about what you learn

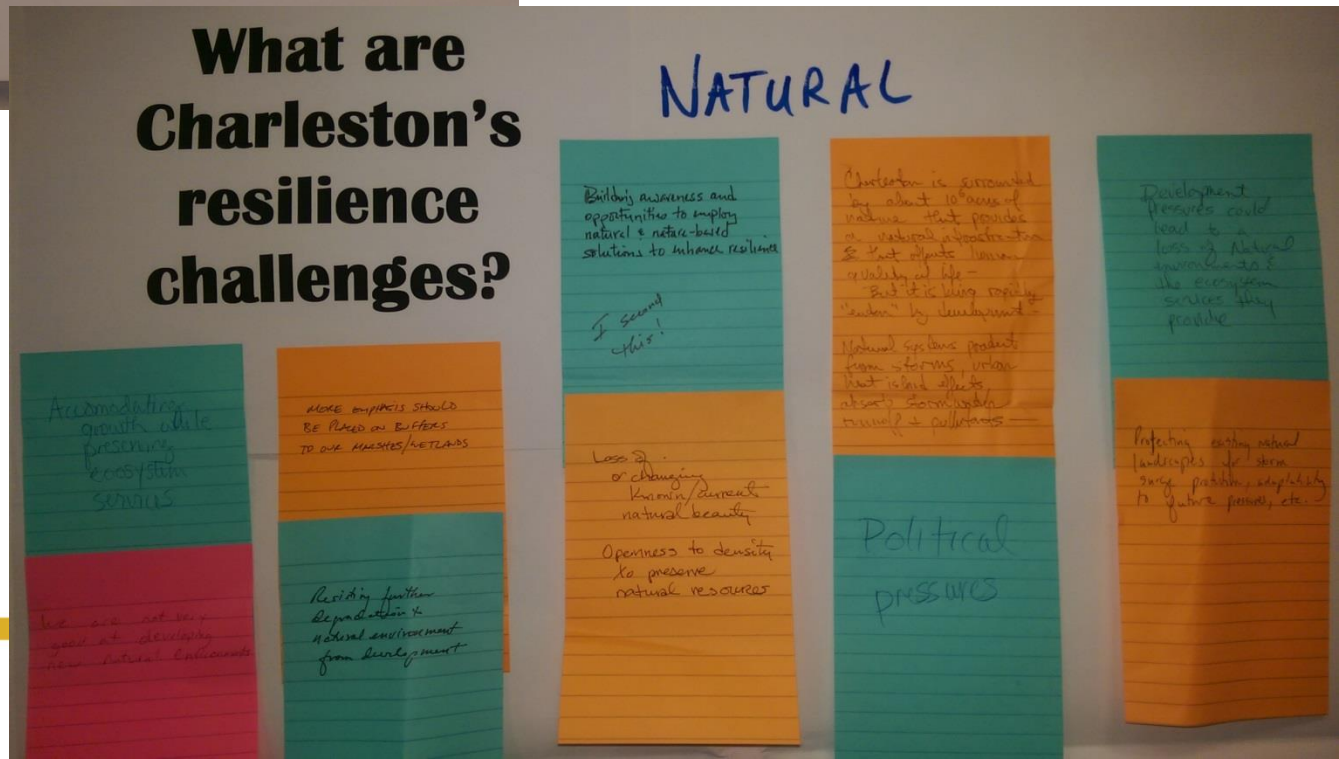

What are Charleston's resilience challenges?
PHYSICAL
Too much impervious surface/stormwater runoff
Flooding
Storm Surge
Earthquakes
Lack of understanding regarding transportation systems
Most of our physical environment (not laws built since NFIP started) are built to be above the 100 yr flood level - but w/ Sea Level Rise our vulnerabilities will increase
Physical Environment
Current infrastructure is barely meeting current needs AND
Current codes don't address future anticipated hazards
Too much Development.
Too much reliance on I-26
Need transportation alternatives — light rail, public transportation, etc.
Transformers in low lying areas could be flooded
Ability to cool indoors as weather warms
No transportation available for working poor/unemployed population
• Flooding
• Land for urban agriculture
• Earthquakes
• $
Transportation facilities are marginal. Roads and bridges are in disrepair. Mass transit is extremely limited
Street flooding
Bridges too Old
Roads too flooded
Dealing w water from pipe bursts esp with new development
Port area vulnerable to storm surge
SOCIAL ENVIRONMENT
CHARLESTON
In what ways is Charleston resilient?
What else do we need to know?
We need to somehow focus on A Need IN The Community We Can Assist Them With (I.E. Juvenile Violence / Mental Health Assistance)
By doing This The Community Stakeholders would be more Apt + Able to buy In to This groups Agenda w/ Resiliency
Needs Assessment of community perceptions

