Texas

READINESS FOR RESILIENCE

Workshop

QUALCOMM®

Texas A&M AgriLife Extension

REBUILD TEXAS
The Governor's Commission to Rebuild Texas

Texas Community Watershed Partners

The Business Council for Sustainable Energy®

SmartCitiesCouncil

NASEO
National Association of State Energy Officials

CenterPoint Energy

TX360®
www.swanislandnetworks.com

HAGERTY

Steve Mikulencak

Texas A&M AgriLife Extension Service,
Governor's Commission to Rebuild Texas

Call to order

READINESS FOR RESILIENCE

Workshop Introduction & Sponsor Remarks

Philip Bane, Managing Director, Smart Cities Council

Alice Tornquist, Vice President of Spectrum and Technology Policy, Qualcomm

Peter O'Dell, Chief Executive Officer/Founder, Swan Island Networks, Inc.

Steve Crout, Director of Policy and Resilience Programs, Smart Cities Council

READINESS FOR RESILIENCE

Keynote
Governor's Plan to Rebuild Texas

Parr Rosson, PhD
Interim Director, Texas A&M AgriLife Extension Service

READINESS FOR RESILIENCE

Texas A&M AgriLife Extension

Building Capacity For Future Proofing Texas from Manmade and Natural Disasters

REBUILD TEXAS
The Governor's Commission to Rebuild Texas

Applying Lessons from Hurricane Harvey

Outline of Today's Presentation

- New Application of an Established Network
- Lessons Learned From Harvey
- Future Proofing Texas Communities

"I knew from the beginning of our efforts that we needed points of contact embedded in those impacted communities, a team that could be our eyes and ears for what was needed for recovery," Sharp explained. "AgriLife Extension already has staff serving every county in this state, and I knew they would be our best tool for both monitoring recovery and ensuring issues don't go unresolved."

REBUILD TEXAS

The Governor's Commission to Rebuild Texas

www.rebuildtexas.today

Applying the Extension Network to Recovery

- ✓ *A Presence in Every County*
- ✓ *Span of Control*
- ✓ *Ability to Concentrate Our Resources*

REBUILD TEXAS

The Governor's Commission to Rebuild Texas

- Texas A&M Forest Service and the Survey 123 App
- Contact – daily → 5 x a week → once a week
- Local officials
- FEMA Public Assistance Categories A through G
- Assistance Center & Joint Field Office
  - State and Federal Partners

Agent Liaison Efforts

Over 6,500 issues reported

- County officials – 2,199
- City officials – 1,447
- School officials - 410

745 separate resolutions delivered

- Flooded Water Wells – 1,500 tested & treated
- Mosquito Control
- DSNAP Location
- Replacement Fire Truck
- Burning of debris with air-curtain incinerators
- How “big is big” report for Governor

Assist with Public Assistance Reimbursements

To aid local jurisdictions with completing and filing the required paperwork to secure reimbursement from FEMA's public assistance program, a group of AgriLife Extension and TEEX employees received training from TDEM & FEMA in aspects of Public Assistance reimbursement of FEMA.

Those agents were then deployed across the Harvey impact zone to assist with completion of forms and data entry to expedite reimbursements for local jurisdictions.

Inspections for Temporary Housing

- Support GLO housing mission
- Jefferson, Hardin & Orange
- Counties of the GHAC
- Initial Site Inspections
- Verification of unit and supporting infrastructure placement

Recovery Workshops

- Hosted across the impact zone
- Targeted local officials and decision makers
- Peer to peer
- Perspective of the road ahead
- Resource Workshops
- Listening Sessions

Resiliency Educational Outreach

- Harvey Community Forums
- 4-H Recovery
- Partnering with Philanthropic Organizations
- TDEM/TEEX Listening Sessions
- Mental Health First Aid
- Support for Long Term Recovery Committees
- Recovery and Preparedness Workshops
  - CHARM & Green Infrastructure
  - Agriculture Producers
- GCRT Report

Resiliency Educational Outreach

- Partnering with Philanthropic Organizations to Long Term Recovery Committees
- Mental Health First Aid
- Recovery and Preparedness Workshops
  - Community Health & Resource Management (CHARM) & Green Infrastructure
  - Agriculture Producers

Strengthen our Support of the Texas Division of Emergency Management

Texas A&M AgriLife Extension DARTs

Aid in animal response

Extension Liaisons

Disaster Summary Outlines

Preliminary Damage Assessments

Rapid Assessments of Ag related damage and losses

Completing Requests for Public Assistance

Filing of Documentation for Reimbursement

Thank you!

TEXAS A&M AGRILIFE

Readiness for Resilience Overview of Smart Technology Roadmap

Charriss York, Extension Program Specialist, Texas A&M AgriLife Extension Service

Steven Mikulencak, AICP, Extension Program Specialist, Texas A&M AgriLife Extension Service

Steve Crout, Director of Policy and Resilience Programs, Smart Cities Council

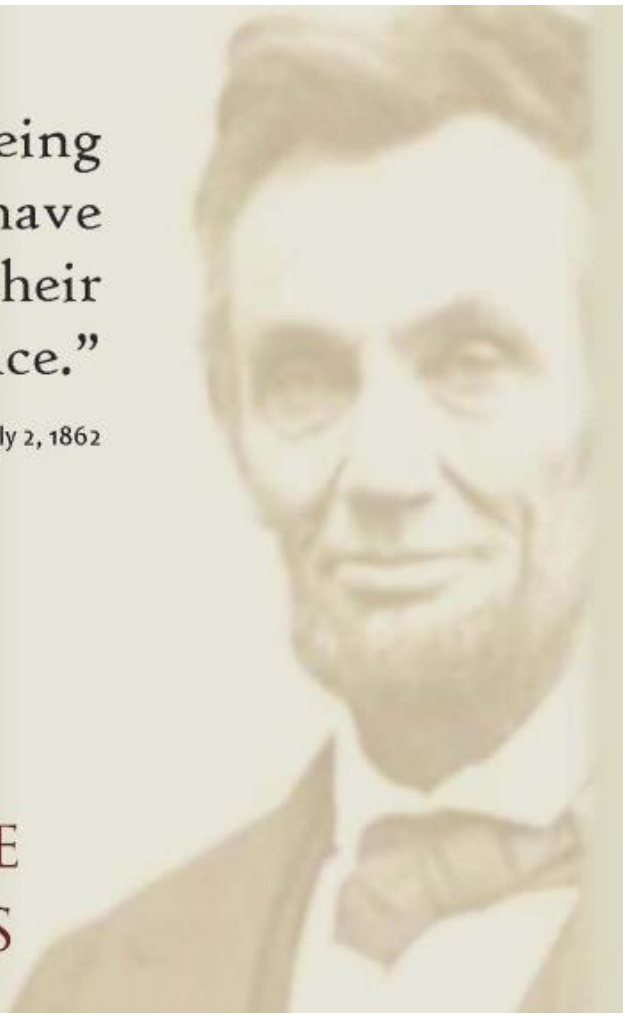
READINESS FOR RESILIENCE

TX Roadmap to Resiliency Smart Technologies

Texas A&M AgriLife Extension

"The land grant university system is being built on behalf of the people, who have invested in these public universities their hopes, their support, and their confidence."

Abraham Lincoln, upon signing the Morrill Act, July 2, 1862



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TRUSTED RESEARCH
LOCAL EDUCATORS...
EXTENDING KNOWLEDGE
PROVIDING SOLUTIONS

TEXAS A&M AGRILIFE EXTENSION

REBUILD TEXAS

The Governor's Commission to Rebuild Texas

"I knew from the beginning of our efforts that we needed points of contact embedded in those impacted communities, a team that could be our eyes and ears for what was needed for recovery," Sharp explained. "AgriLife Extension already has staff serving every county in this state, and I knew they would be our best tool for both monitoring recovery and ensuring issues don't go unresolved."

TEXAS A&M AGRILIFE EXTENSION

Harvey response

REBUILD TEXAS
The Governor's Commission to Rebuild Texas

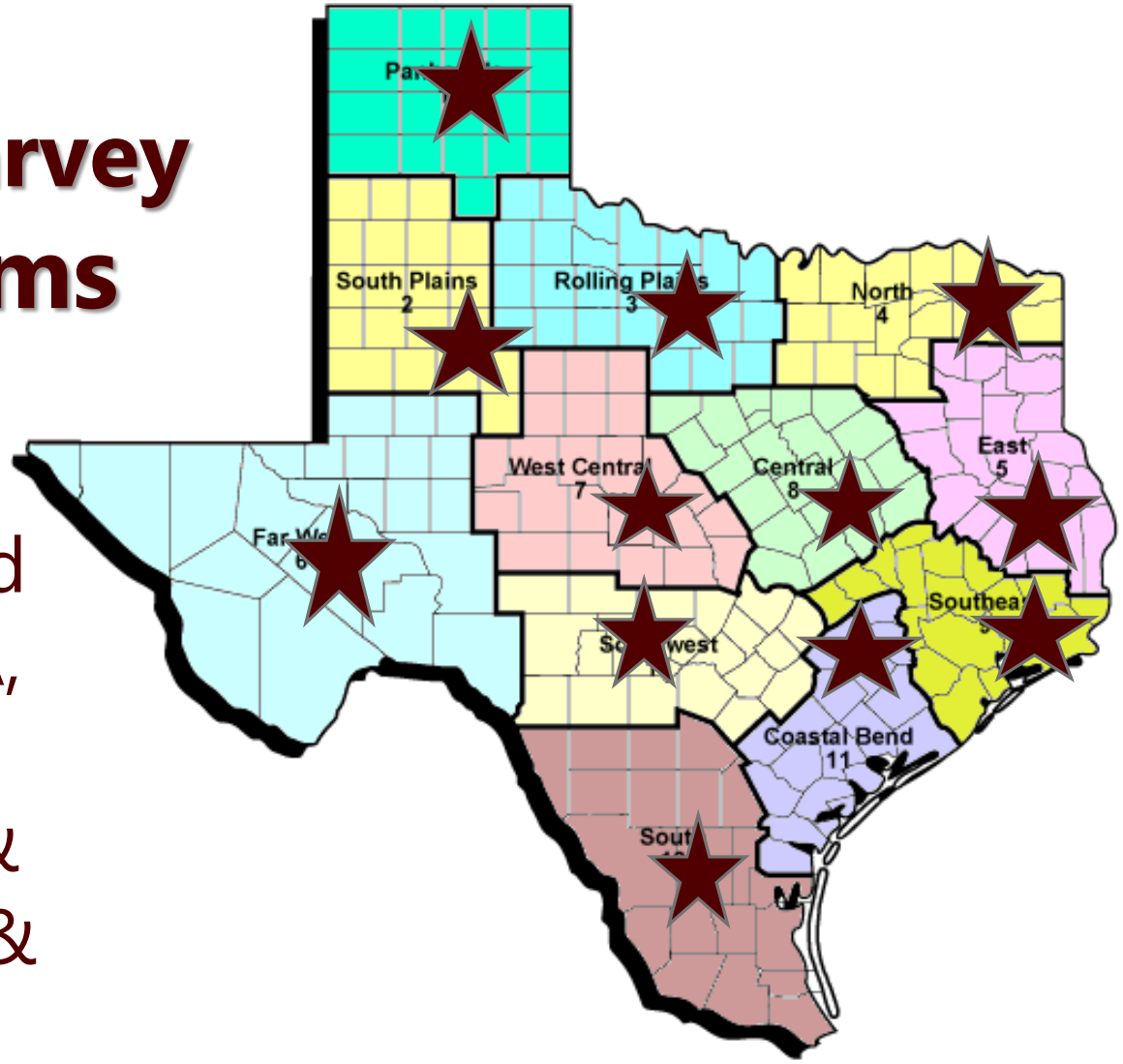
www.rebuildtexas.today

Applying the Extension Network to Recovery

TEXAS A&M AGRILIFE EXTENSION

Hurricane Harvey Strike Teams

120 AgriLife ST members activated supported by TDA, TAHC, & USDA-NRCS personnel & local jurisdictions & volunteers



Texas A&M AgriLife Extension

Statewide presence

- Agent Liaison Efforts
  - Over 6,500 issues reported
    - 2,199 County officials
    - 1,447 City officials
    - 410 School officials
  - 747 separate resolutions delivered
- Harvey Communities Forums
- TDEM/TEES Listening Sessions
- GCRT Report

TEXAS A&M AGRILIFE EXTENSION

RSVP ONLINE: agrilifeextension.eventbrite.com

Readiness for Resilience:

A Smart Technology Roadmap for Texas

RSVP for the location most convenient for you :

HARRIS COUNTY
DECEMBER 11
9:30AM-2:30PM
University of Houston Student Center
4455 University Dr. Houston, TX 77204

ORANGE COUNTY
DECEMBER 12
8:00AM-12:30PM
Convention and Expo Center
11475 FM1442 Orange, TX 77630

ARANSAS COUNTY
DECEMBER 13
7:30AM-12:00PM
The Inn at Fulton Harbor
215 N Fulton Beach Rd. Fulton, TX 78358

FAQ's

Is there a cost to attend?
There is no cost to attend these workshops. Breakfast or lunch will be provided.

Who should attend?
Local leaders and staff who have been working in the trenches of Harvey response and recovery, including long-term recovery groups, emergency responders, mitigation, hospitals, levee and flood control districts, planners, and representation from other local, regional, state and federal agencies.

What is on the Agenda?

- Smart Cities technologies to build community resilience
- Governor's Commission to Rebuild Texas Report
- Working group discussions with technology partners

For more information contact smikulencak@tamu.edu or cyork@tamu.edu

Join us at a half-day Discovery Workshop to provide unfiltered input about the challenges and successes during and after Harvey. As we focus on investing in long-term community resilience, hear from technology partners how bringing smart technologies to the table can streamline response and recovery, improving lives and reviving economies.

The knowledge you share at these workshops will help experts create a roadmap for Texas that links local needs with technology and funding solutions. The conversation will continue at a Spring 2019 conference, convening community leaders, stakeholders, and technology experts to pave the way for local projects.

Be a part of building a more resilient Texas.

Qualcomm

Qualcomm Incorporated has sponsored this program to assist Texas communities

Texas A&M AgriLife Extension

NASEO National Association of State Energy Officials

SmartCitiesCouncil

The Business Council for Sustainable Energy

REBUILD TEXAS The Governor's Commission to Rebuild Texas

Texas Community Watershed Partners

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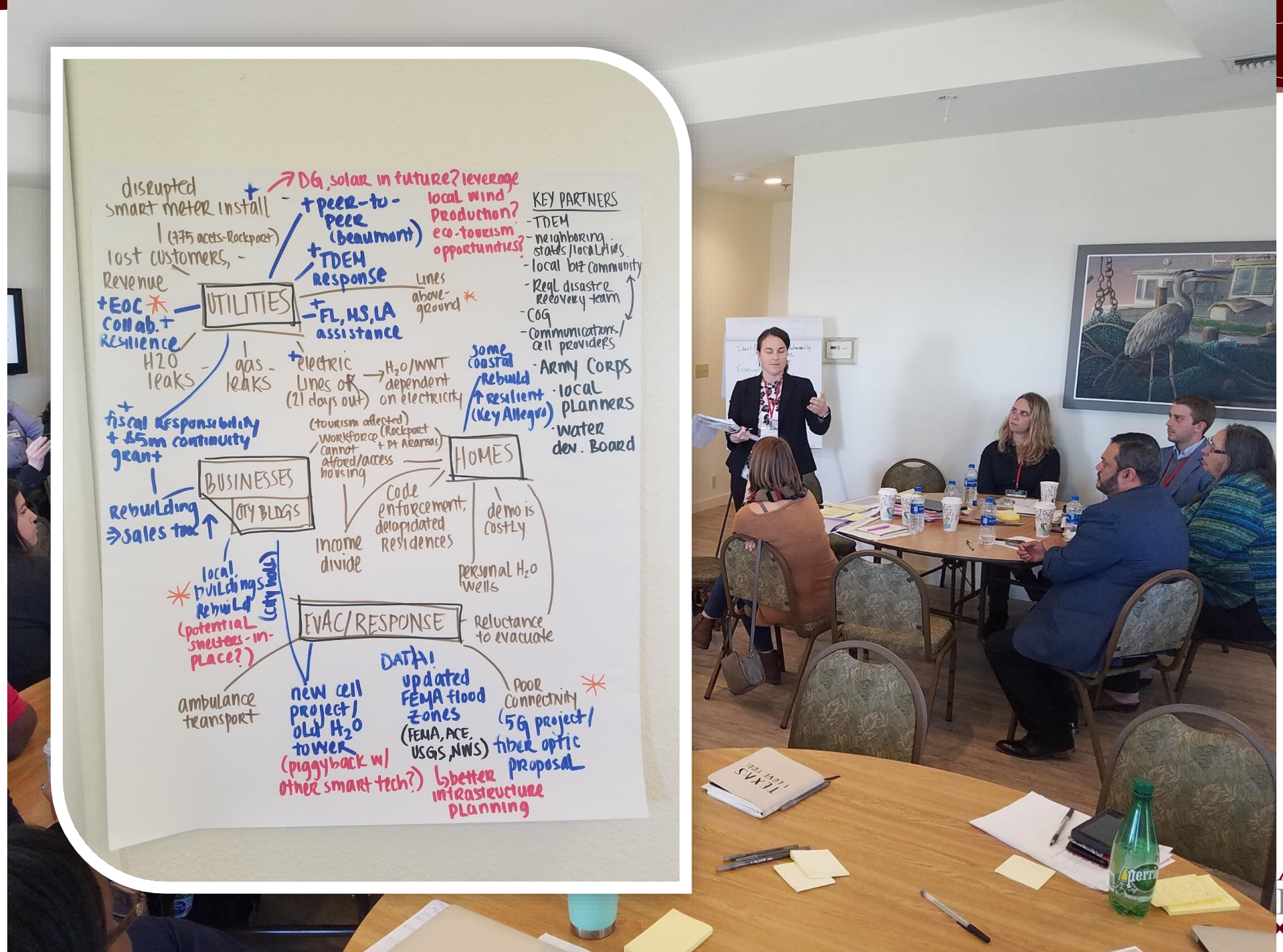


“Readiness for Resilience”

A Resilient Technology Roadmap for Rebuilding Texas

Sponsored by: Qualcomm

READINESS FOR RESILIENCE

A Resilient Technology Roadmap for Rebuiding Texas

With Partners: NASEO National Association of State Energy Officials · SmartCitiesCouncil · The Business Council for Sustainable Energy®

“Readiness for Resilience”

A Resilient Technology Roadmap for Rebuilding Texas

What is the Readiness for Resilience Program?

A Partnership, sponsored by Qualcomm, with:

- Texas A&M AgriLife Extension
- Smart Cities Council
- Business Council for Sustainable Energy
- National Association of State Energy Officials

The program includes three stages:

1) Discovery phase to learn of local rebuilding needs and project priorities;

2) Development of a “Resilience Roadmap” pairing technology best practices with identified community needs

3) Pairing the Resilience Roadmap with public-private partners and funding opportunities to spur smart, resilient project development. ensure smart, resilient and sustainable technology is incorporated into infrastructure rebuilding.

Discovery Workshop Action Areas

Stakeholders Discuss Priorities

Public Safety: How can Texas factor smart city technologies and processes into public safety priority areas to keep people safer during and after natural disasters?

Energy: How can Texas improve its energy resilience with smart city technologies and processes to build greater infrastructure resilience while creating co-benefits?

Telecom and IT: What smart technologies and design principles should Texas consider as it designs more connected, citizen-centered, affordable and resilient services?

Transportation and Mobility: What mobility solutions, technologies and standards might Texas consider as it moves to create a more intelligent, resilient and sustainable transportation system?