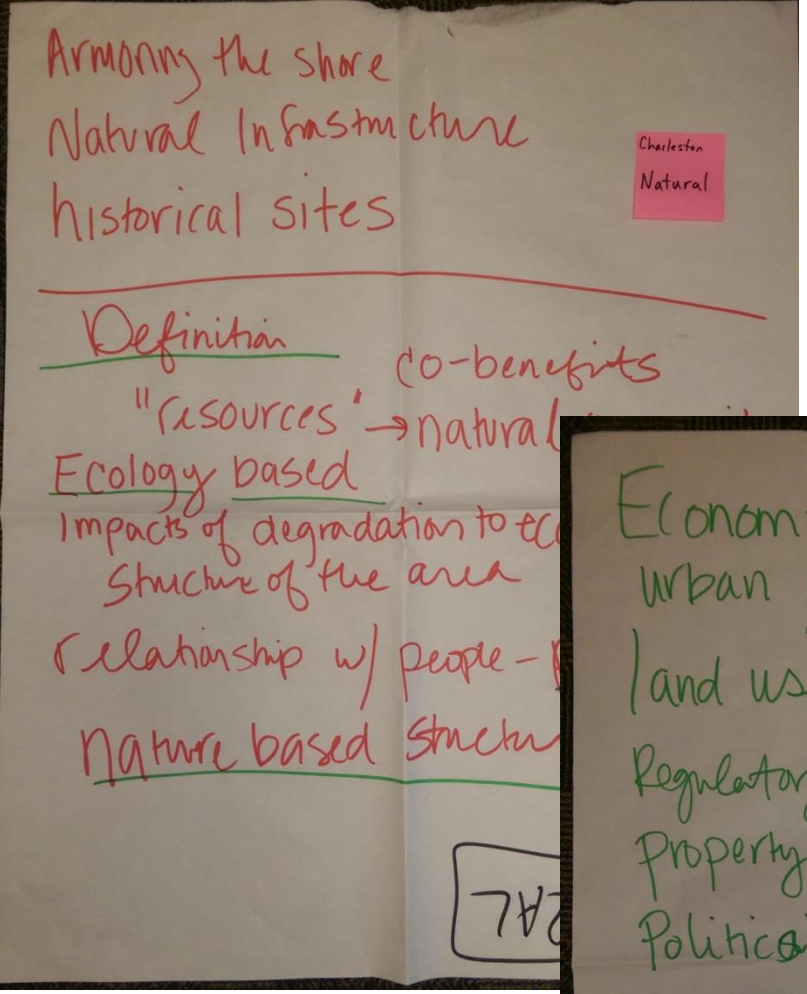
of
MEDICINE

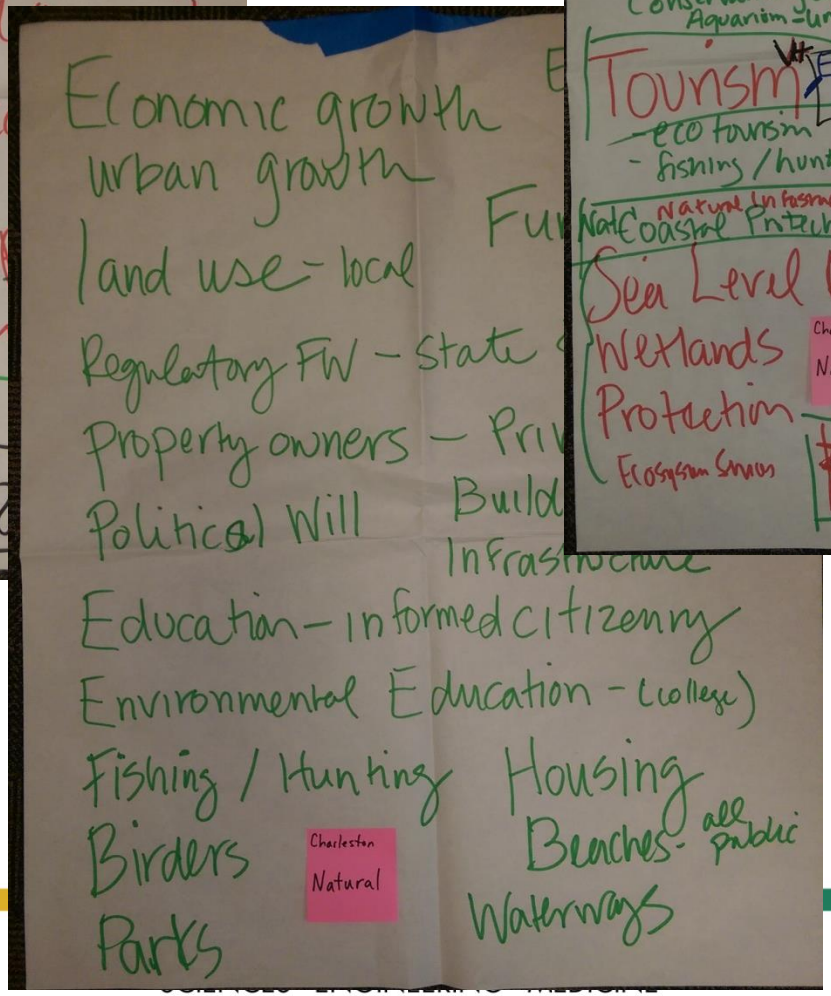
Natural Environment

natural resources, non-engineered structures, and associated eco-system services (e.g., erosion, surge, flood protection)






Armoring the shore
Natural Infrastructure
historical sites
Charleston Natural
Definition
co-benefits
"resources" → natural
Ecology based
Impacts of degradation to ec
Structure of the area
relationship w/ people -
nature based


Economic growth
urban growth
land use - local
Regulatory FW - state
Property owners - Priv
Political Will
Build
Infrastructure
Education - informed citizenry
Environmental Education - (college)
Fishing / Hunting
Housing
Birders
Beaches - all public
Parks
Waterways
Charleston Natural


Land use
- economic growth
- pop ↑ - retent
- urban ↑
Political Will
local & state govt
Property Owners - housing plantations
Regulations
impact of incremental chang over time, slow
Education
informed citizenry trad knowledg
environ. ed.
Conservation groups
Aquarium - understanding risk
- building codes
Built Environ
Port
Transportation
Industry
Tourism
eco tourism
- fishing / hunting
Economic Growth
Federal Agency
Nat Coastal Protection System
Sea Level Rise
Recreation
parks
- beaches
- waterways
Wetlands Protection
Ecosystem Servics
Charleston Natural
Pollution
Science
Culture


Natural
What are the key components, assets, and/or functions in this environment in your community?
How could you measure the resilience of each component, asset or function?
Governance / Leadership
What are the key components, assets, and/or functions in this environment in your community?
How could you measure the resilience of each component, asset or function?

Linn County/Cedar Rapids, Iowa

LINN COUNTY/CEDAR RAPIDS, IOWA

In 2008, Cedar Rapids/Linn County, IA experienced catastrophic flooding that changed how they approach preparing for future disasters. In addition to riverine flooding, Cedar Rapids is at risk from flash flooding, tornadoes, drought, hazardous material incidents, and is in close proximity to a nuclear power plant. Following the 2008 flood, an active and engaged community emerged around issues of resilience; County Supervisor Linda Langston led this charge with a focus on building resilience in the region.