Activity 1: Resilience Priority Identification

Identify 2- 3 projects that offer the biggest potential for increased resilience

FOCUS AREA:

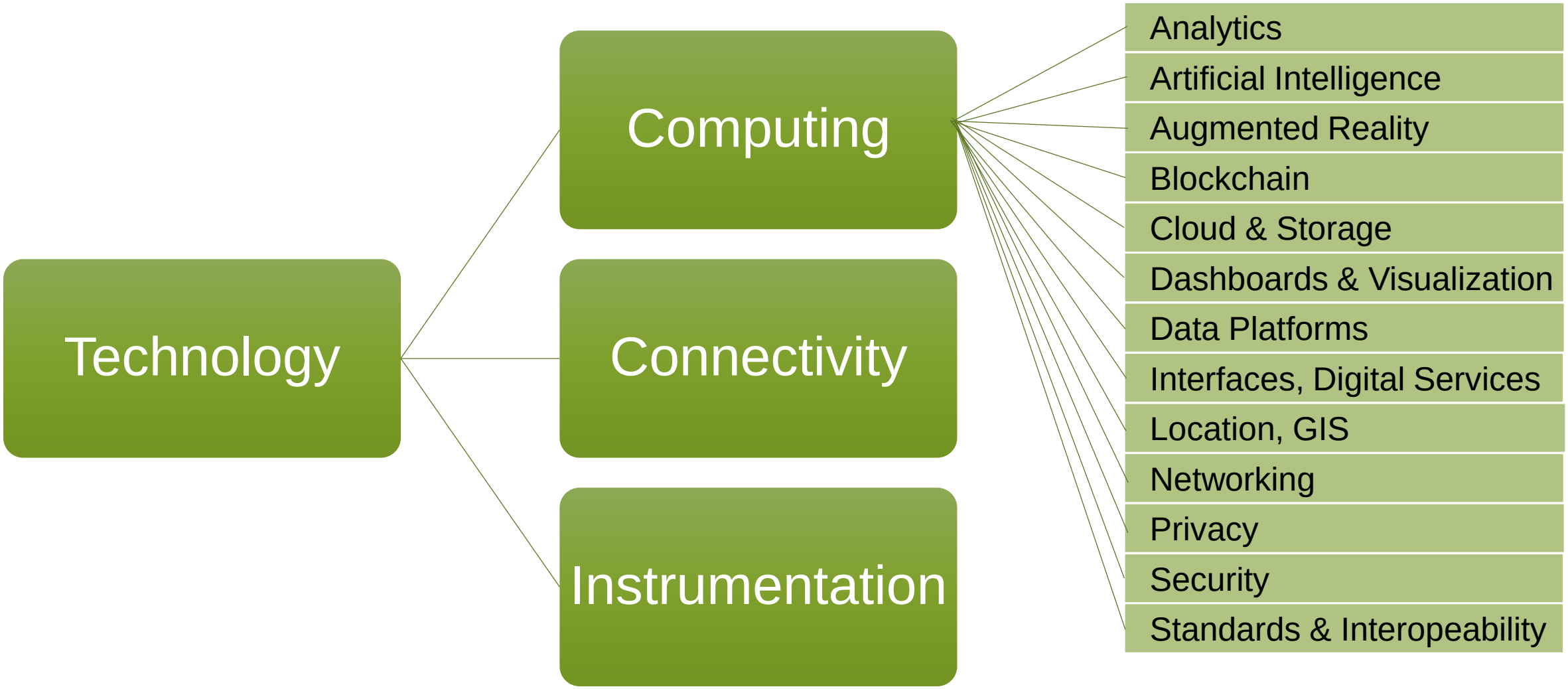
Resilience Challenges Faced with Harvey	**Biggest Community Needs for Recovery & Resilience**	**Potential Reconstruction Projects to Meet Needs (full list)**	**Prioritized Projects** (why a priority: e.g. biggest impact, quick win)	**Key Project Stakeholders**
Flooding Winds Debris Evacuation	Preparedness Communication Energy	See Recommendations		Government Industry Non-profit Academia

Activity 2: Technology Solutions & Best Practices

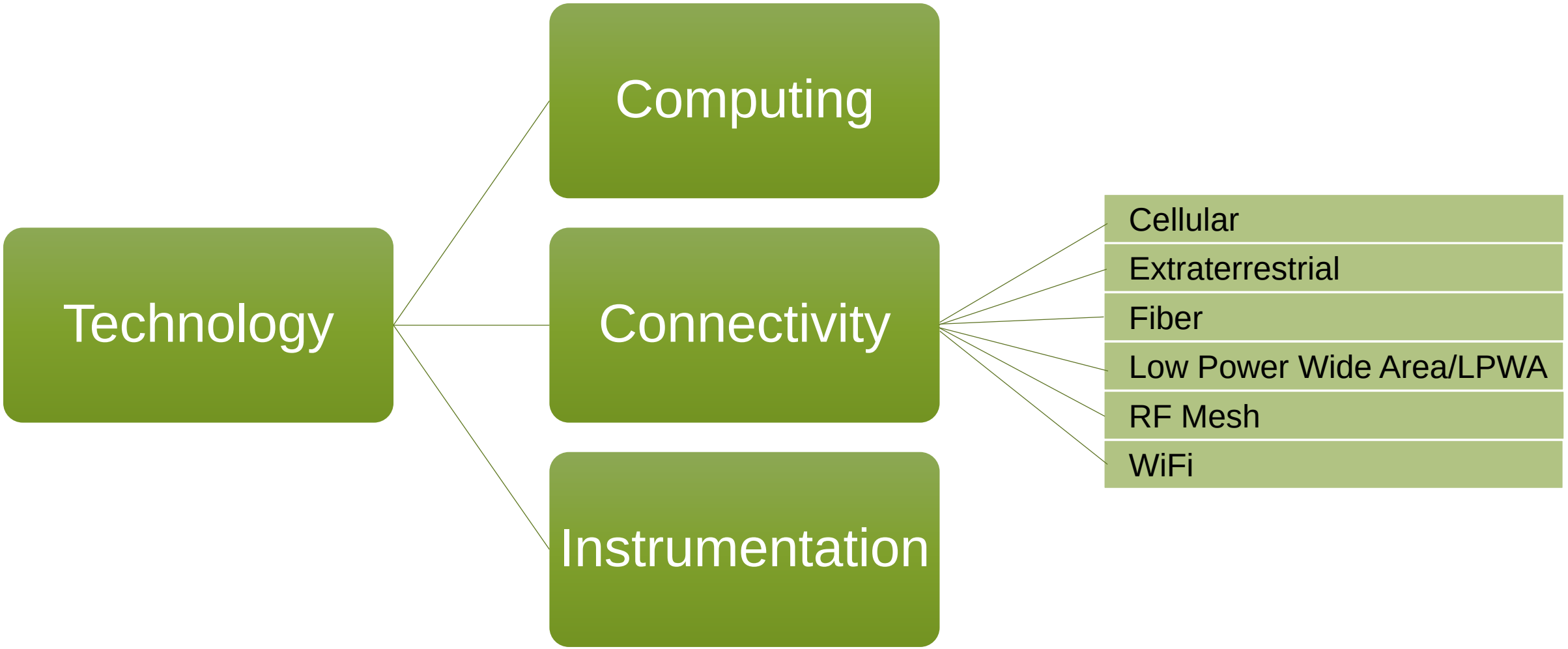
Focus Area:

Priority Resilience Project(s)	**"Smart" Technology/Best Practices (ways innovative tech can add value)**	**Potential Benefits Above and Beyond a Traditional Solution**	**Potential Collaboration Opportunities**	**Potential Process Innovations (new business models, legislation, etc.)**	**Critical Success Factors (to factor into guidelines)**

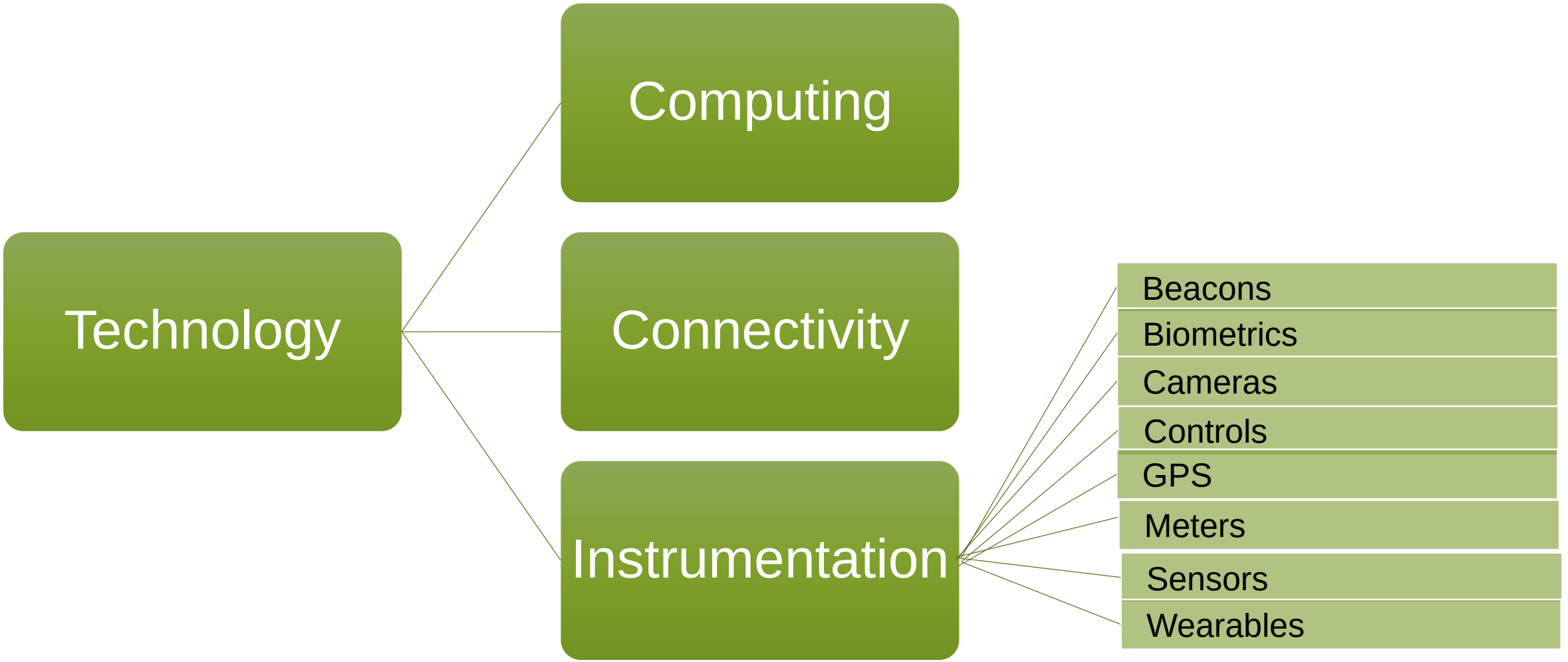
Technology Enablers



Technology Enablers



Technology Enablers



Public Safety

Local Challenges and Priorities

Common Themes

- Coordinate response across agencies
- Direct people and resources during and immediately after the disaster, and
- Plan and prepare for emergencies before they occur, with an eye to vulnerable populations.

Public Safety

Projects and Technology Best Practices

Project PS-1: "Match.com"-style resilience tool:

- Integrated resilience tool for public to access people, processes, systems and data they need to assist with preparedness, response & recovery *(Houston-Galveston and Coastal Bend)*

Project PS-1B: Proactive debris removal planning:

- Resilience planning tool could help community members and emergency responders understand rights of way, identify all the options for where to put debris and get MoU's in place in advance.
- Consider options for handling debris (what can be salvaged, mulched, used for waste-to-energy, etc.), and provide safety guidelines. *(Coastal Bend)*

Project PS-4: Volunteer Rescue Network:

- Extending public safety response through a system of volunteers using "ride-sharing" technology.
- This could include offering evacuation car-pooling, connecting volunteer expertise with special populations, matching people in need to volunteers offering food and shelter, matching pets and temporary foster homes, etc. *(Houston-Galveston and Southeast TX)*

Project-Governor's Report Mapping: Public Safety

Smart Resilience Project	County			Resilience Focus			Relevant Governor's Commission Report Recommendations (Chapter #, Recommendation #)
	Harris	Orange	Aransas	Prepare	Respond	Recover/ Revitalize	
PS-1: Match.com-style resilience tool	●		●	●	●	●	**6-9:** Create recovery task force to provide specialized assistance to communities and individuals to speed local level recovery. **8-16:** Examine ways to better inform public about how to prepare for and survive a disaster.
PS-1A: Localized damage prediction			●	●			**8-4:** Strengthen quality and sharing of data used in emergency management operations.
PS-1B: Proactive debris removal planning			●	●	●	●	**6-1:** Catastrophic debris management plan and model guide **6-2:** Improve contracting for debris removal **6-3:** Study issues surrounding removal of "wet" debris
PS-1C: Evacuation scenario planning		●		●	●		**6-18:** Grant TxDOT authority to pre-purchase and stockpile food and water for each hurricane season
PS-2: Smart, resilient buildings	●		●	●		●	**6-7:** Improve oversight, accountability and availability of individuals in building trades offering services to disaster survivors.
PS-3: Affordable housing	●				●	●	**6-19:** Study and recommend ways to resolve restrictions impeding debris removal or trailer placement for short-term disaster housing.
PS-4: Volunteer rescue network activation	●	●		●	●		**8-2:** Review current training courses to strengthen training for recovery operations for state and local emergency management personnel.

Energy & Utilities

Local Challenges and Priorities

Common Themes

- Stable and clean power generation
- Access to back up power during extreme weather emergencies
- Improving building codes relating to flooding and wind storms, and enabling counties to have more code
- Improving back up power generation – currently back-up generators are often diesel
- Improving planning and communications across entities in the field.

Energy & Utilities

Projects and Technology Best Practices

- **Project EU-1: Localized infrastructure monitoring:** Improve monitoring of underground and above ground utility infrastructure at the connection level to provide household service visibility to expedite recovery (Houston-Galveston and Coastal Bend).

- **Project EU-2: Municipal Microgrids:** Establish public-private partnerships to examine the feasibility of municipal microgrids that enable critical community assets to continue operating event during power outages or disruptions.

- **Project EU-3: Smart Metering, Smart Grid, and Energy Efficiency:** Better manage power outages, reduce financial losses, and shorten outage time by installing smart grid technologies and systems.

Project-Governor's Report Mapping: Energy & Utilities

Smart Resilience Project	County			Resilience Focus			Relevant Governor's Commission Report Recommendations (Chapter #, Recommendation #)
	Harris	Orange	Aransas	Prepare	Respond	Recover/ Revitalize	
Project EU-1: Localized infrastructure monitoring	●		●	●	●	●	**4-1:** Reorganize emergency management functions to unify most critical emergency response and recovery functions**7-3:** Investigate ways to improve hardening of utilities and facilities. **8-15:** Examine ways for state to apply data analytics to improve disaster management through more effective and timely information.
Project EU-2: Municipal microgrids	●	●	●	●	●	●	**4-1:** Reorganize emergency management functions to unify most critical emergency response and recovery functions. **7-3:** Investigate ways to improve hardening of utilities and facilities.
Project EU-3: Smart metering, smart grid and energy efficiency	●	●	●	●	●	●	**4-1:** Reorganize emergency management functions to unify most critical emergency response and recovery functions. **7-3:** Investigate ways to improve hardening of utilities and facilities. **8-15:** Examine ways for state to apply data analytics to improve disaster management through more effective and timely information.

Telecom & IT

Local Challenges and Priorities

Common themes

- More reliable baseline and emergency communications infrastructure.
- Improved information sharing with the public.
- A standardized communication platform for agencies and communities engaged in recovery efforts. Lack of local-level coordination impedes response and recovery.

Telecom & IT

Projects and Technology Best Practices

Project TI-1: Resilient communications infrastructure: All regions recommended creating greater telecom system resilience by hardening and expanding infrastructure and creating more redundancy.

Project TI-2: Integrated community notification system: All regions recommended improving the way storm related information gets to the public. A multi-faceted notification system to get key information out to the public, better guide evacuation, and assist people during and in the aftermath disasters.

Project TI-3: Interlocal mobile communications system: Develop self-contained, mobile communications and IT system(s) for use in emergency and high-impact events. Mobile units can be shared across regions and agencies and directed to where they are needed the most (Coastal Bend).

Project TI-4: Telecom system gap analysis: Conduct a gap analysis of local connectivity and power and develop plan to fill gaps to improve emergency response planning, response and recovery (Coastal Bend).

Project-Governor's Report Mapping: Telecom and IT

Smart Resilience Project	County			Resilience Focus			Relevant Governor's Commission Report Recommendations (Chapter #, Recommendation #)
	Harris	Orange	Aransas	Prepare	Respond	Recover/ Revitalize	
TI-1: Resilient communications infrastructure	●	●	●	●	●	●	**5-1:** Consider appropriating additional funds from Emergency Radio Infrastructure Account to fund radio infrastructure. **8-14:** Cultivate relationships with private technology providers for assistance when communications systems are damaged or destroyed.
TI-2: Integrated community notification system	●	●	●	●	●	●	**4-1:** Reorganize emergency management functions to unify most critical emergency response and recovery functions. **8-10:** Establish state website at the Texas A&M University System that is easy to use and presents important post-disaster information about response and recovery activities. **8-11:** Consider ways to make better use of 911 and social media during disaster response. **8-12:** Explore development of new mobile app to deliver important information to responders and disaster victims alike.
TI-3: Interlocal mobile communications system			●	●	●	●	**7-3:** Investigate ways to improve the hardening of utilities and facilities. **8-9:** Review laws and practices affecting the use of drones during emergency events and recommend changes in operations to promote use.
TI-4: Telecom system gap analysis			●	●	●	●	**7-4:** Create comprehensive inventory of needed mitigation and resiliency projects statewide and develop a prioritization methodology to guide local, state and federal decision makers.

Transportation

Local Challenges and Priorities

Common themes

- Improved and more real-time broadcasting of information to the public about evacuation routes and closed roadways.
- Improving emergency evacuation processes and evacuee access to services.
- Opening up transportation routes after disasters, removing debris, and addressing the mobility needs of vulnerable populations (i.e., retirees, elderly, and poor) are priorities.

Transportation

Projects and Technology Best Practices

Project TM-1: Real-time, coordinated evacuation and resource routing: Improve evacuation effectiveness and efficiency by using a variety of communications devices, sensors and data to route and reroute people to safety and resources in real-time during a disaster.

Project TM-2: Smart signage: In addition to strategically placing signage and incorporating real-time data to improve signage along evacuation routes, a smart system would use real-time triggers, such as roadway water-level sensors, to adjust signage, suggest reroutes and automate road closure gates (Houston-Galveston and Southeast TX)

Project TM-4: Roadway flood protection: As roadways are being repaired, seek opportunities to upgrade materials and incorporate green stormwater infrastructure and other sustainable design principles to improve drainage and reduce flood risks. Also incorporate water-level, traffic count, environmental and other sensors to enable real-time condition monitoring, reporting and route management (Houston- Galveston).

Project-Governor's Report Mapping: Transportation

Smart Resilience Project	County			Resilience Focus			Relevant Governor's Commission Report Recommendations (Chapter #, Recommendation #)
	Harris	Orange	Aransas	Prepare	Respond	Recover/ Revitalize	
TM-1: Real-time coordinated evacuation and resource routing	●	●		●	●		8-15: Examine ways for state to apply data analytics to improve disaster management through more effective and timely information.
TM-2: Smart Signage	●	●		●	●		**8-15:** Examine ways for the state to apply data analytics to improve disaster management through more effective and timely information.
TM-3: Evacuation transportation assistance	●		●	●	●		**6-14:** Develop a process to capture vehicle identification information in FEMA's vehicle assistance program.
TM-4: Roadway flood protection	●			●	●	●	**7-1:** Special study committee to propose options for state-local partnership to future-proof Texas against flood events on a watershed basis.

Mapping Projects to Smart Cities Framework

The Smart Cities Framework shows how a project in one area can address other responsibility and benefit areas. It also shows technology enablers for each project and encourages cross-solution technology adoption to improve coordination and unlock synergies.

"Smart for Resilience" Projects"	Additional Benefit Areas																Technology Enablers		
	Buildings	Digital Services	Economic Dev.	Education & Training	Emergency Response	Energy	Environmental Svcs	Health	Human Services	Payments	Public Safety	Street Infrastructure	Sports, Culture, Tourism	Telecommunications	Transportation	Waste Management	Water & Wastewater	Computing	Connectivity	Instrumentation & Control
Project PS-1: "Match.com" resilience tool			●	●	●	●	●	●			●			●	●	●	●	• Analytics • Data Platform • Mobile App • Cloud and Storage	• WiFi • Cellular	• Beacons • Biometrics • Cameras • GPS
TI-3: Interlocal mobile communications system					●	●	●	●			●			●	●	●	●	• Analytics • Data Platform • Cloud and Storage	• WiFi • Cellular • Satellite	• Beacons • Cameras • Sensors • GPS
Project TM-2: Smart signage:		●			●		●				●	●			●			• Analytics • Data Platform • Location, GIS	• WiFi • Cellular	• Beacons • Cameras • GPS

Smart Cities Council

Activity 1: Public Private Partnership Principles

For each project identified, fill in the 3P Principles outlined below.

FOCUS AREA:

Project	Create a Shared Vision	Identify Key Stakeholders and Partners	Outline Risks and Rewards for all Partners	Determine Institutional Roles, Responsibilities	Identify Investment, Funding Options	Prioritize Investment Based on Value	Ensure Political, Regulatory Support	Communicate Public Benefit

Smart Cities Council

Activity 2: Match Projects/Funding Streams/Assistance

Focus Area:

Project	Identify Federal Funding Streams	Identify Additional Federal Assistance Programs	Identify State and Local Funding Streams	Identify Additional State and Local Assistance	Match Projects with Federal, State and Local Funding Streams	Match Projects with Federal, State and Local Assistance	Match Potential PPP Contribution to Each Project	Compile Project Federal State & Local Funding & Assistance

Activator addresses government needs

Activator Discover

- Powerful input tools to capture the needed data
- Instant access to best practices

Activator Plan

- Collaborative tools for multi-stakeholder planning
- Templates from leading experts

Activator Exchange

- Trade lessons learned with peer cities

Activator Finance (coming soon)

- Rocket Mortgage for cities – fill in one form, get introductions to multiple lenders

Public Private Partnerships

Moderator: ***Lisa Jacobson, President, Business Council for Sustainable Energy***

June W. Choi, Managing Partner, Serval Ventures

Trish Starkey, Engagement Leader, AlphaStruxure, North America Operations

Pete O'Dell, Chief Executive Officer/Founder, Swan Island Networks, Inc.