Priorities of the community:

- Building resilience of vulnerable populations
- Developing more effective cross-sector partnerships and collaborations
- Building a more diverse and resilient business sector
- Improving management of ecosystem services and natural environment

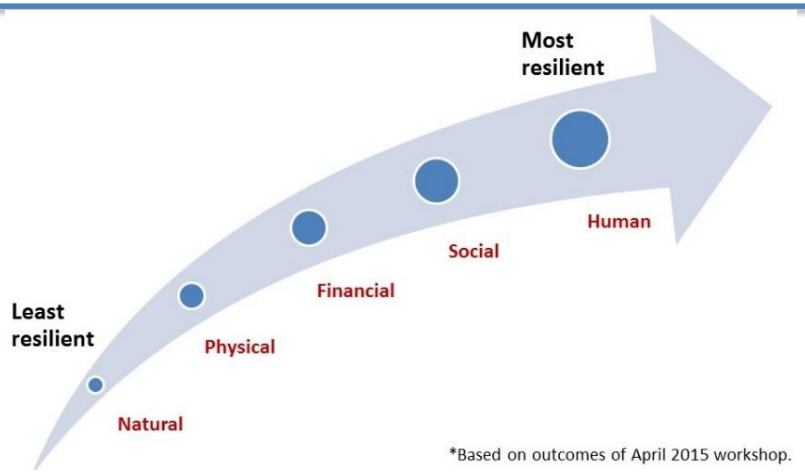
Demographics

Population: 217,751 people (129,195 in Cedar Rapids)
Median household income: $59,560
Race: 90% white, 4.5% African American, and 2.9 %

TRUST AND VERIFY: SURVEY RESULTS CEDAR RAPIDS/LINN COUNTY

Capital	Average Score
Human	85
Social	84
Natural	83
Physical	75
Financial	72
Resilience Score	**80**

A = 100
B = 66
C = 33
D = 0



*Based on outcomes of April 2015 workshop.

Theme	Average Score
Energy	100
Water	100
Waste	93
Food	89
Transport & Communication	80
Assets & Livelihoods	79
Life & Health	79
Education	78
Governance	72
Natural environment	66

Key findings based on the data

- **Pre-existing relationships:** Resilience is largely about connectivity and trust.
- **Effective partnerships:** Breaking out of organizational silos and building partnerships is key.
- **Individual preparedness:** People are more aware about the flood risk but are not necessarily taking action to become more prepared.
- **Continued engagement:** It is difficult to help communities understand the value of resilience without an event.
- **Vulnerable populations:** There is the need to better understand at risk populations.
- **Mental health:** The community stills struggle with mental health issues from the 2008 flood.
- **Financial recovery:** People and institutions struggle with financial challenges post-floods.

Tulsa, Oklahoma

Tulsa, OK

The Problem

- Tulsa, OK is at risk to natural hazards that include floods, tornadoes, and earthquakes.
- When basic community resilience needs such as health, transportation, employment, and alleviating poverty go unmet, disaster preparedness is not a high priority.
- When a new mayor was elected, his office identified a set of community priorities that focused on the daily stressors and social inequities in the region.
- The city relies on sales tax revenue for its budget, which can result in high levels of variation from year to year and present uncertainty regarding available resources each year for many city services
- The RAR was asked if our work could focus on a targeted, pressing challenge related to Tulsa's economic resilience - the relationship between sales tax revenue and its potential implications for resilience.

The Approach – Using Network Analysis

- Using network analysis, the RAR investigated how sales tax revenues relate to community resilience, including questions of:
  - To what extent are sales tax revenues indicators of resilience?
  - Does understanding how, where and when sales tax revenues are generated indicate the resilience or non-resilience of neighborhoods, communities, and the region?
  - What are the system and process relationships that impact sales tax revenues?
  - Are there currently unrecognized relationships that we can bring to the surface?
- This work was done in partnership with the City of Tulsa's Department of Finance and the City Auditor's, who accessed and supplied the relevant sales tax data.

THE RESEARCH

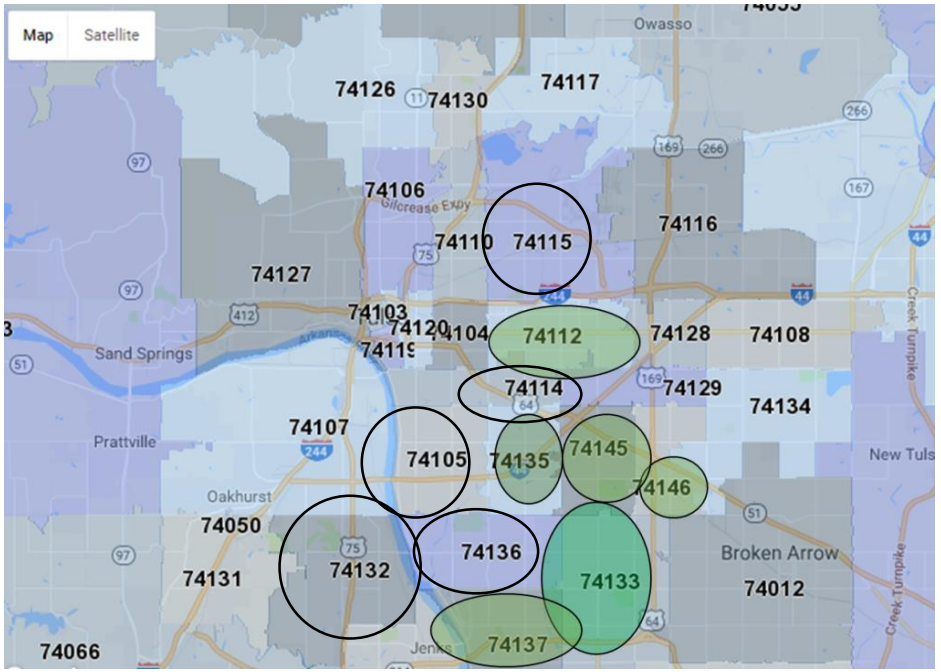
Sales tax revenue (STR) data was obtained across 28 zip codes in Tulsa. Using network analysis, the following questions were investigated:

- Is there geographic concentration in Tulsa's sales tax revenues?
- If there is concentration, how significant is it?
- If there is concentration, is it increasing, decreasing, or remaining stable?
- Is there a statistical relationship between the levels of geographic or categorical concentration and the decline in Tulsa's sales tax revenues?

Initial findings demonstrated that there was geographic concentration and that 78% of Tulsa's STR was generated in eleven of the 28 zip codes. With one zip code produces 23 of all STR.

Additional correlation studies were done to try and better understand how STR in the different zip codes may be influenced by other factors that included:

- Population
- Median Household Income
- Payroll paid
- The Urban Hardship Index
- Number of commercial establishments



Demographics

Population: 403,000
Median household income: $49,759
Race: 61 % white; 15.1 % Hispanic; 15.7% African American; 5.5% American Indian;