READINESS FOR RESILIENCE

The Business Council for Sustainable Energy®

Expanding markets for clean energy technologies worldwide

2019 BCSE Members

The Business Council for Sustainable Energy®

BCSE Mission

BCSE advocates for policies that promote clean, efficient, and sustainable energy products, technologies and services

2019

Sustainable Energy in America

Factbook

GROWTH SECTORS OF THE U.S. ENERGY ECONOMY

BloombergNEF

The Business Council for Sustainable Energy®

GET THE FACTS

www.bcse.org

BCSE Resilience and Reliability Dialogue

- Thought Leader Speaker Series
- White Paper on Resilience and Reliability
- External education and advocacy initiatives

CLEAN ENERGY BUSINESS NETWORK

BCSE BOARD OF DIRECTORS MEETING 11.20.18

CLEAN ENERGY BUSINESS NETWORK

GROWING THE CLEAN ENERGY ECONOMY– ONE SMALL BUSINESS AT A TIME

POLICY

EDUCATION

BUSINESS SUPPORT FOR SMALL & MEDIUM ENERGY COMPANIES

CLEAN ENERGY BUSINESS NETWORK

INNOVATION APPROACH TO PUBLIC PRIVATE PARTNERSHIPS

June W Choi
Serval Ventures
NY Bay Capital

RESILIENT CITIES & INFRASTRUCTURE

- **Robustness** – able to withstand hazard events without surges & partial loss
- **Redundancy** – spare & latent capacity to withstand surges & partial loss
- **Diversity & Flexibility** – services supplied a number of pathways, using distributed & multifunctional equipment
- **Responsiveness** – incorporating automated monitoring, short feedback loops & controls at multiple points, transparency of performance data & rapid adjustment to maintain functionality
- **Coordination** – between systems so knowledge is shared, planning is collaborative & strategic, responses are integrated for mutual benefit

from *Toolkit for Resilient Cities: Infrastructure, Technology and Urban Planning*, a research project by Arup, RPA & Siemens

APPLICABLE LESSONS

from top tech companies
that move the markets

Facebook
Amazon
Apple
Netflix
Google

Innovation Frameworks

Design thinking

Agile process

Continual iteration

Innovation Mindset

0 to 1

Transparency

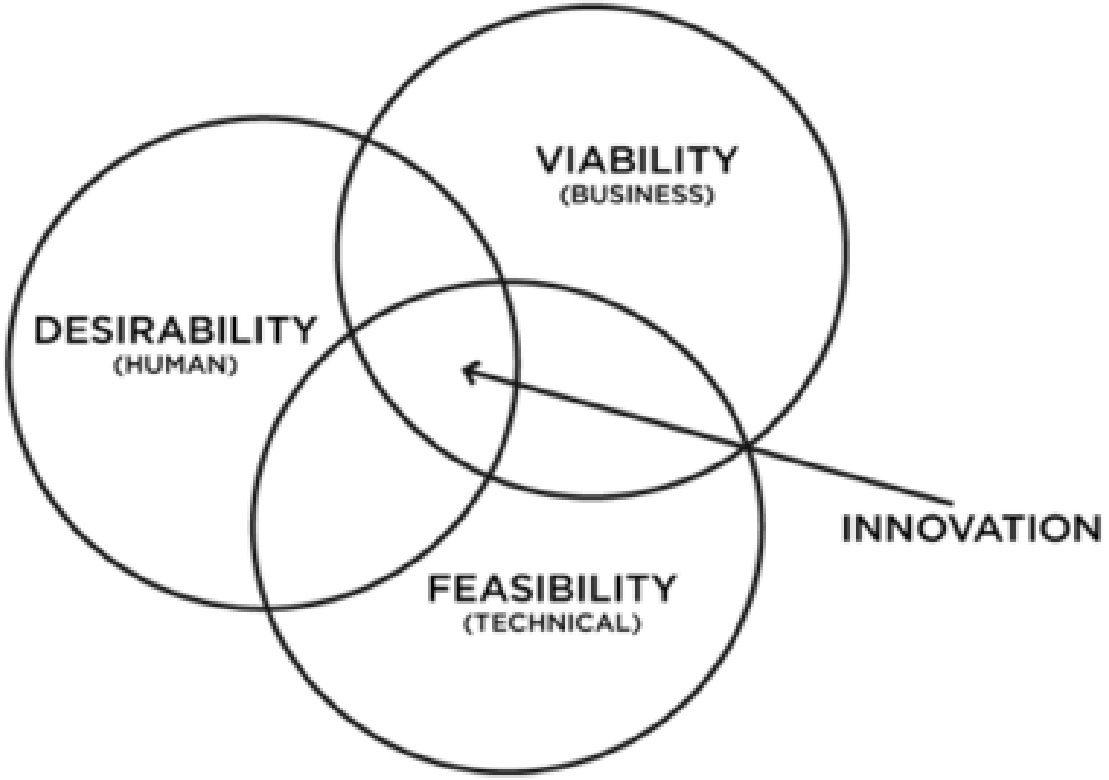
JUNE W CHOI, JUNEWC@SERVALVENTURES.COM

DESIGN THINKING

Sweet spot of human need, technical possibilities, and sustainability

Vital to have diverse people around the table who can really speak from each perspective

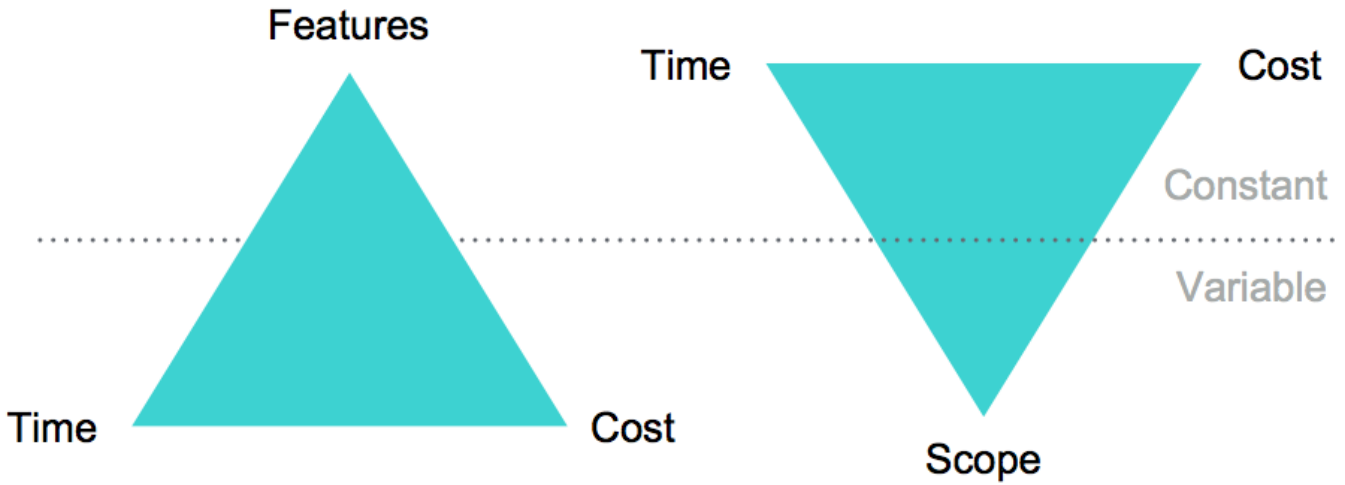
Studies show diversity increases success



https://cdn.gihub.org/local-umbraco/media/1455/gih_showcaseprojects_penn-bridges_art_web.pdf

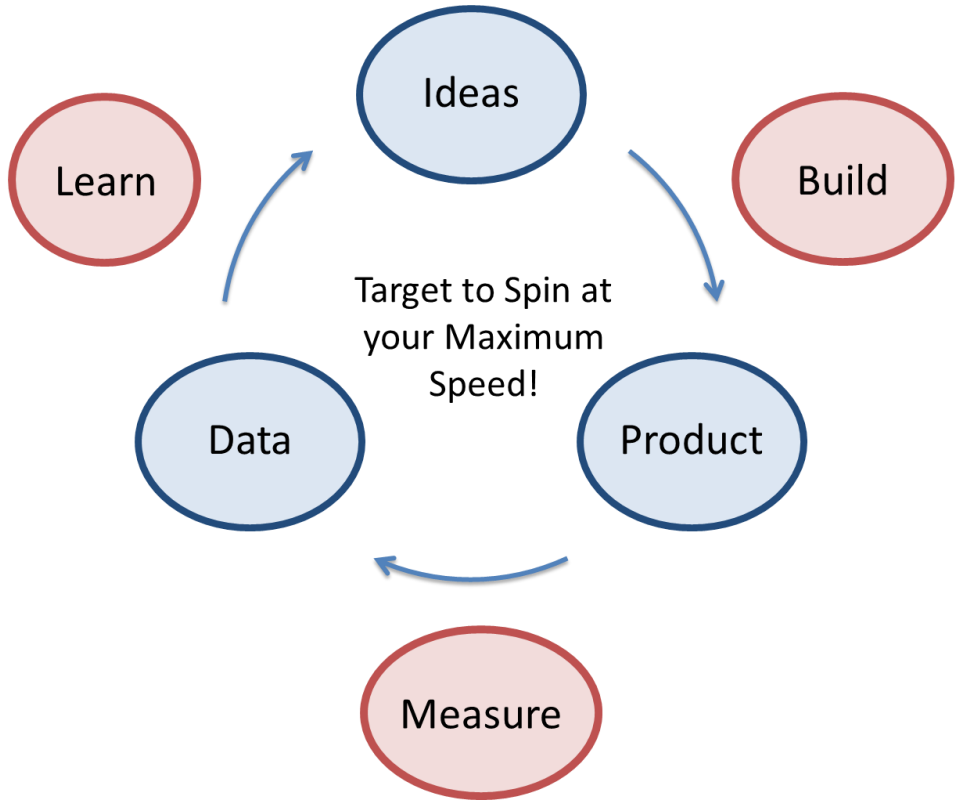
AGILE PROCESS

Waterfall/traditional **Agile/current**



Agile is the better process to apply given the rapid pace of technological changes

CONTINUAL ITERATION/IMPROVEMENT



Scientific method for business

Time-tested process, adapted from the scientific method, that can be successfully applied to evolving complex challenges

Key is to stay curious & don't get complacent, like good scientists

JUNE W CHOI, JUNEWC@SERVALVENTURES.COM

Figure 1. A five-step framework for successful infrastructure investment

Source: PwC

JUNE W CHOI, JUNEWC@SERVALVENTURES.COM

MINDSET IS THE SECRET SAUCE

0 to 1

Building the first of something that doesn't yet exist

Spurs creativity & freshness in approaches to solutions

Transparency

Social media has made private public

Culturally, today people expect & respect transparency

JUNE W CHOI, JUNEWC@SERVALVENTURES.COM

APPLYING THE LESSONS TO 3P PROJECTS

- People around the table – design thinking
- Project structure – Agile approach
- Financing sources & structuring – get creative, involve partners early in design process
- Messaging & public engagement – test & learn
- Implementation processes – innovation mindset
- Addressing problems - transparency
- Future or follow-on projects – continual iteration

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P3's – *Ready Today*

Readiness for Resilience Workshop – Port Aransas, TX June 2019

Trish Starkey
Engagement Leader
AlphaStruxure — a Carlyle and Schneider Electric Company

AlphaStruxure

What is foundational for Resilience?

Leading Business Model – P3

Experienced Partners (strategic capital with best-in class technology)

Electrical infrastructure supporting clean, resilient microgrid power

Repeatable and Scalable

AlphaStruxure

Key Stats

$3.7T

in infrastructure investment per year until 2035

$1T

Approximate amount needed in the US according to the American Society of Civil Engineers

Declining Infrastructure Spending

The U.S. dedicates less to infrastructure spending than it has in the last 20 years

AlphaStruxure

The Carlyle Group

THE CARLYLE GROUP
GLOBAL ALTERNATIVE ASSET MANAGEMENT

Established in Washington, D.C. in 1987, Carlyle is one of the world's largest and most diversified multi-product global alternative asset management firms.

Overall Platform

AUM	$210 billion
Active Investment Vehicles	335 Investment Vehicles
Dry Powder[1]	$73 billion
Active Investments	275+ Active Portfolio Companies 315+ Active Real Estate Investments
Offices	31 offices across 19 countries
Employees	1,625+ employees including 650+ investment professionals
Investors	1,875+ active carry fund investors from more than 86 countries

Four Operating Segments

Corporate Private Equity		Real Assets	
$81 billion AUM	34 Funds	$45 Billion AUM	28 Funds[2]
28% Realized/Partially Realized Gross IRR[3]		15% Realized/Partially Realized Gross IRR[3]	
Global Market Strategies[4]		**Investment Solutions**	
$36 Billion AUM	58 Funds	$48 Billion AUM	215 Fund of Funds Vehicles

Note: As of June 30, 2018. AUM numbers may not sum to total due to rounding. Past performance is not necessarily indicative of future results.

1. Amount of unspent commitments to Carlyle investment funds.
2. Includes four Energy & Power and Renewable funds jointly advised with Riverstone Investment Group, L.L.C. and nine funds advised by NGP Energy Capital Management.
3. Includes co-investment. Gross IRRs do not reflect management fees, carried interest, taxes, transaction costs and other expenses to be borne by investors, which will reduce returns and in the aggregate are expected to be substantial. Metrics for realized and partially realized investments are not representative of overall performance, as the inclusion of unrealized investments may result in lower substantially different aggregate performance metrics than referenced herein.

AlphaStruxure

Schneider Electric, leading the digital transformation of Energy Management and Automation

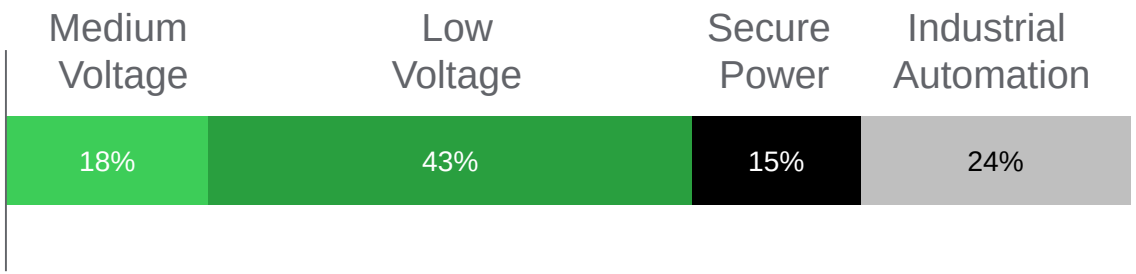
Life Is On | Schneider Electric

€25.7 billion
FY 2018 revenues

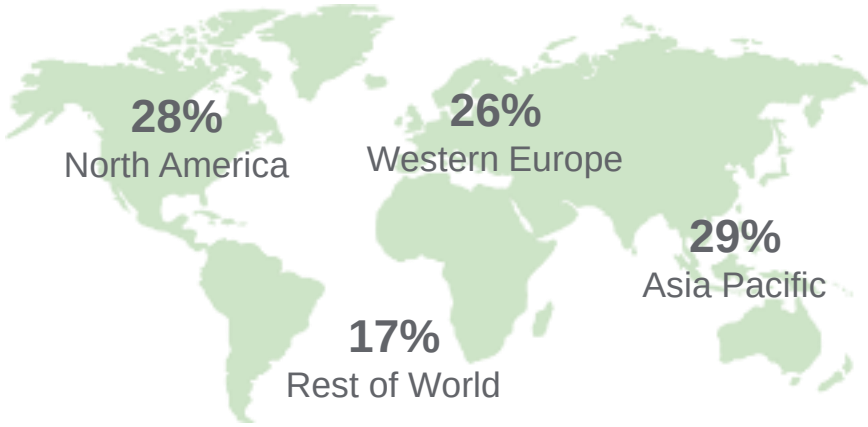
~5%
of FY revenues devoted to R&D

145,000+
people in 100+ countries

Our Products & Solutions – FY 2018 revenues



Balanced geographies – FY 2018 revenues



AlphaStruxure

AlphaStruxure provides **financial** and **operational expertise guaranteeing** clean, resilient, and predictable **energy** – all with **zero capital expenditure** from your organization

GUARANTEED OUTCOMES

Eliminate the complexity of the new energy landscape while **shifting the burden of ownership and performance** to experts who deliver to defined outcomes.

Remove financial, technical, operational, and regulatory **risks**, while retaining long-term, key decision-making rights.

RESILIENT INFRASTRUCTURE

Upgrade critical infrastructure without capital outlay to ensure **business continuity.**

Enhance competitiveness by **digitizing your operation** for the 21st century.

LOWER CARBON FOOTPRINT

Improve sustainability with smartly acquired, locally produced and efficiently consumed resources.

Optimize a mix of traditional and renewable onsite/offsite energy.

AlphaStruxure

New Energy Landscape in 2018 – “Size and Scale”

BOWERY FARMING WILL USE SOLAR MICROGRID TO SUPPORT UNINTERRUPTED FARMING

BOWERY
THE MODERN FARMING COMPANY

RoBotany™

Schneider Electric Building Microgrid at Port of Long Beach

Schneider Electric announced Wednesday that it has a $5.2 million contract to design, engineer and build a new microgrid at the Port of Long Beach in southern California. The port also is going to get ...

Port of LONG BEACH
The Green Port

Faith Technologies and Schneider Electric Partner to Build State-of-the-Art Microgrid

Faith Technologies, a leading electrical planning, engineering, design, and installation expert, in partnership with Schneider Electric, a global specialist in energy management and automation, design...