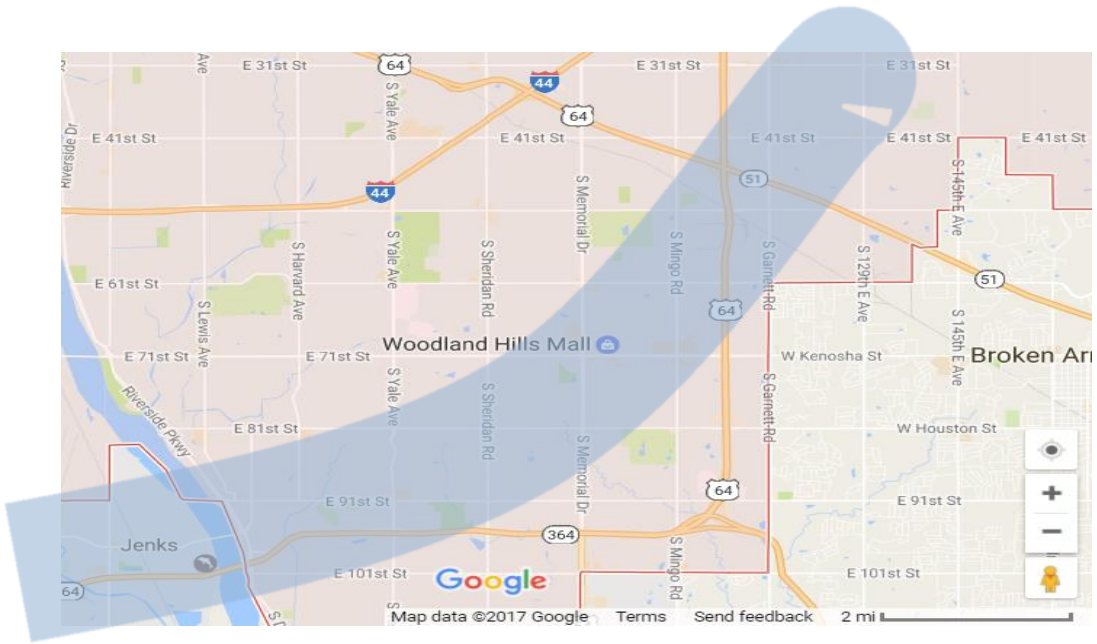
INITIAL FINDINGS SUGGEST…

- Economic activity is concentrated geographically and within individual establishments.
- Sales Tax Revenue declines as the number of commercial establishments declines city-wide... and as a higher proportion of Sales Tax Revenue is generated within a particular set of neighborhoods.
- There is a tight correlation (0.473) between a zip code's number of persons per commercial establishment and that zip code's score on the Urban Hardship Index. *Essentially, this says that the number of persons per commercial establishment predicts the population health of a neighborhood as well as education predicts income in the United States.*
- In some communities, residents must go to other areas of the city to spend money and access retail stores, such as grocery stores, restaurants, pharmacies, etc.

Other implications for social stressors:

- Geographic distribution of STR reflects day-to-day stressors such as:
  - Access to transportation
  - Unemployment
  - Food deserts
- The absence of retail raises questions of:
  - Economic opportunities (e.g. jobs) for first-time employment and second-incomes
  - what, if anything, is replacing the role of grocery stores, pharmacies, bars, cafes and other key "nodes" in the social interaction of most communities

IF TULSA WERE TO EXPERIENCE AN **EF5 TORNADO, FOR EXAMPLE** MOORE WAS 1.3 MILES WIDE & JOPLIN WAS ABOUT 1 MILE WIDE ….



Aug. 6, 2016: More than 150 businesses, 25 homes damaged as Tulsa tornado tore through midtown ….Fox 23 News

Teamwork and Trust

TEAMWORK AND TRUST

The way we gathered information and built the evidence base contributed to building trust and teamwork with the local communities.


SEA CHANGE
STAKEHOLDER INVOLVEMENT & OUTREACH
• Technical Working Group
• Policy Advisory Committee
• Community Task Force
• Public Outreach
WIFI


ADVANCED TECHNOLOGIES IN STRUCTURAL ENGINEERING FOR MORE RESILIENT COMMUNITIES
Twitter: #ResilientTech2017, @theNASEM
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OUR PARTNERSHIP IN LINN COUNTY

- Established a local ground team of diverse, engaged stakeholders from the public, private, non-profit, and academic sectors working on resilience issues
- Convened workshops and expert meetings to identify and address local priorities for building resilience
- Implemented a resilience measures framework to better understand the community's baseline and progress in building resilience
- Leveraged the expertise of the RAR and its network to provide evidence-based research, data, and information to implement targeted resilience actions
- Provided opportunities for knowledge exchange and dialogue among those working and investing in resilience efforts in the federal government, private sector, and non-profit sectors

Information, data, and lessons learned through this partnership have helped our community partners identify and initiate resilience interventions to address local resilience challenges, integrate resilience into local planning efforts, and help to apply for external funding to continue their resilience work.