EDUCATION RECREATION CONSERVATION SUSTAINABILITY
BUBOLZ NATURE PRESERVE
Fox Cities Environmental Learning Campus

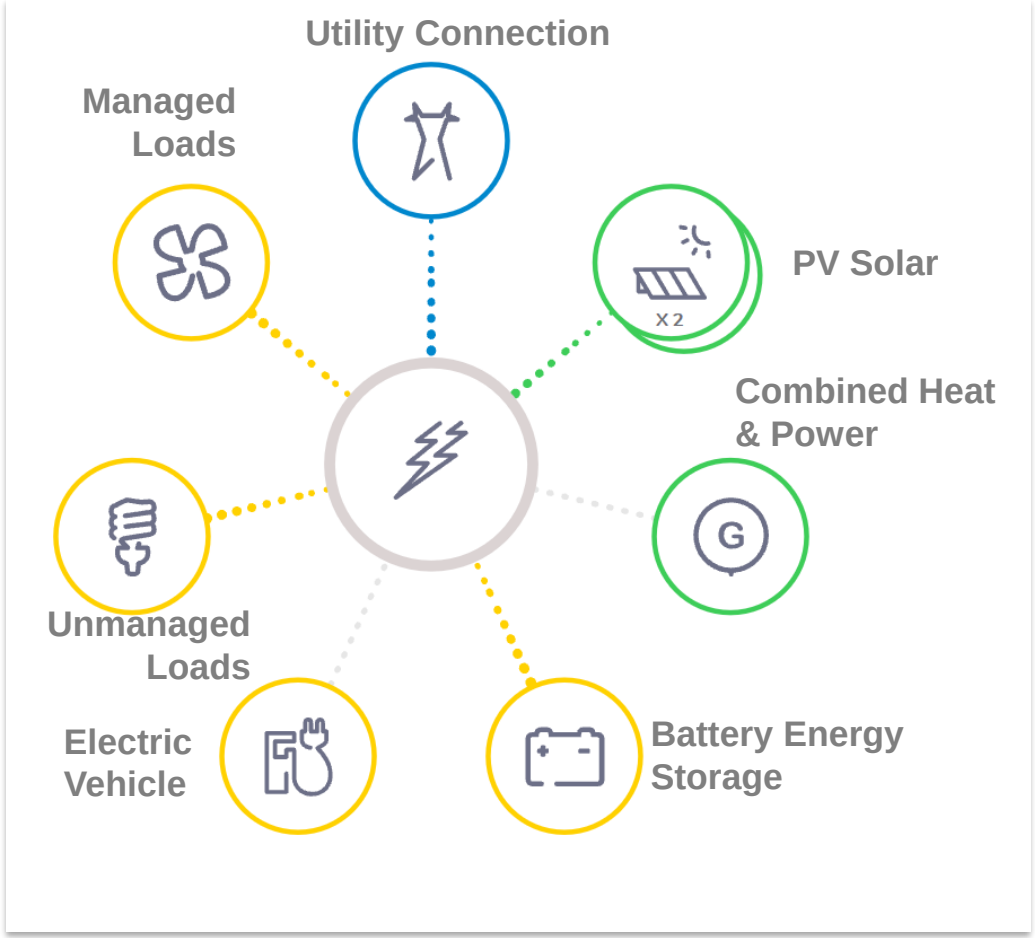
MONTGOMERY COUNTY 17 76 MARYLAND

Successful microgrid activation showcases innovation; supports reliable, efficient, clean energy at Montgomery County, Md., critical facilities

AlphaStruxure

Integrated Energy Outcomes

Historically passive consumers are thinking about energy in new ways



Cost

- Lower / More Predictable Energy Costs
- Energy / Fuel Source Arbitrage
- Flexibility drives savings / incremental revenue

Resilience

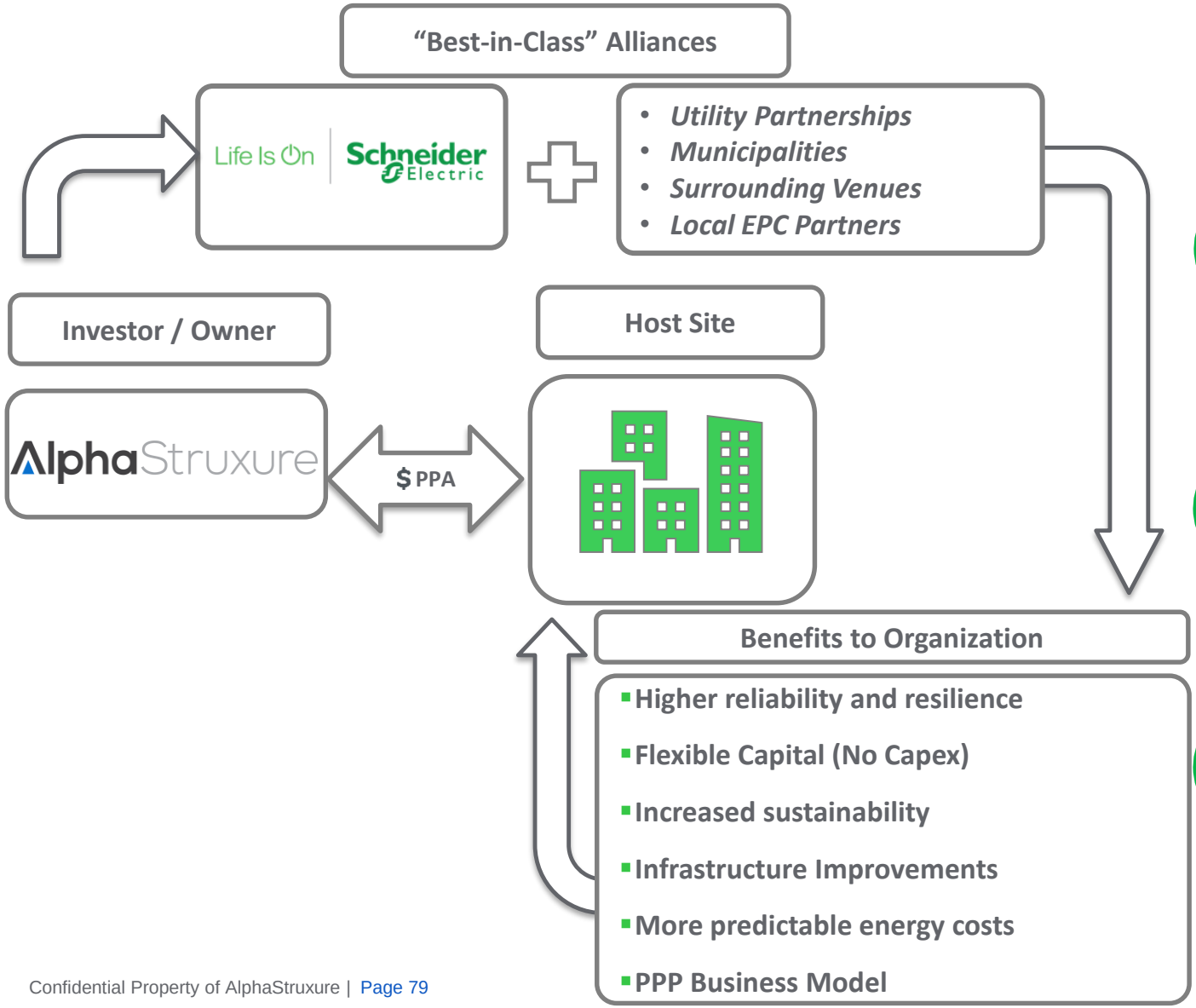
- Serve loads during times of grid stability
- Oasis for employees / customers – shelter in place
- Protect power sensitive / critical assets from poor power quality

Sustainability

- Reduce carbon footprint
- Improve brand image
- Attract / Service carbon sensitive customers

AlphaStruxure

Energy as a Service



Capital Availability

- The Carlyle Group provides stability and strategic capital ($210 billion AUM & 30 years)
- Willing to put significant capital at risk to fund energy infrastructure initiatives

Structuring Capabilities

- Complex deal structuring with long term view in mind
- Flexible, innovative structuring approaches to meet all stakeholder's objectives

Performance Standards

- Features incorporated in funding programs to align interests of project participants while holding Carlyle and Schneider Electric accountable for performance

Industry Expertise

- Carlyle and Schneider's experience and expertise facilitates a unique ability to understand the needs of all project constituents

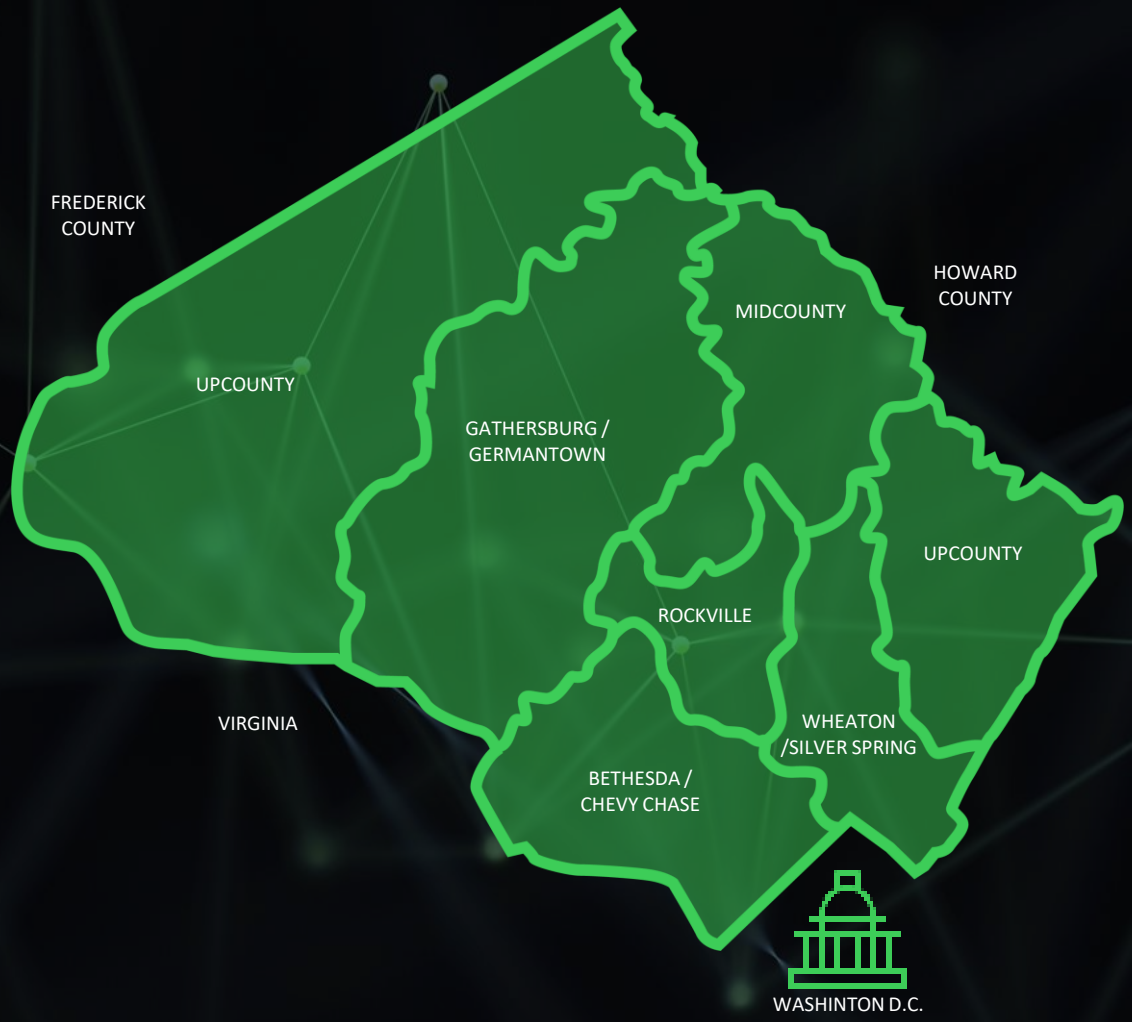
AlphaStruxure

About Montgomery County, Maryland

Approximately
1M people

High-tech,
knowledge-based
economy

400+ facilities
9M sq ft of real estate
3k vehicles
9k employees



Leader in advanced energy

- 11 megawatts of solar across 18 sites
- More than 430,000,000 kWh of clean energy annually
- Procure 100% clean energy for County facilities
- U.S. DOE's Combined Heat and Power for Resiliency Accelerator


Schneider
ELECTRIC

Challenges

- Capital procurement not an option
- Some aspects of the solution can be tied to volumetric commodities (e.g., electricity) others cannot
- Technology risk

- Rebate, tax credit, and incentive uncertainty
- Approach new to utilities and permitting officials
- Ensuring competition and best value

- Packaging to multiple sites
- Difficulty in constructing “in situ”

Key technology considerations for microgrids

Integration

Architectures and systems that ease integration of energy assets

Energy Control Center

Resilience

Edge automation that makes microgrids more resilient than the grid

EcoStruxure Microgrid Operation

Orchestration / Analytics

Best-in-class algorithms that make the most of local energy assets

EcoStruxure Microgrid Advisor

AlphaStruxure

A Carlyle and Schneider Electric Company

Trish.Starkey@se.com
615-720-7637

- ✓ Leading Business Model – P3
- ✓ Strategic Capital & Best in Class Technology

The Metropolitan Resilience Network

A Prototype for Collaborating on Shared Risks & Resilience

Key Lessons Learned

- **Disruption** will be the norm not the exception
- **Dependencies and interdependencies** on critical infrastructure (power, telecom, transportation)
- **Collaboration** on common risks will be vital.
- **Crisis can be a catalyst**. Optimal resilience is bouncing forward not back!

Mission:

To enable public and private stakeholders to collaborate on shared risks & challenges to their operations.

Metropolitan Resilience Network

Metro-NY/NJ/CT- Funded by Port Authority

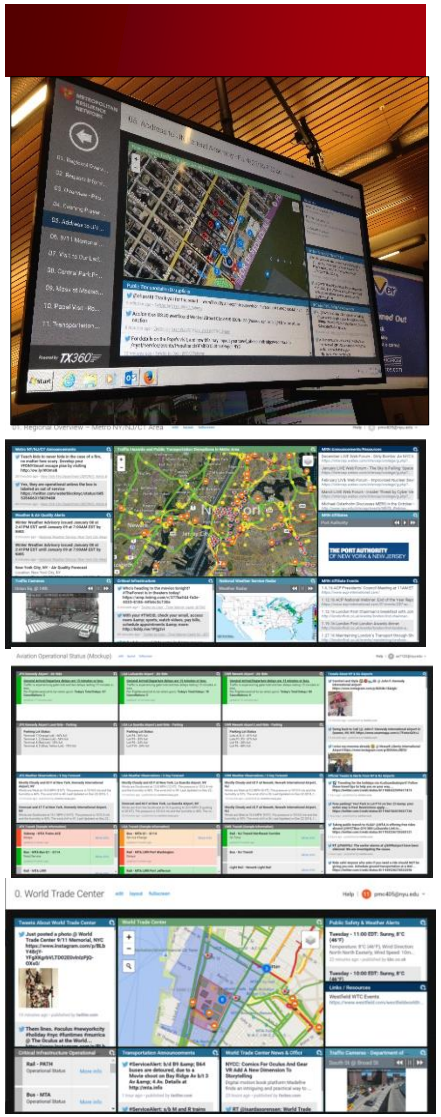
Global Resilience Network

Building a Community of Networks

GLOBAL RESILIENCE NETWORK

Who We Connect

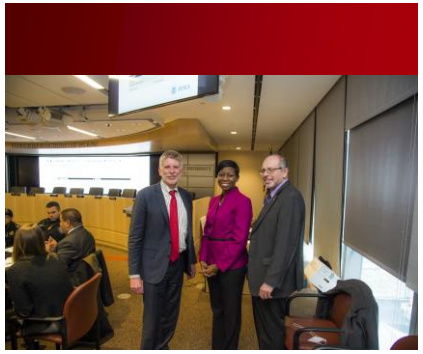
GLOBAL RESILIENCE NETWORK

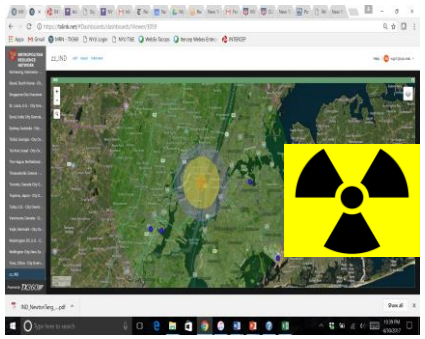


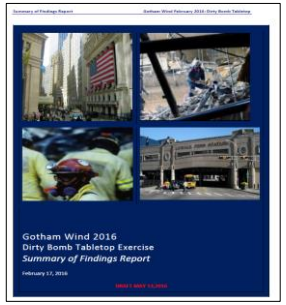
24/7 Situational Awareness Platform

Situational Awareness Monitoring of the Operational Environment

- –Public Safety Alerts
- –Critical Infrastructure Status
- –Weather
- –Transportation: Mass Transit, Traffic
- –Ongoing Threats: Infectious Disease, Natural Disasters, Cyber
- –Targeted News & Social Media







Joint Exercises with other Public & Private Sector Organizations

Joint Exercises with Government, other Corporations and NGOs forwarding relationships and insights.

- RAD - Dirty Bomb Tabletops
- IND - U.S. National Exercise
- Future Pandemic Exercise?

After Action Reports capture Lessons Learned for your future planning.

Scenarios and Exercise Documents may be available for your organization to apply for internal training / exercises.

Where We are Goging

- **New Functionalities** (Improved Communications & Collaboration, Resource Request / Management Capacity, Dedicated Industry / Association Focus)
- **Insurance Acknowledgement**
- **Linking Corporate Security Operations Centers**
- Working with other Communities to **Build a National / International Network**

Thank You.

Bill Raisch

Director

International Center for Enterprise Preparedness, New York University

Web: **www.intercep.nyu.edu**

Call **+1-646-997-4020**

Email **intercep@nyu.edu**.

Texas Community Showcase

Pete O’Dell, Chief Executive Officer/Founder, Swan Island Networks, Inc.

Jeffrey Pollack, AICP, Director of Planning, Port Corpus Christi

Paul Stevenson, Business Development Manager, OptaSense

Brett Beringer, Chief Engineering Office, Fyber

Marcus Perdue, Senior Vice President, Special Operations, Allied International

Moderator: Steve Crout, Smart Cities Council

READINESS FOR RESILIENCE

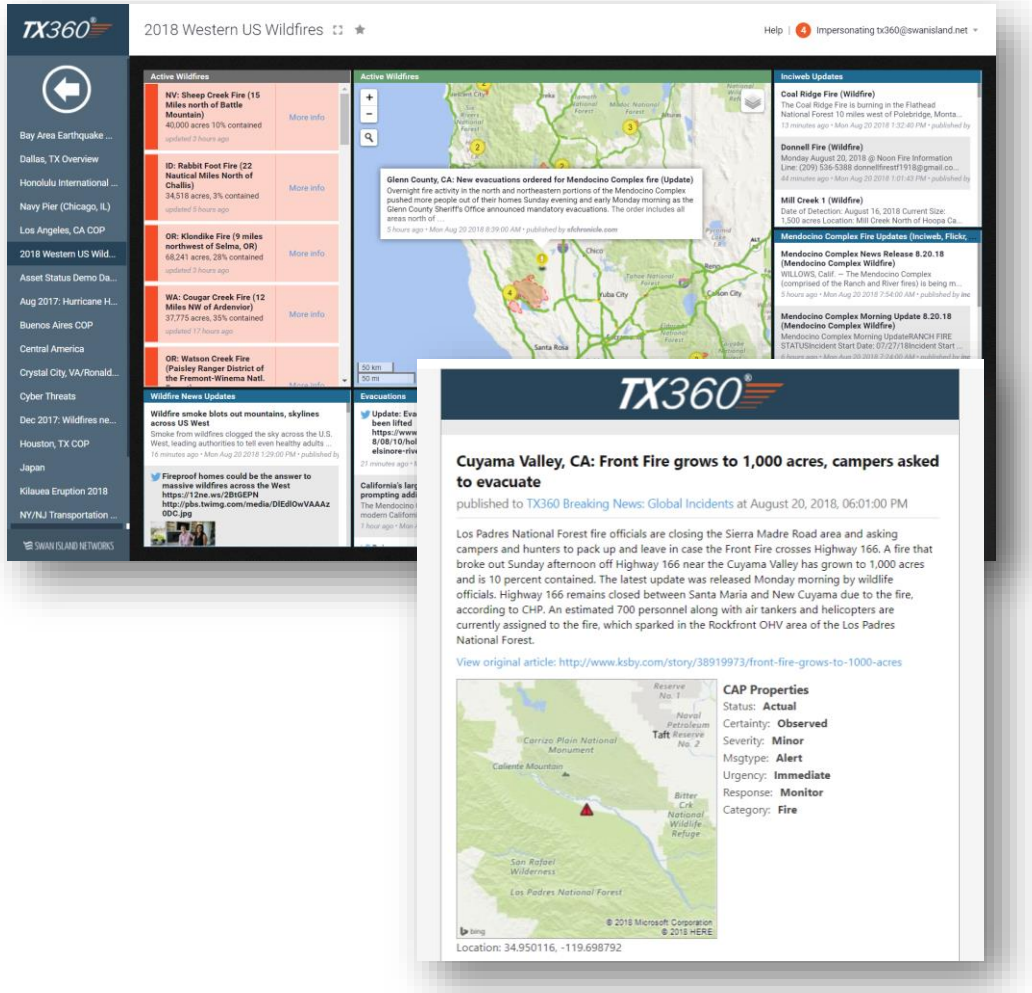
Pete O'Dell
CEO/Founder
Swan Island Networks, Inc.

READINESS FOR RESILIENCE

TX360

SITUATIONAL AWARENESS PLATFORM

- 24/7 proactive, all-hazards threat monitoring – 2000 global info channels
- Common Operating Picture dashboards for everyday ops
- Crisis and events dashboards
- Automated Smart Alerts providing real-time notifications
- Microsoft Azure cloud: security, scale, distributed access
- Easy to deploy, use, customize, integrate, afford
- Partner provided GSOCaaS



SWAN ISLAND NETWORKS

EVERY ORGANIZATION FACES MORE THREATS

THAN EVER BEFORE

TX360®

Situational Awareness is critical in all phases of the threat cycle:

Blue Sky:
- Situational awareness - 360°, 24/7
- Plan, Prepare, Anticipate
- Monitor
- Enable info sharing
- Partner
- Exercise

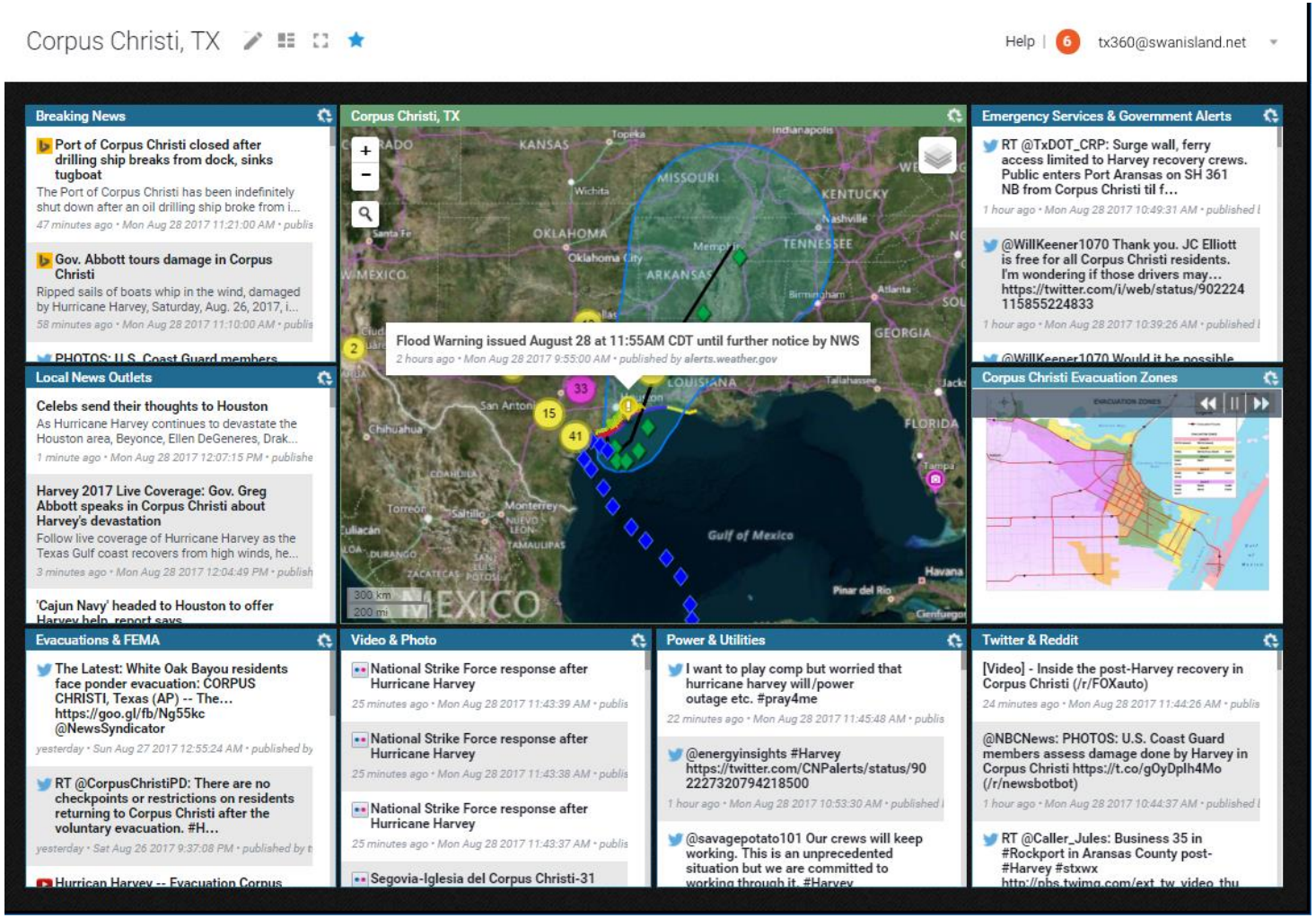
Gray sky! – identified threat
- Enhanced monitoring
- Alternatives development
- Enhanced situational awareness
- Partner sharing/planning
- Contingencies

Emergency/disaster (Black Sky):
- Real time Situational Awareness
- Work your plan
- Adjust and reconfigure
- React to unanticipated elements
- Monitor cascading failures
- Work partner synergies
- Mobilize surge resources

We're going to recover:
- Prioritize
- Communicate
- Lessons learned acted upon
- Partner debriefs

HARVEY, CORPUS CHRISTI

NHC, NWS data with open source feeds, alerts and images



TX360®

Fiber Optic Sensing Association
Connect and Protect

Fiber optic sensing technology to make communities safer and more efficient

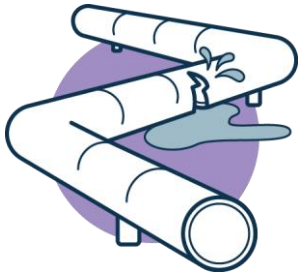
Paul Stevenson, Infrastructure monitoring, OptaSense Inc

FOSA member

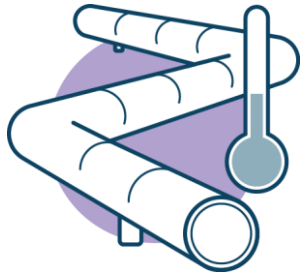
What is FOSA?

- The Fiber Optic Sensing Association (“FOSA”) is a non-profit industry association formed in 2017 in Washington D.C.
- Provides education on the benefits of distributed fiber optic sensing technology, including through:
  - Webinars
  - Videos
  - White papers
  - Developing industry best practices
  - Public policy advocacy
- Membership is open to organizations globally who make, install, test, support and use distributed/quasi-distributed fiber optic sensors.
- Currently at around 25 organizations with 40,000 miles of Fiber Optic Sensing installations.

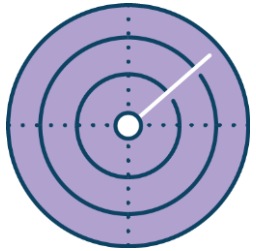
FOSA Supported Markets



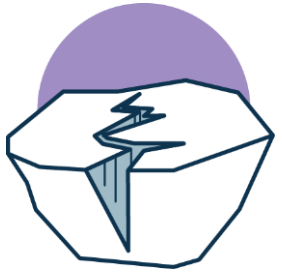
Pipeline Condition Monitoring



Pipeline Heat Trace Monitoring

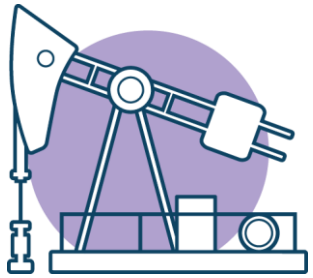


Third Party Intrusion/Security



Geo-Technics

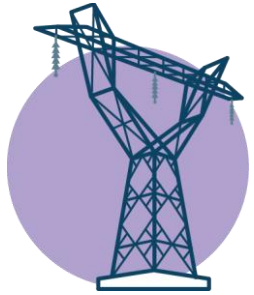
Transport Monitoring



Oil & Gas In-Well Monitoring

Industrial Process Monitoring

Structural Health Monitoring



Power Cable Monitoring

Principals of DAS

The fiber is the sensor

- OptaSense® employs a Coherent reflection technique which uses the Rayleigh backscatter phenomenon of telecoms cable to convert the fiber into a highly sensitive acoustic sensor.

Standard Single Mode optical fiber

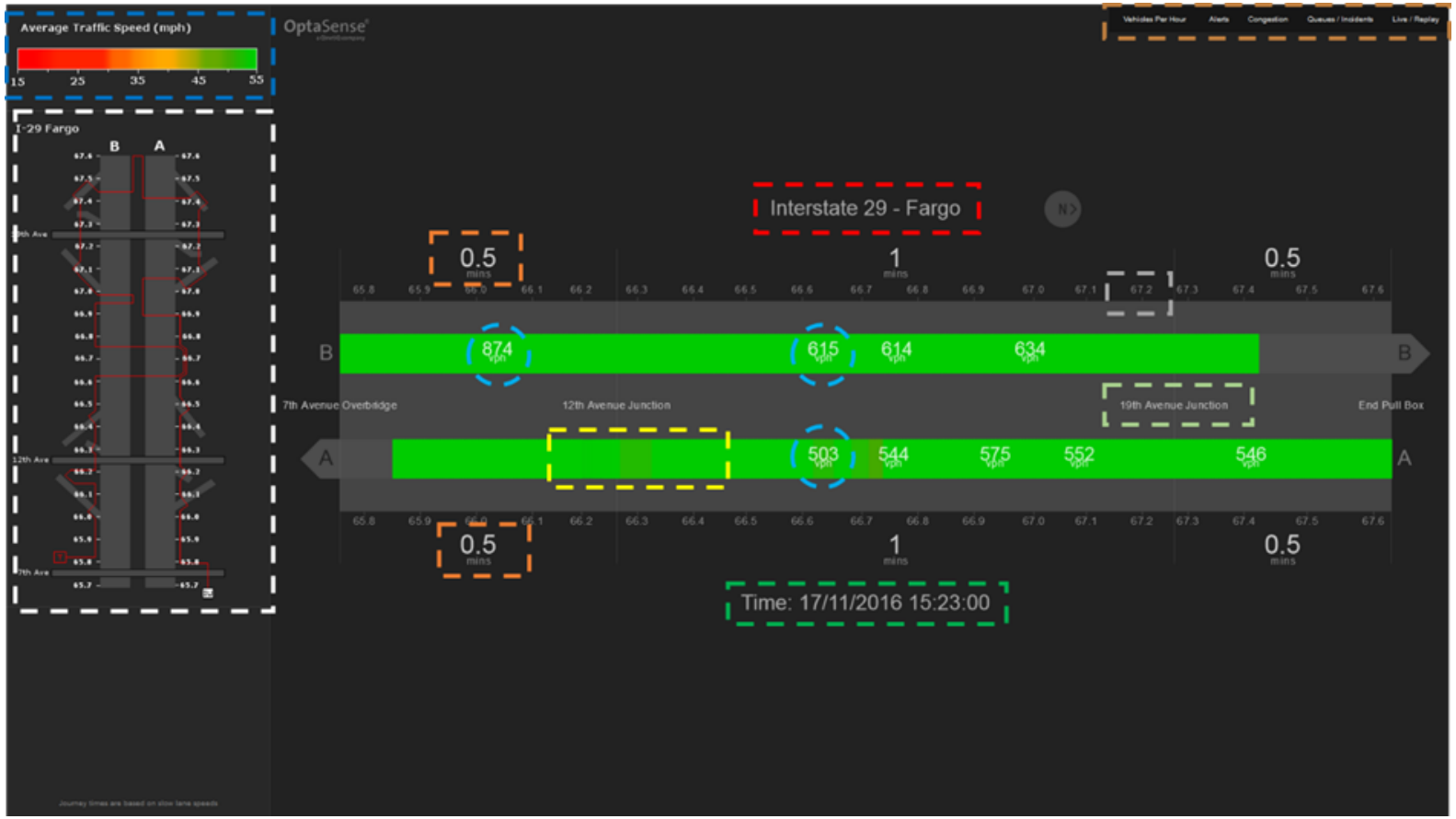
A_1 A_2 A_3 A_4 .....

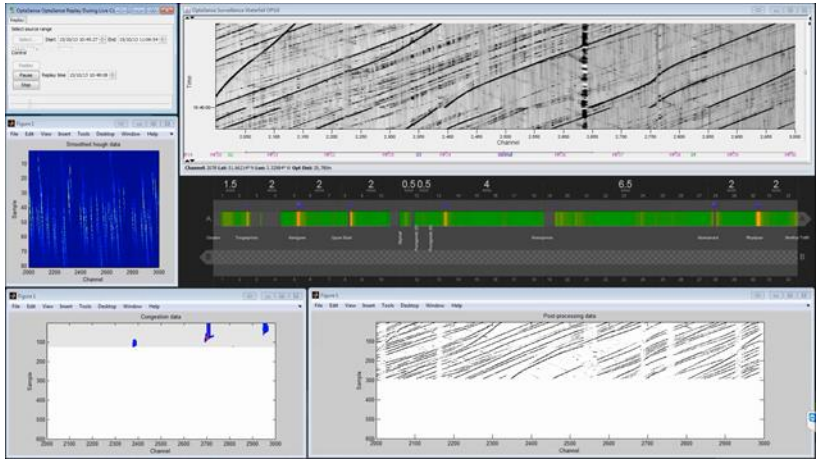
- Changes in the reflected light are reactions to the acoustic activities present at each ~30ft increment along the pipeline, railway, border etc…

Pulse of light

$A_{4,995}$ $A_{4,996}$ $A_{4,997}$ $A_{4,998}$ $A_{4,999}$

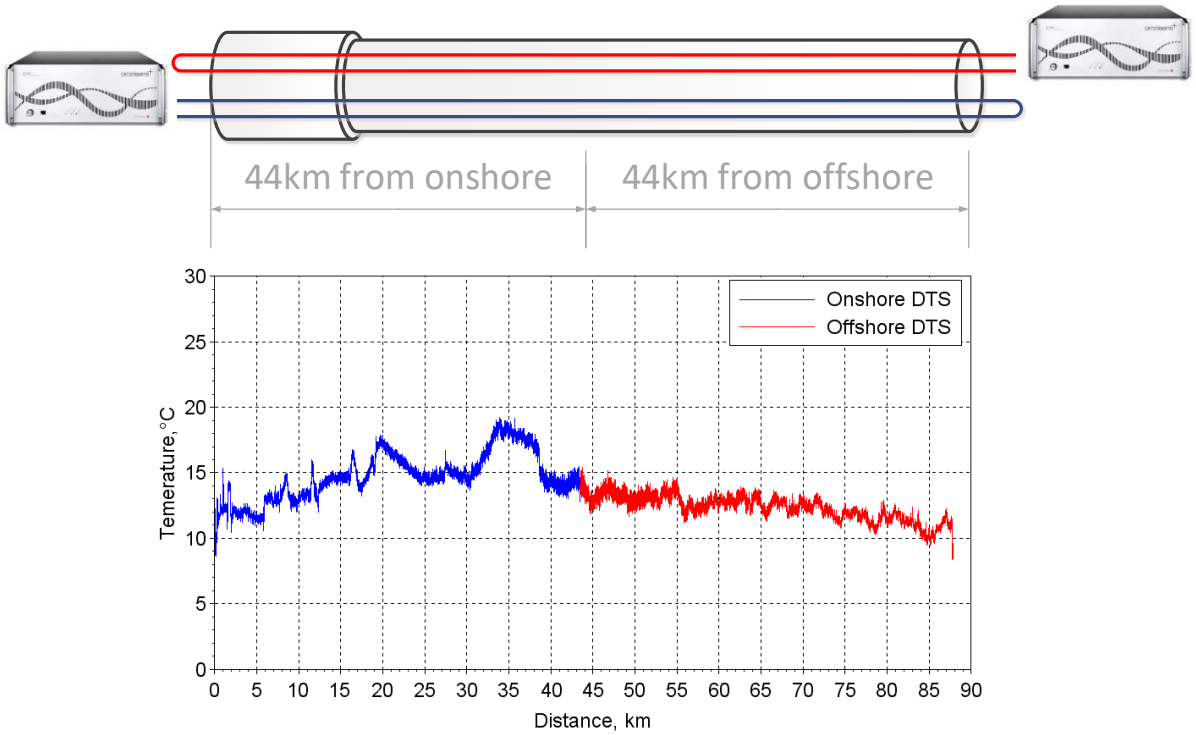
Freeway Traffic Monitoring





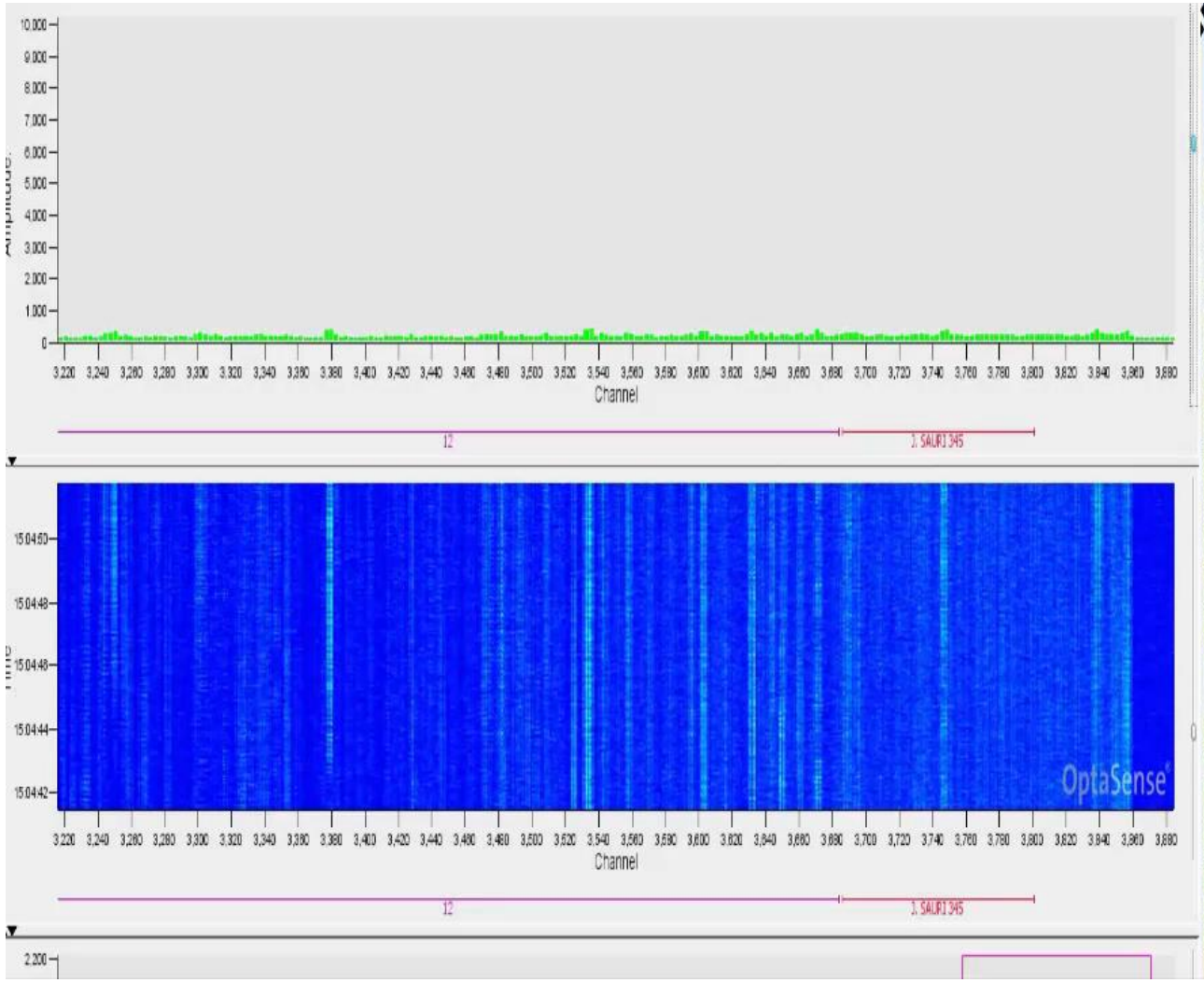
Power cable load & integrity monitoring

- Temperature measurement of power cable allows
  - Hot spot and thermal bottleneck detection
  - Dynamic load management
  - Burial depth estimation
  - Fault finding
- Deployed within offshore wind industry
  - Long distance reach (>100km)
  - AC and DC



Example: temperature profile of unloaded subsea power cable

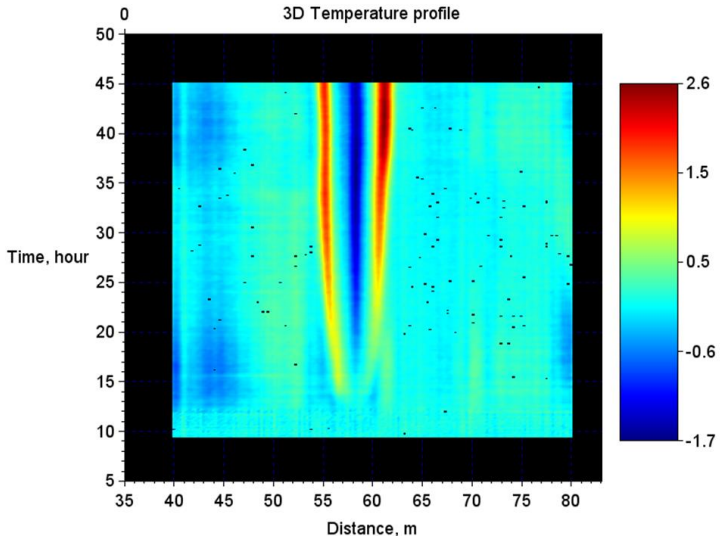
Pylon Intrusion/Vandalism detection using Optical Ground Wire (OPGW)



Enhancing Leak Detection with DFOS

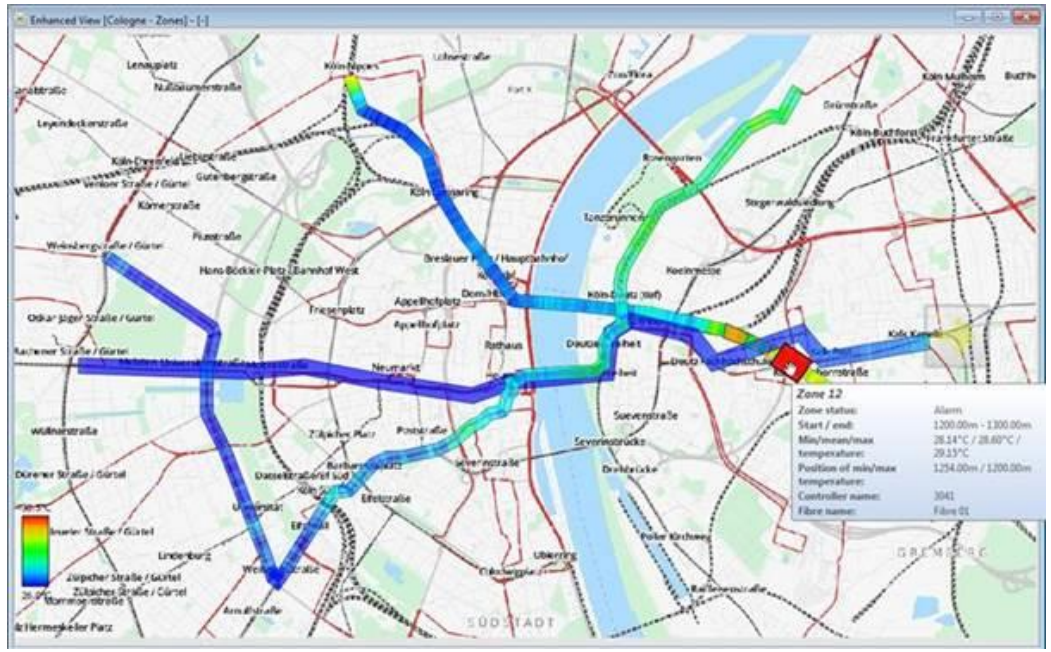
- Some/insipient leaks are associated with abnormal local temperature changes
  - Detection limit < 0.1% of flow – order of magnitude better than conventional CPM or Mass/Volume balance systems)
  - Thermal leak shows “signature pattern” that can be distinguished from surrounding conditions
  - Independent from leak size
- Dedicated alarming algorithm provides efficient leak detection