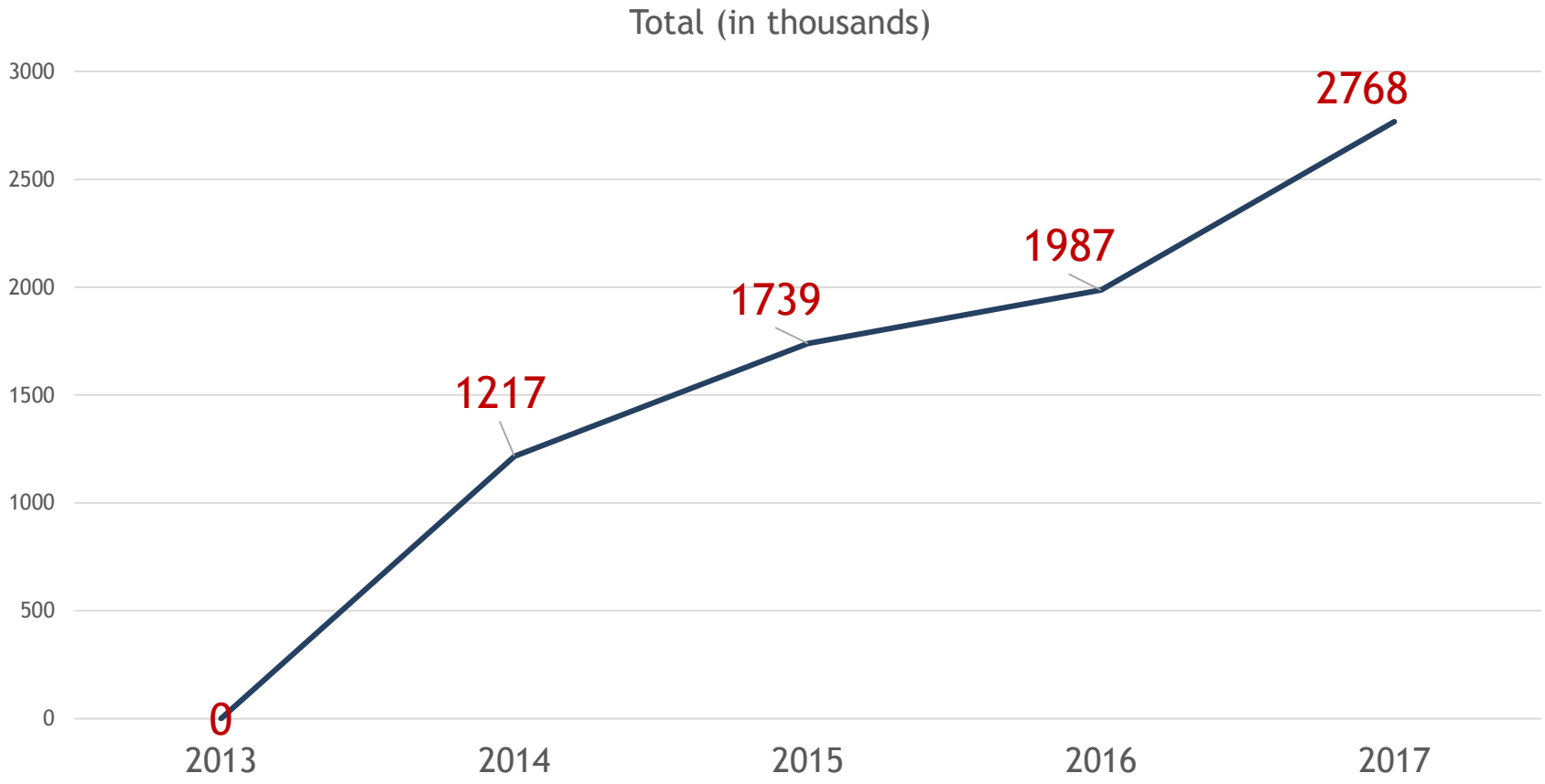
Fuel: financial and human resources

RESOURCES

Broad and diverse sponsor base includes:

- FEMA, NOAA, MACF, Zurich Insurance, Dewberry, USGS, DHS, Army Corps of Engineers, Kaiser Permanente, UPS Foundation, NACo, NADO, Fraunhofer, and others
- Committed staff
- Volunteers
- Local community “ground teams”

MONEY



We have a good trend line. It is resource-intensive program

ONE WORD ABOUT TIME

Years

Act III: Tips and Lessons

The Recipe for the Resilient America Secret Sauce

BOTTOM LINE FIRST: THE RECIPE

- Be dogged: you need a vision **and** a plan
- Go Deep: know your stuff
- Teamwork
- Money does not fall out of the sky
- You can't control everything: luck and timing
- Pack your best: bring flexibility, grit, and humor
- Enjoy the ride

THINGS DISCUSSED

1. Be dogged: you need a vision **and** a plan
2. Go Deep: know your stuff and build your own credibility
3. Teamwork
4. Money does not fall out of the sky

THINGS I DIDN'T QUITE MENTION

Captain Barbossa

About the "plan"…

"the code is more what you'd call "guidelines" than actual rules."