- Example: Controlled Methane leak
  - 800 µm pinhole size
  - 2.5bar gas pressure
- Alarming
  - ~15h after leak
  - <1.7°C measured DT



Fire Detection in Tunnels / Stations

- Assets up to 12 miles can be monitored by a single interrogator
- Fire localized with 10 ft accuracy
- Fast alarming (< 1 min) by using time differentials and not just static limits
- Cost efficient, reliable. Approved in multiple countries
- Thousands of installations , mostly in Europe and Asia

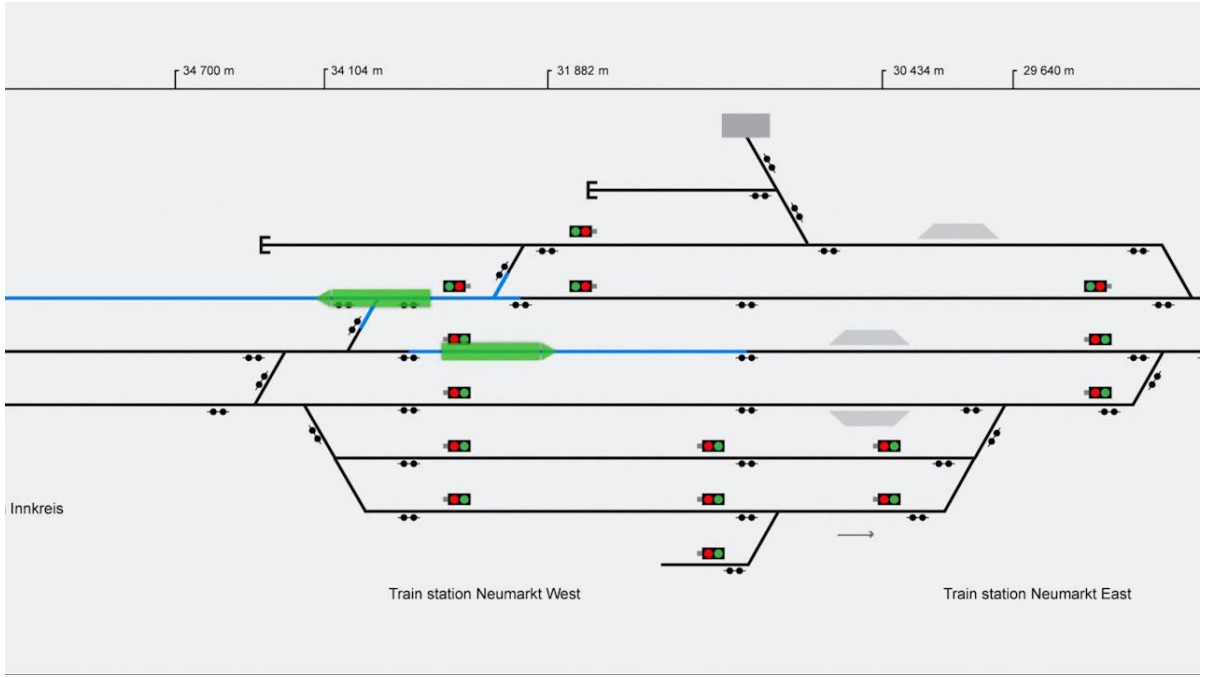


Example: Alarming within a zone

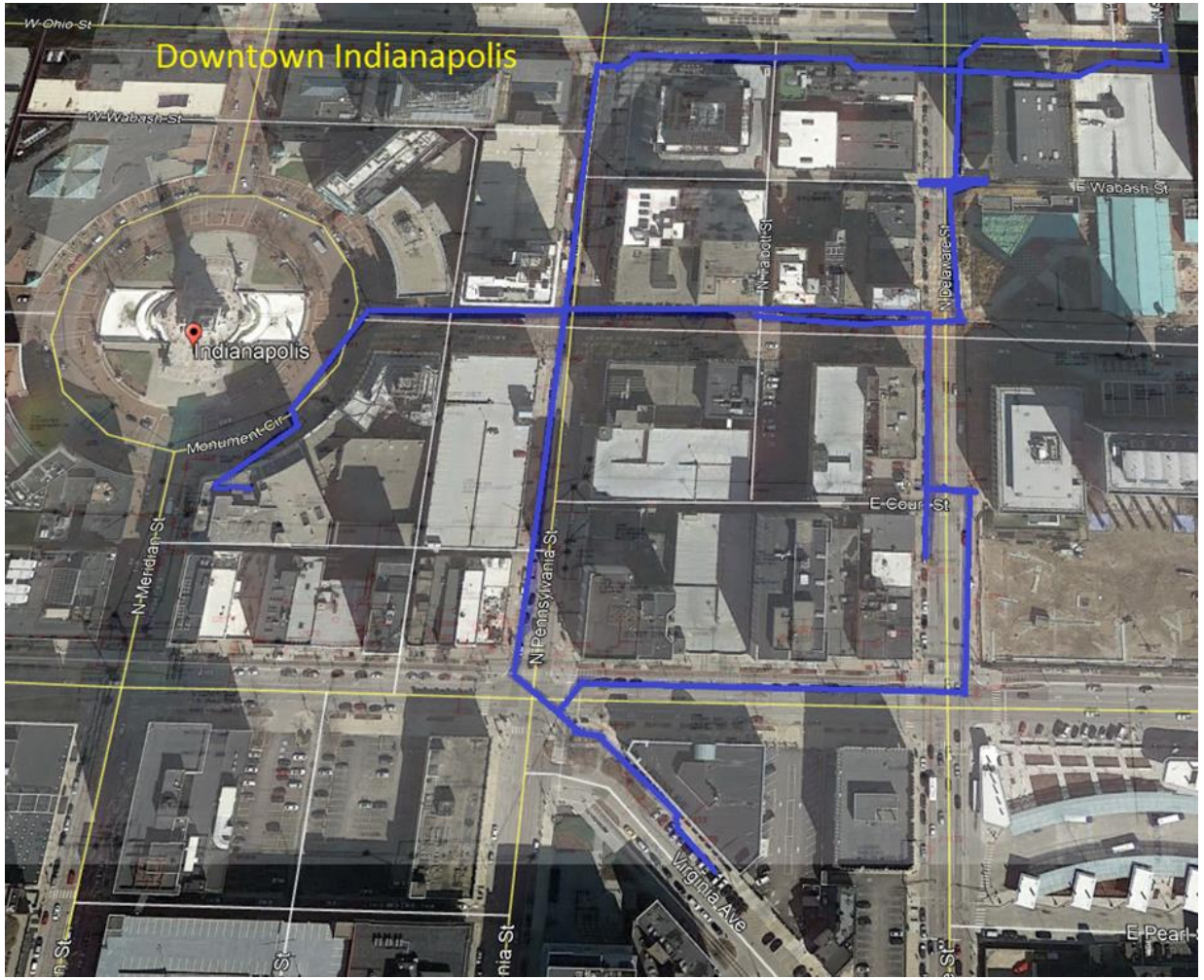
Picture: Beijing Metro Line 5 is protected with fiber-optic fire detection across 17 miles track encompassing 22 stations

Train Tracking

- Non-vital applications with current technology
  - Positional accuracy up to 10m, subject to fiber position relative to track
  - Hard to determine track ID without additional inputs.
  - Tracking through complex junctions can be difficult.
- Information for Traffic Management
- Time of arrival e.g.
  - Platform announcements
  - To an incident
- An enabler for other Railroad DAS applications.

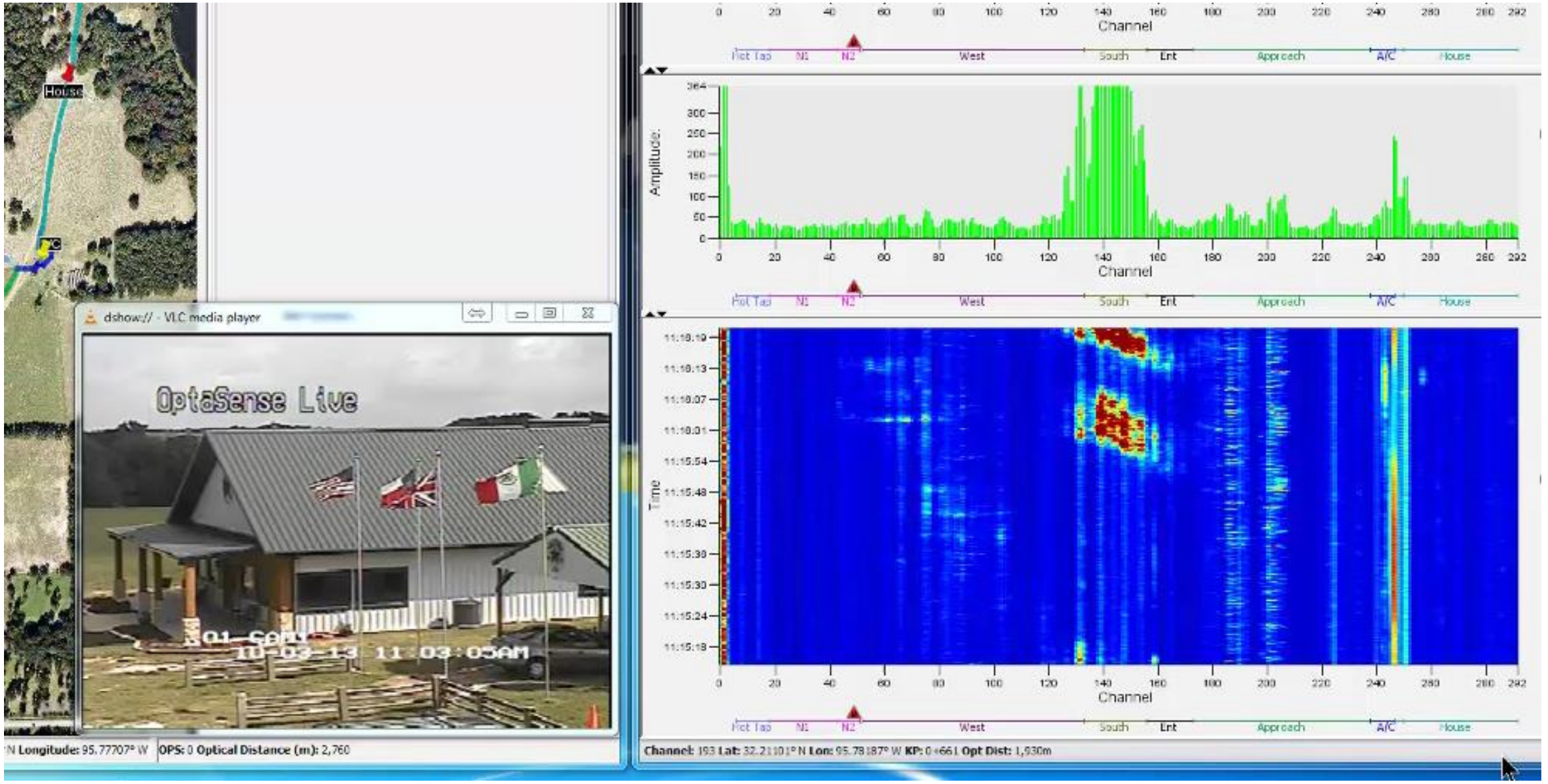


Subterraneous Utilities Protection – Pilot project

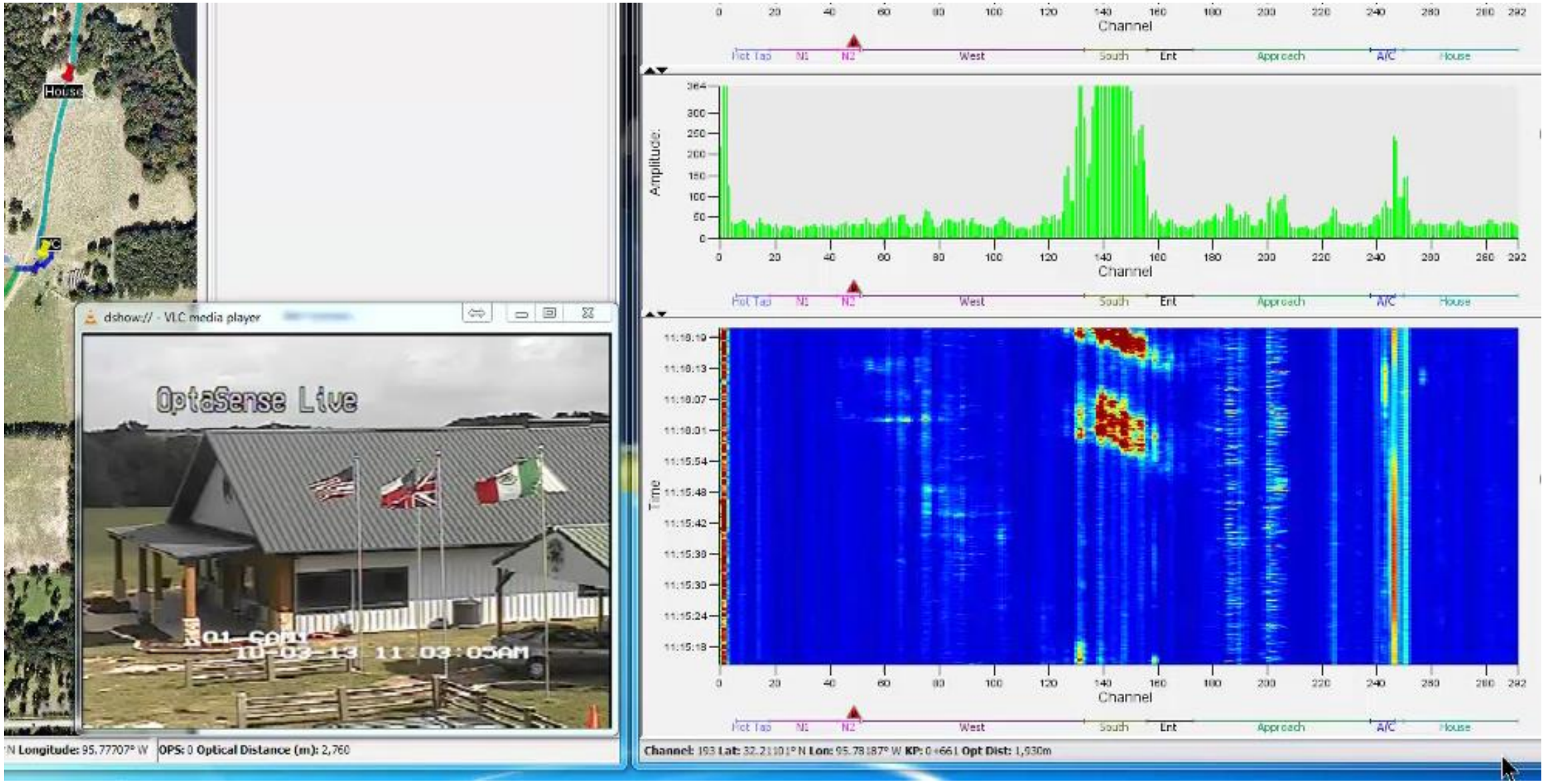


- Advanced warning of digging activity.
- Detection of entry to vaults (manhole cover removal).
- SCADA networking.
- Primary circuits fault detection after tripping.
- Secondary circuits fault detection as they happen.
- Email notification with Google Maps™ location of an event or incident.
- Improved overall public safety.

Quick Demo (Athens, Tx)

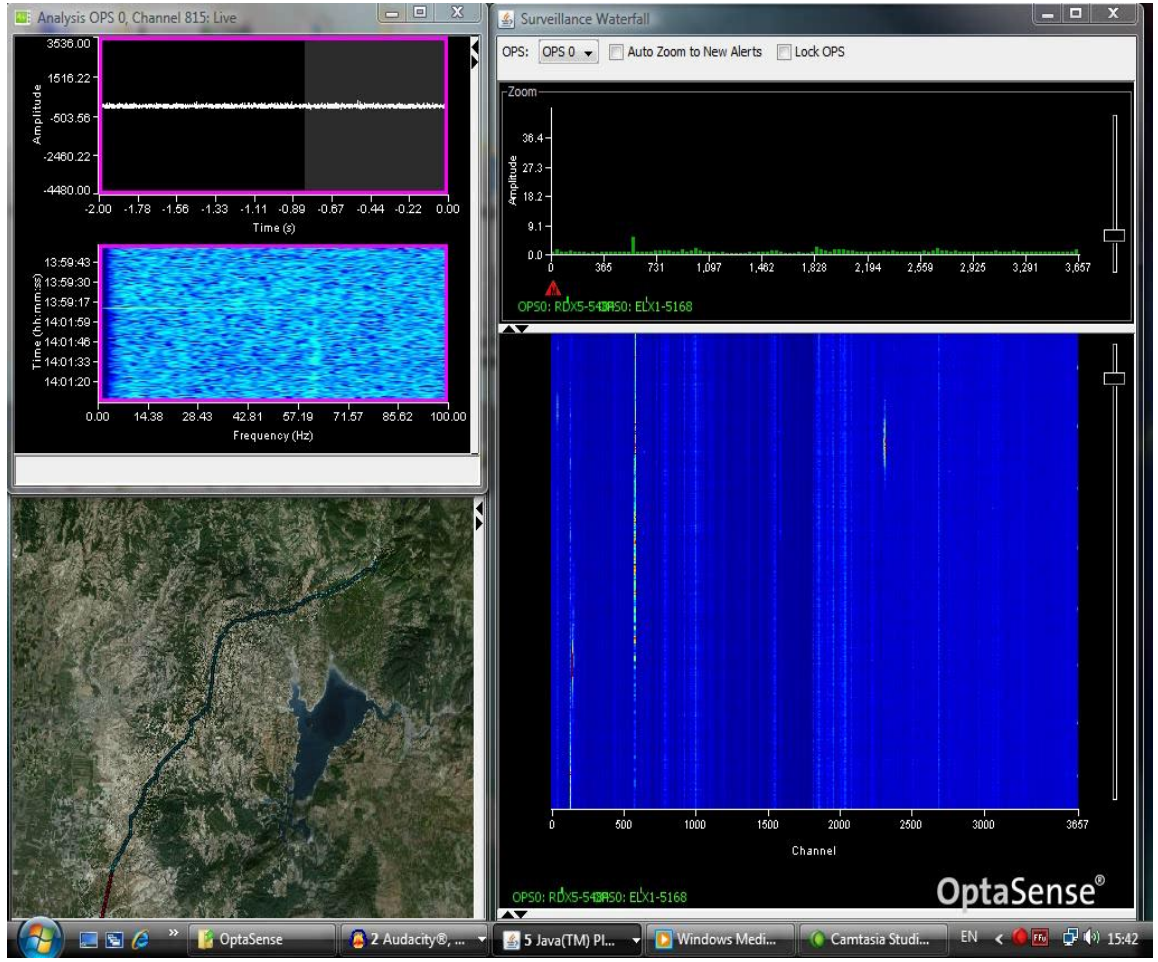


Quick Demo (Athens, Tx)



Earthquake Monitoring

Magnitude 3.8 earthquake in Turkey

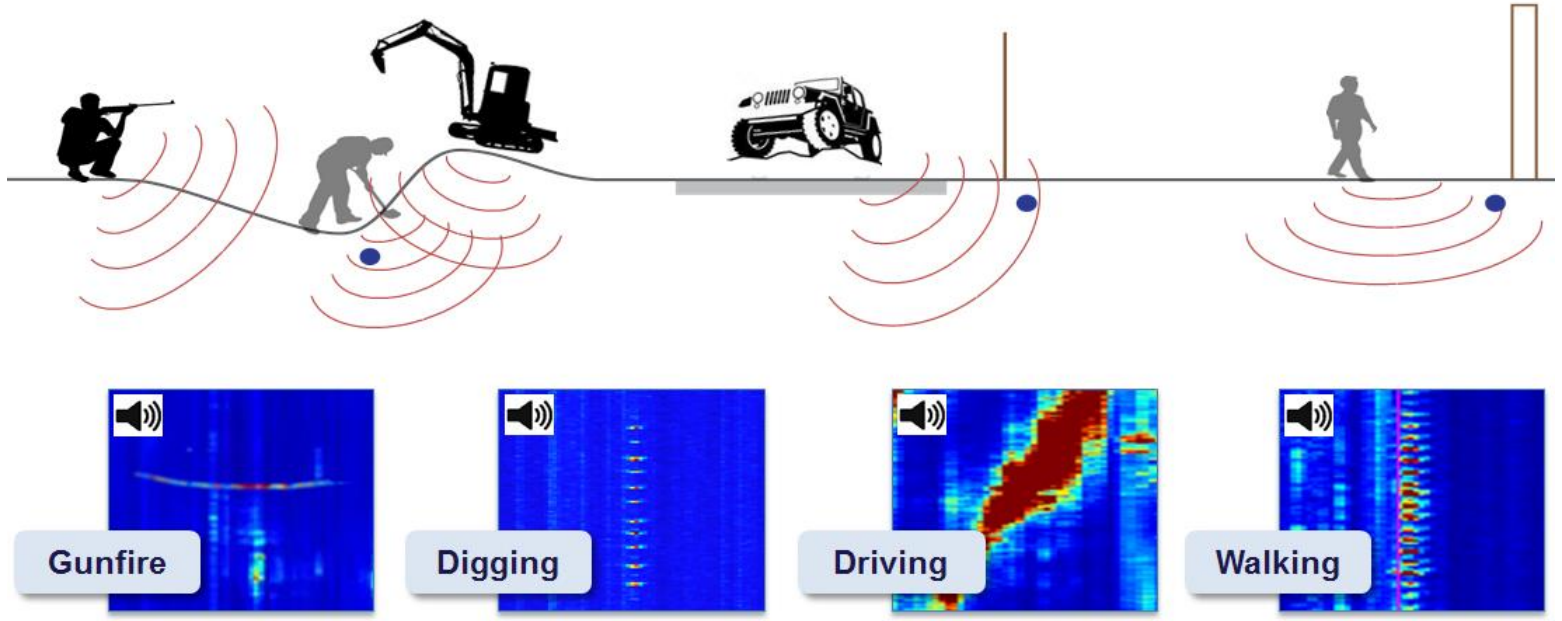


35 km

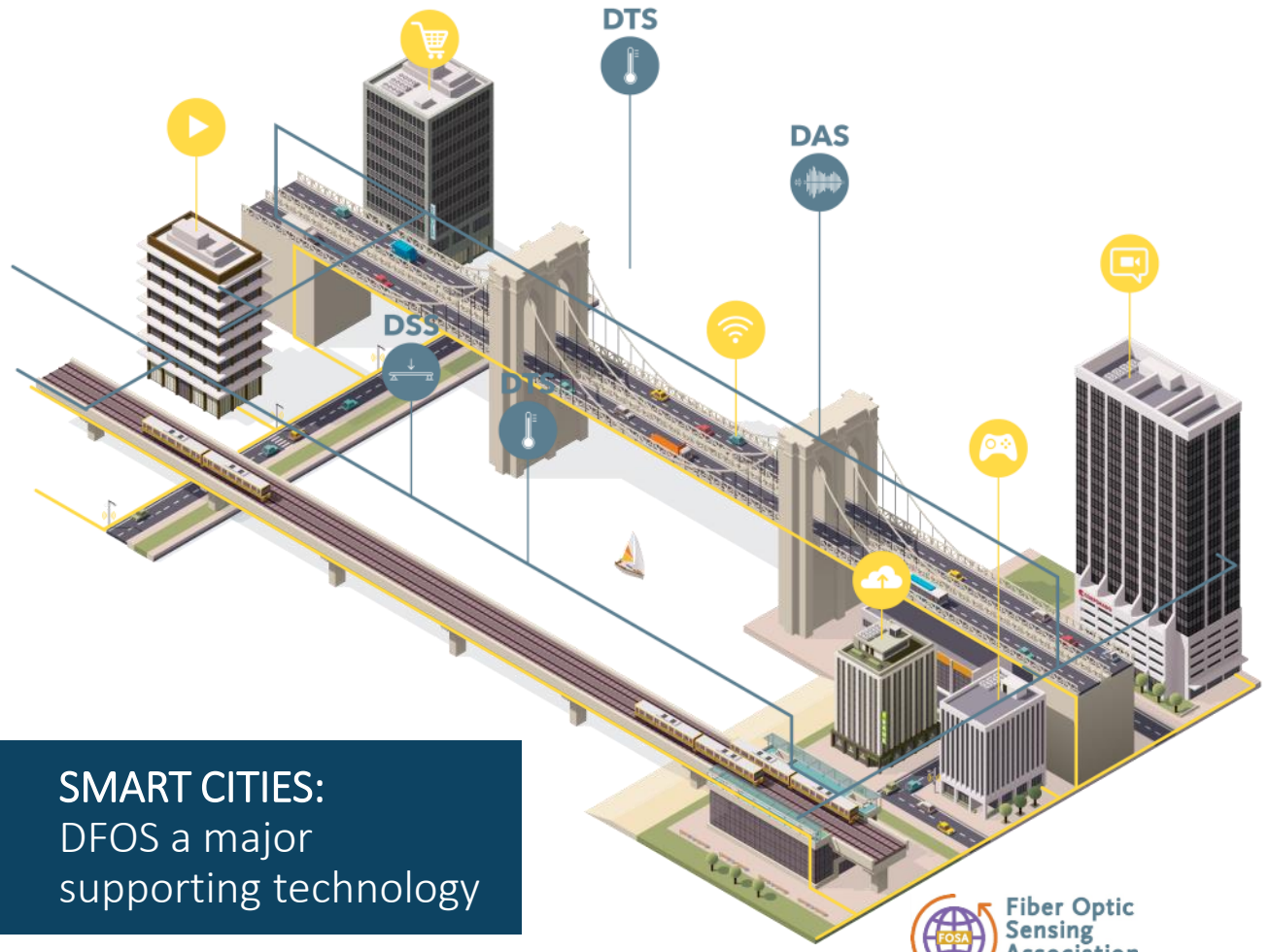
- During a routine deployment at a customer pipeline a magnitude 3.8 earthquake was observed and recorded
- OptaSense provided early warning of potential pipeline damage in a seismically sensitive location
- Before and after analysis was preformed in order to focus on inspections

Unique features – Classify activity

- Classify different threats automatically
- Reject ambient signals like animals or weather
- Classification reduces False Alarm Rate



Smart Cities



SMART CITIES:
DFOS a major supporting technology

Many beneficial applications to support smart cities:

- Structural integrity – buildings, bridges, tunnels
- Fire detection – tunnels
- Intelligent traffic monitoring, speed detection, traffic counting
- Sewer integrity and management
- Smart power grid – smart man-holes
- Light rail security and monitoring

Fiber Optic Sensing Association
Connect and Protect

Introducing the Smart Cities **Activator**

Readiness for Resiliency Workshop – Houston
July 9, 2019

Philip Bane, CEO
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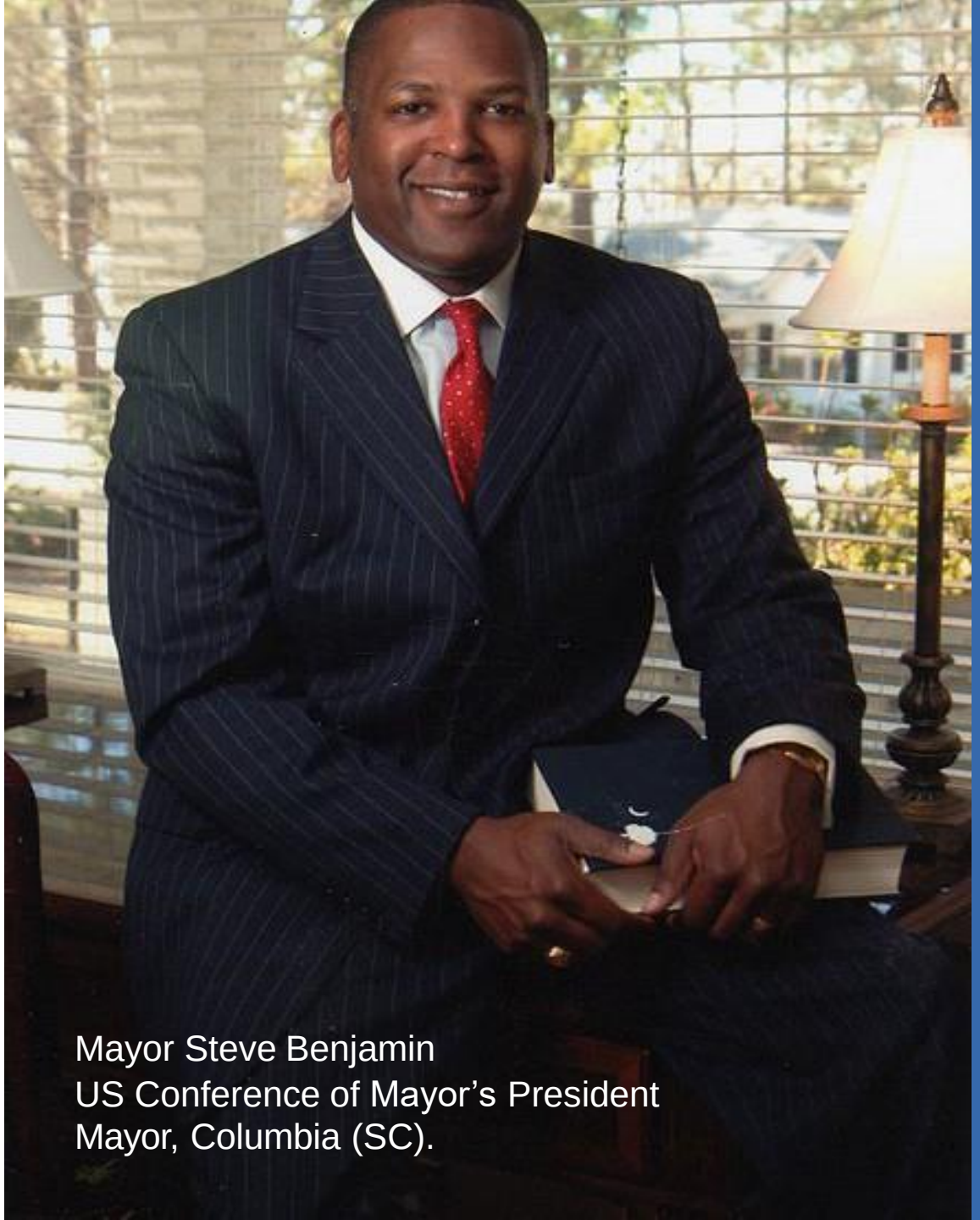
SmartCitiesCouncil
LIVABILITY | WORKABILITY | SUSTAINABILITY

Agenda

- The need for Smart Cities Activator
- How Activator helps government
- How to get involved


Our cities face massive challenges…
Congestion
Crime
Equity
Food
Pollution
Poverty
Energy
Water
… including paying for it all



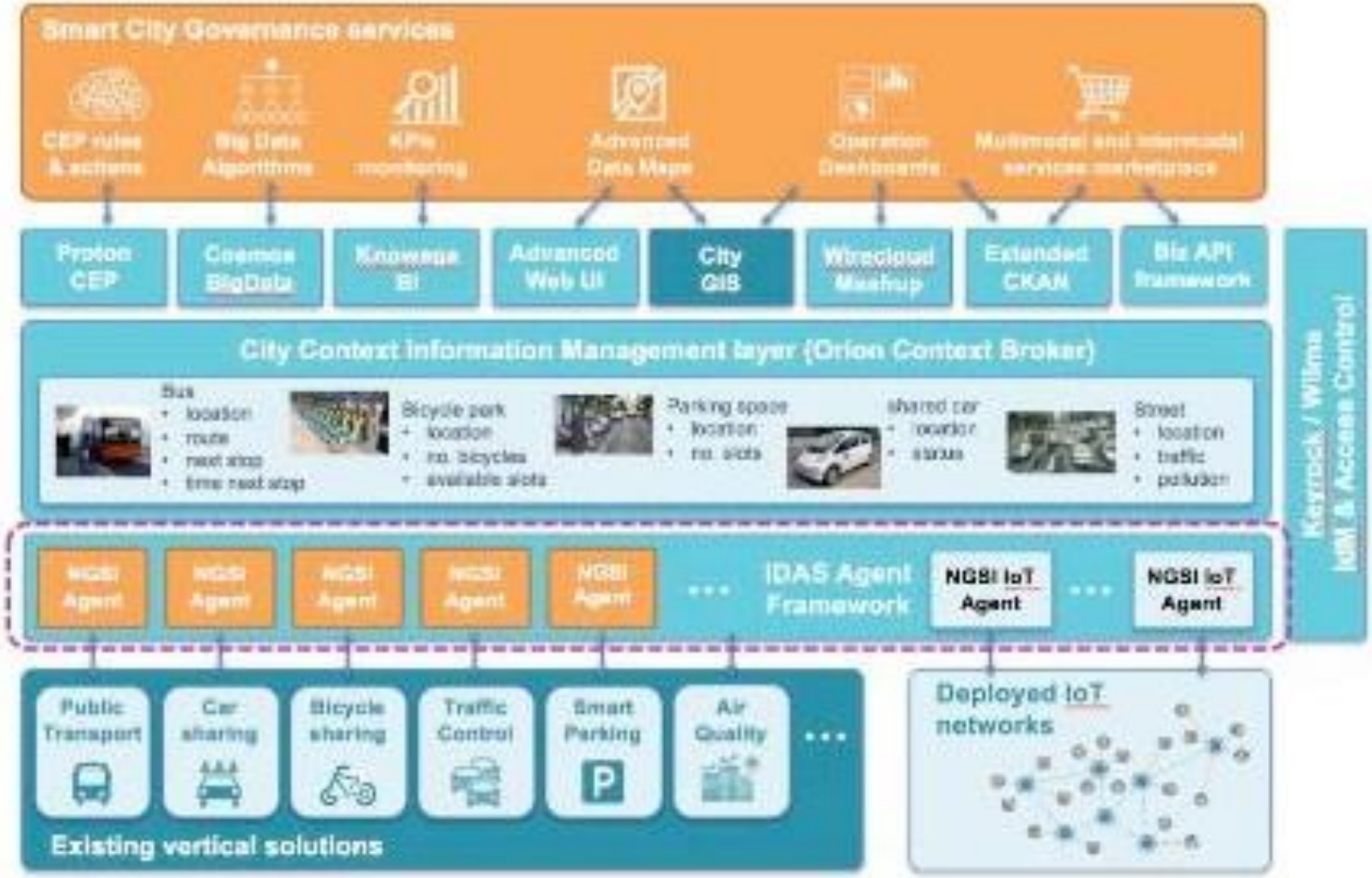
Mayor Steve Benjamin
US Conference of Mayor's President
Mayor, Columbia (SC).

"No fully developed smart city exists anywhere in the country and there are no clear standards or financing strategies for their formation."

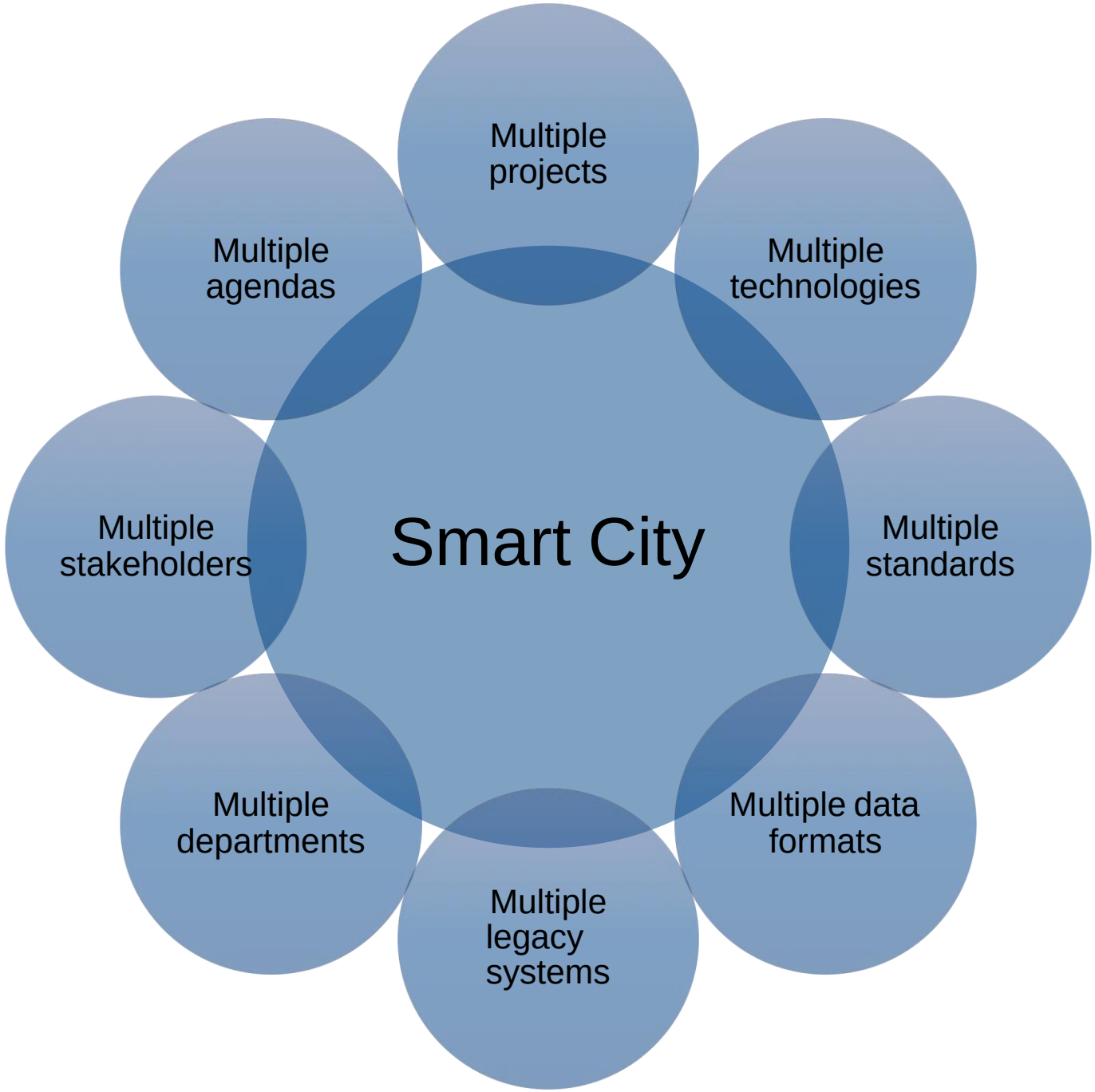
US Conference of Mayor's Institute on Smart Cities

But smart city projects are enormously complex

FIWARE Reference Architecture



Technically complex
Legally complex
Socially complex



Where does government find…

The skills…

- …to scope massive technology projects?

The access…

- …to best practices and best standards?

The advice…

- …from cities that have gone before?

The tools…

- …to plan collaboratively with stakeholders?

The money…

- …to pay for the upfront costs?