1. A LITTLE FLEXIBILITY GOES A LONG WAY

- "we don't want to talk about natural disasters."
- Consequence analysis not risk assessment
- Start from the end and work backwards

CURVE BALLS AND UNEXPECTED DECISION POINTS

2. LUCK AND TIMING

- Racial unrest in Charleston, SC
  - Michael Slager shoots Walter Scott in the back
  - Dylan Roof kills 9 people in the AME church
- Interactions with 100RC cities Tulsa and Seattle
- Cascadia Rising
- Mayoral elections
- Historic floods in South Carolina in 2015
- 2016 floods in Cedar Rapids
- 2017 Hurricane Season
- See item #1

3. GRIT AND HUMOR

4. A SPOONFUL OF SUGAR

- For those of us who work all the time, we may as well enjoy the work.
- Work enjoyment comes from within and is visible to all who encounter you

"In every job that must be done
There is an element of fun
You find the fun and snap!
The job's a game!"

~Mary Poppins

BOTTOM LINE

- Be dogged: you need a vision **and** a plan
- Go Deep: know your stuff
- Teamwork
- Money does not fall out of the sky (good people don't either)
- You can't control everything: luck and timing
- Pack your best: bring flexibility, grit, and humor
- Enjoy the ride—bring that spoonful of sugar.

FINAL CURTAIN

THANK YOU!

Visit us: http://ResilientAmerica.nas.edu

Contact: laugustine@nas.edu

WHAT MAKES RESILIENCE WORK IN LINN COUNTY?

- Buy-in and support from the local community/government –local champions
- Regional partnerships are important to cross jurisdictional boundaries ; disasters don't end at the community borders (WMAs)
- Flexible approaches to integrate resilience into existing strategies and plans
- Strong commitment, pre-existing relationships, and planning can have a huge impact on increasing flood resilience – just look at the difference between 2008 to 2016
- The strong relationships among community stakeholders have been cultivated for years.

Resilience building moves forward because of the strong commitment and implementation by local government and key community stakeholders

MAIN LESSONS

1. Relationships, relationships, relationships are key… and they take a long time to develop
2. Science and data support decision makers' ability to make informed decisions.
3. Daily stressors significantly impact a community's ability to build resilience to a large disaster
4. To operationalize resilience, it needs to be built into existing efforts
5. Ultimately, the community needs to take this work forward to impact their own resilience.

AND also …..

- Becoming resilient requires a ***culture shift***.
- ***Local government*** is a critical partner.
- To measure progress towards meeting resilience goals, ***communities need to know their starting point*** (baseline).
- ***Resilience is not a one size fits all***. Each community defines and builds resilience based on its own priorities and goals.
- Communities struggle with ***how to community risk effectively***.
- Communities do not want to talk about natural disasters in isolation. ***Economic and social resilience*** are key to a communities resilience
- Communities are especially concerned about the resilience of their ***vulnerable populations and issues of social equity***
- Building resilience is a ***place based*** activity
- Communities ***share common issues and goals*** for building resilience, and want to learn from each other. Networks are important!
- Most communities struggle with ***measuring resilience***
- Decision makers know their risks but often lack resources and time to manage them. Providing ***opportunities to build relationships,*** share information, and leverage resources within the community can fill these gaps
- Working in communities requires A LOT of ***flexibility***

KEY LESSONS FROM TULSA

- Daily stressors significantly impact a communities ability to build resilience to a large disaster
- Data sharing requires trusted partnerships and relationships.
- Communities value evidence-based information and data.
- Existing data sources can be used in different and creative ways to better understand and address community resilience challenges.
- A flexible approach in working with communities can result in new opportunities to understanding resilience in that community, and maybe other communities, as well.