Agenda

The need for Smart Cities Activator

How Activator helps government

How to get involved

Activator addresses government needs

Activator Discover

- Powerful input tools to capture the needed data
- Instant access to best practices

Activator Plan

- Collaborative tools for multi-stakeholder planning
- Templates from leading experts

Activator Exchange

- Trade lessons learned with peer cities

Activator Finance (coming soon)

- Rocket Mortgage for cities – fill in one form, get introductions to multiple lenders

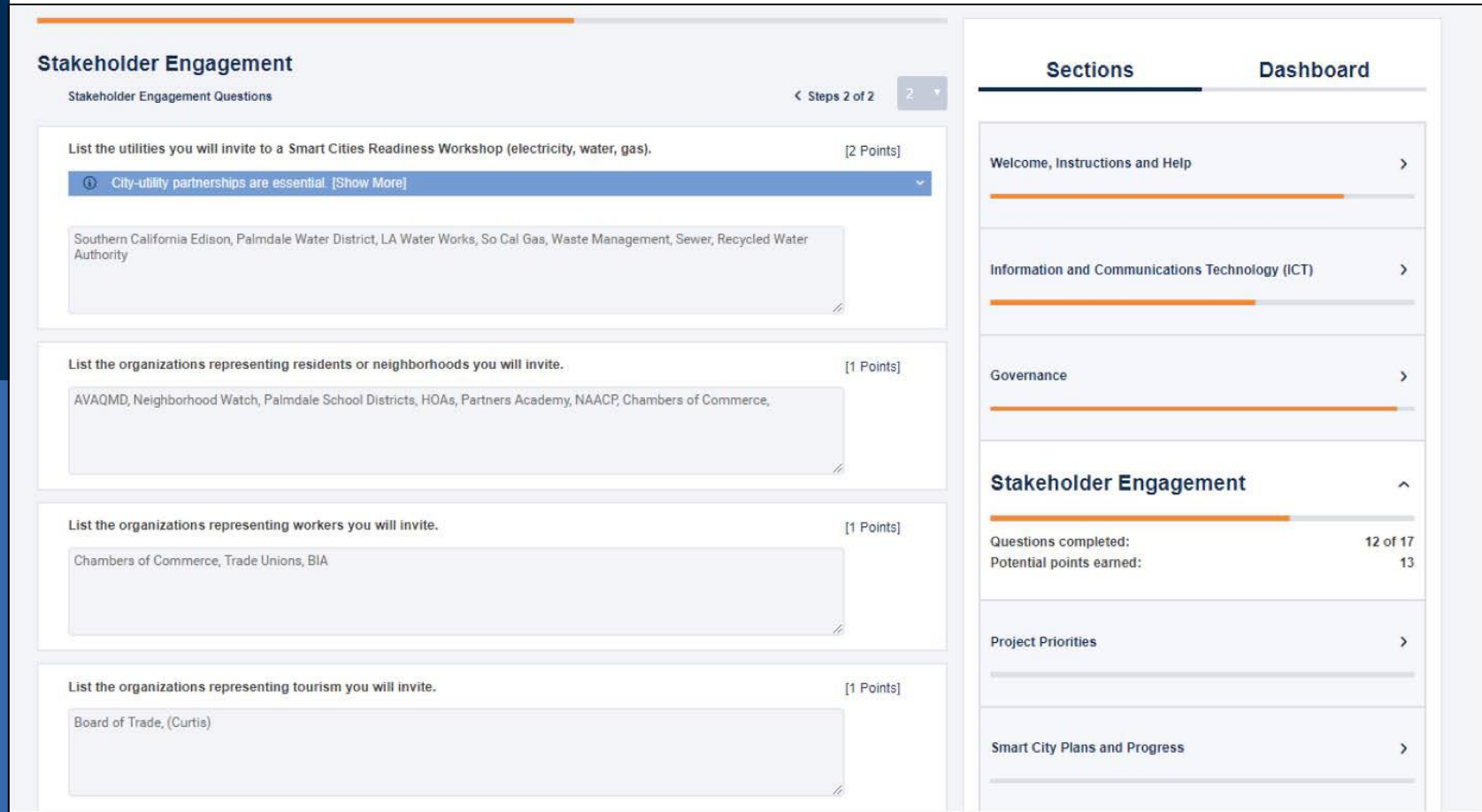
Activator

Discover

Build your own forms or use those from experts

Gather data

- From departments, contractors, stakeholders
- Input forms can use structured data to allow powerful analytics and dashboards

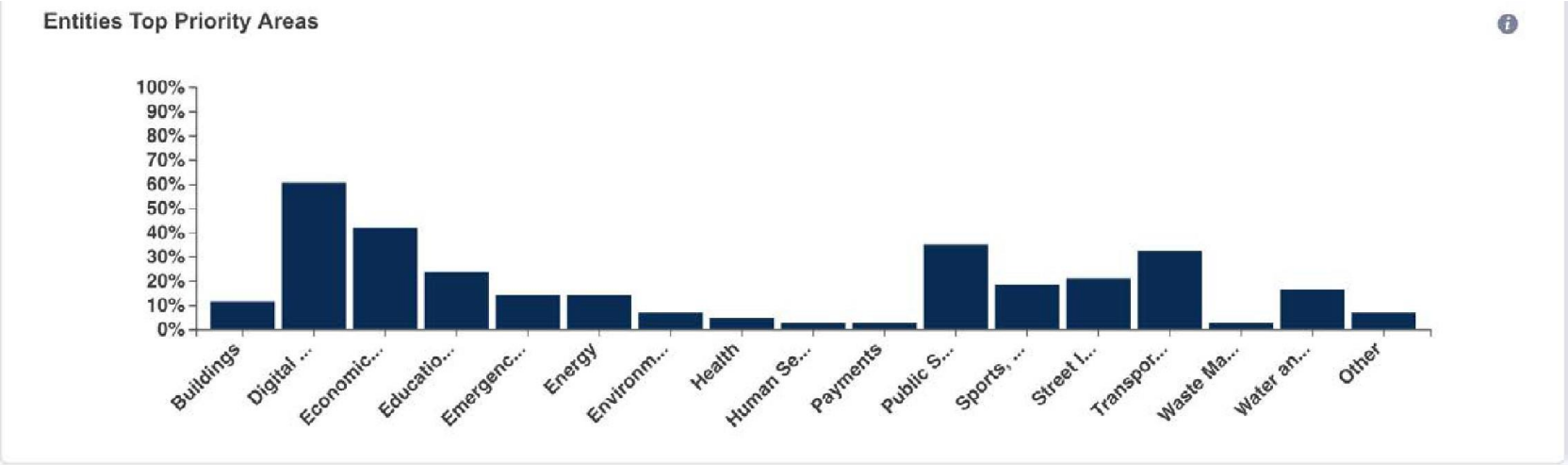


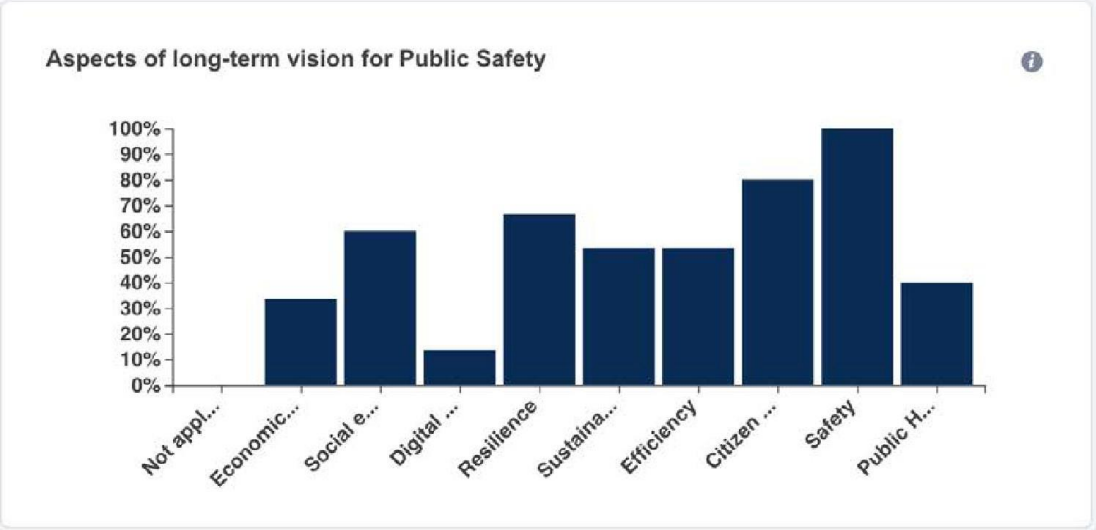
Activator
Discover

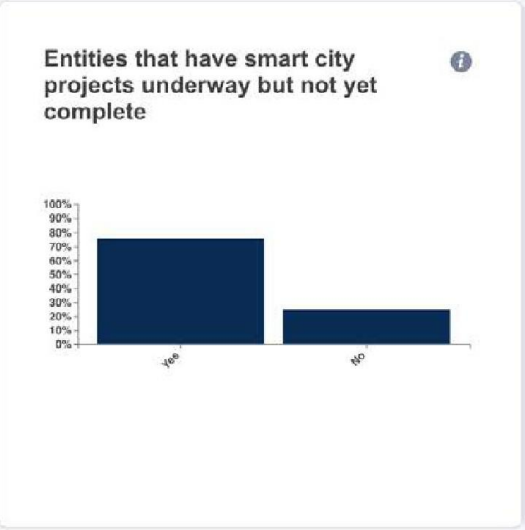
Build your own dashboards or use those from experts

Dashboards monitor progress

- Track progress, spot trends, uncover issues across one or many projects





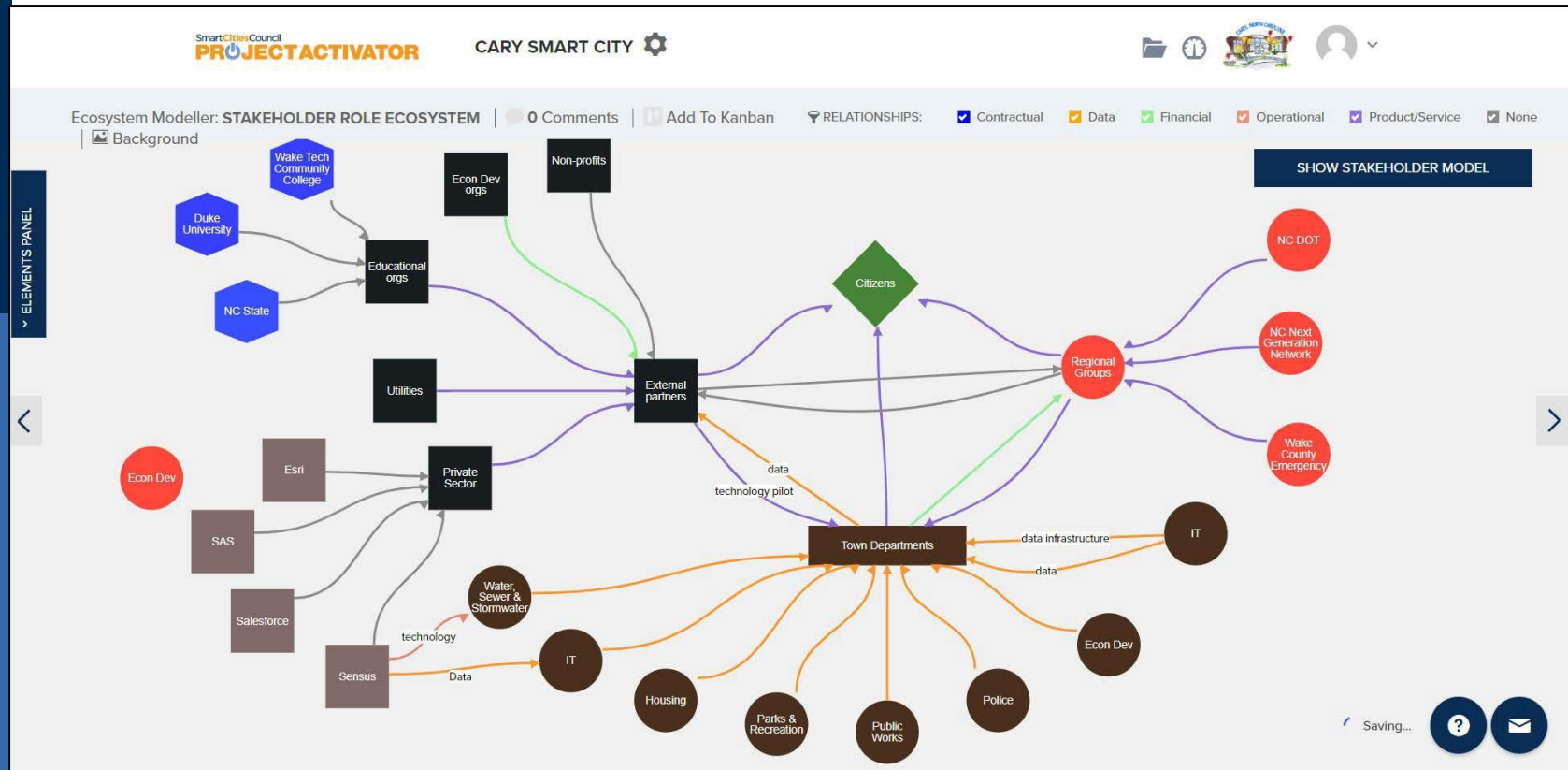


Activator

Discover

Map your ecosystem

- Projects involve multiple stakeholders: city departments, business, utilities, universities, contractors, lenders, neighborhoods, etc.
- Activator maps this ecosystem and its inter-relationships



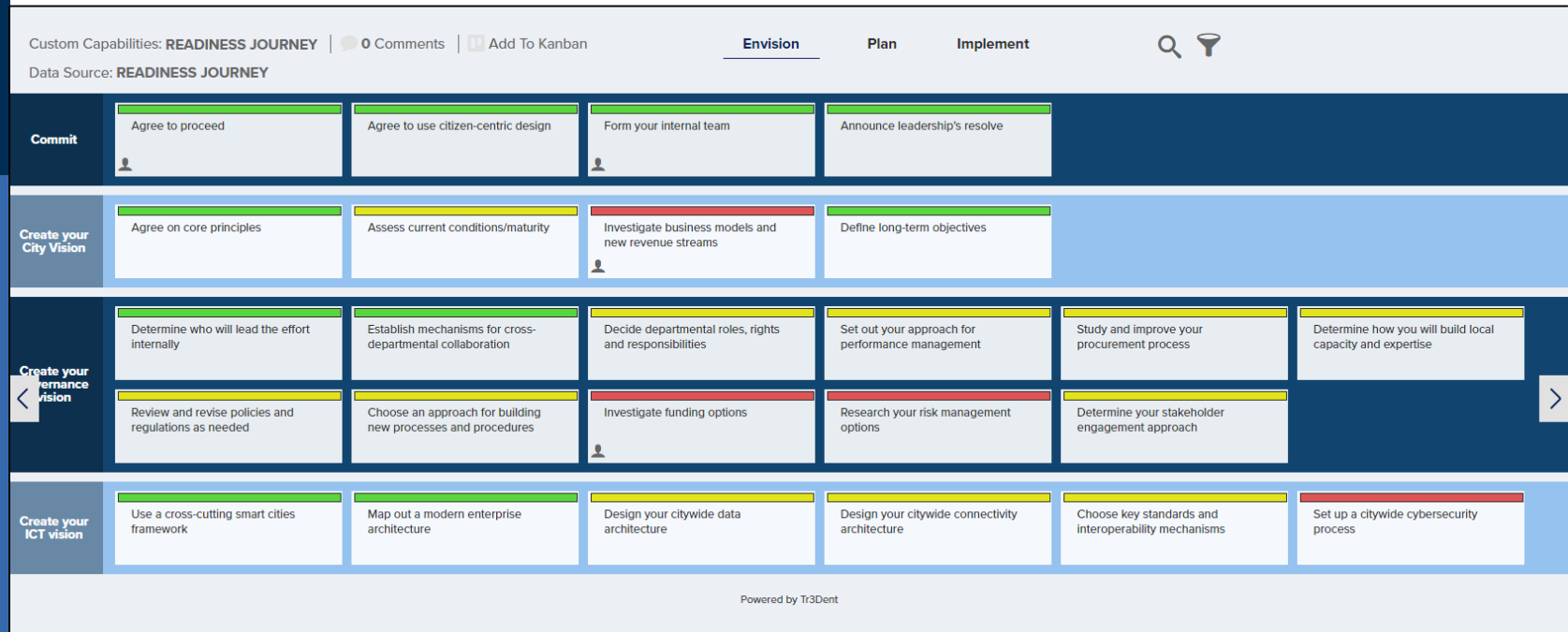
Activator

Plan

Build your own templates or use those from experts

Use proven project templates

- Embed and enforce best practices, procedures, approvals, standards
- Link knowledge resources to any step for just-in-time learning
- Work simultaneously with others
- Centralized, standardized, replicable, scalable

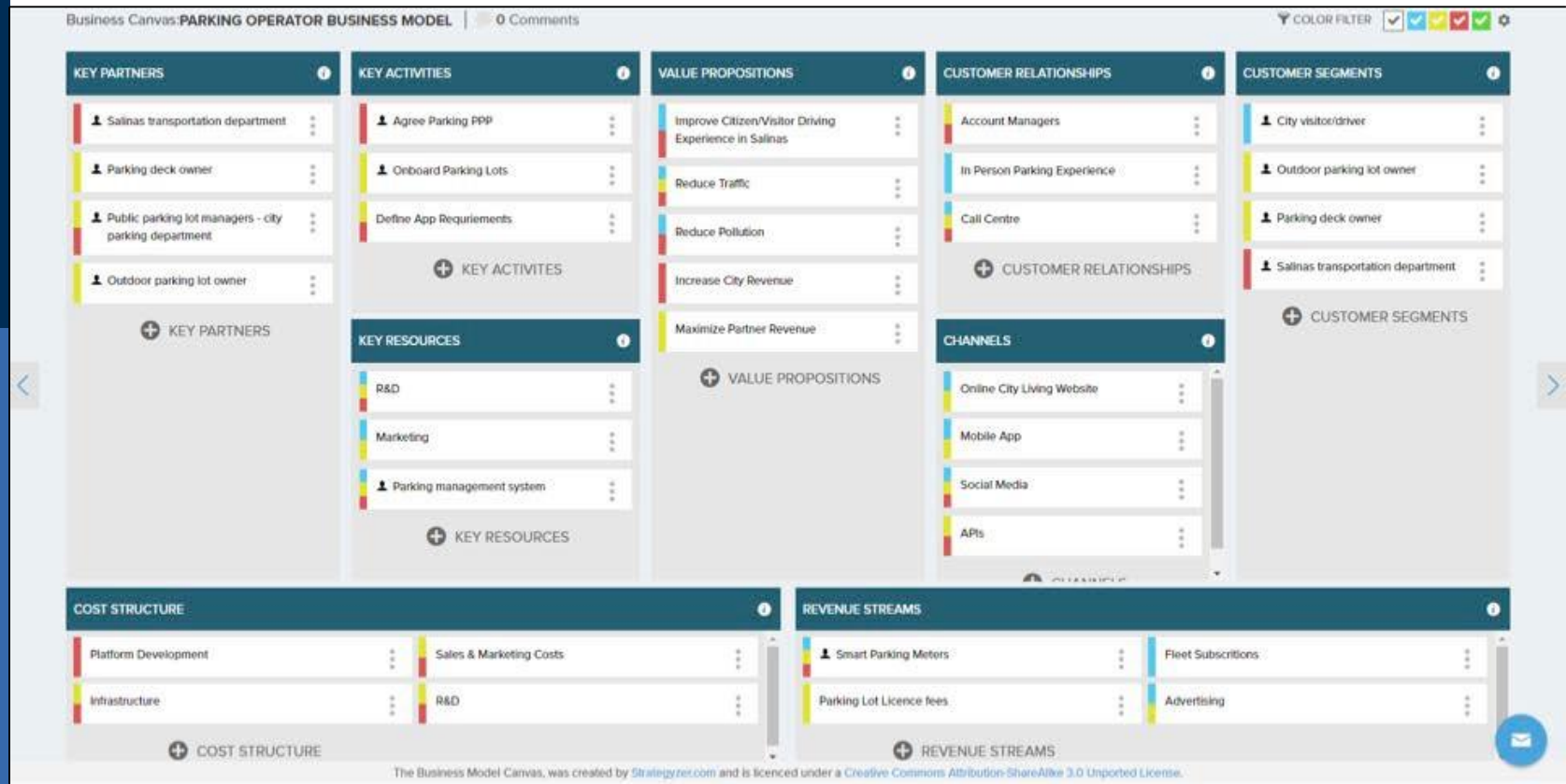


Activator

Plan

Two dozen planning modules

- Business canvas, SWOT, problem statements, use case diagrams, user/customer journey, product/service offerings, etc.
- Apply proven private-sector techniques to public-sector planning



Activator

Exchange

August, 2019

Learn from and network with other cities

- **Post** summary data about your own projects
- **Find** cities working on similar initiatives
- **Access knowledge resources** such as guides, RFPs, contract language, joint buying opportunities, standards, references, procedures, processes, reference architectures, policies, etc.
- **Access the Readiness Network** – a global community of smart city practitioners

2018 Readiness Challenge

- Online applications were Activator data intake forms
- Entrants get free use of Activator for the next year
- 200+ smart city projects entered to date

Innovative Governance Program

- ***Virginia*** (62 agencies, 139 cities/counties, >50 universities and boards)
- Process is to discover, engage and then plan all activity in Activator with goal for collaborative planning across multiple stakeholders (cites, counties, utilities, executive agencies, universities, others.)
- Repeat with economic development, transportation, public safety (a replicable process)

2019 Users of Private Sector version of Activator

Getting started

Start – First Year with Council's Readiness Program – Innovative Governance using Resilience as the focus:

- Discover how local government are managing resilience (who, what, why)
- Engage all stakeholders
- Plan and prioritize use cases
- Learn what is needed to manager resilience collaboratively (webinars/workshops)
- Learn lessons for next program
- Replicate process

- ***Alternatively/Together*** – Smart Cities Pilots - replicate state wide pilots and publish planning templates for all Texas cities and counties to use

Introducing the Smart Cities **Activator**

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SmartCitiesCouncil
LIVABILITY | WORKABILITY | SUSTAINABILITY

Resilience Rebuilding Funding Options

Campbell Delahoyde, Program Manager, National Association of State Energy Officials

Shawn Strange, PMP, Disaster Recovery Specialist, Texas General Land Office

Mitchell Osburn, Mitigation Branch Director, Federal Emergency Management Agency, TRO

READINESS FOR RESILIENCE

NASEO

National Association of State Energy Officials

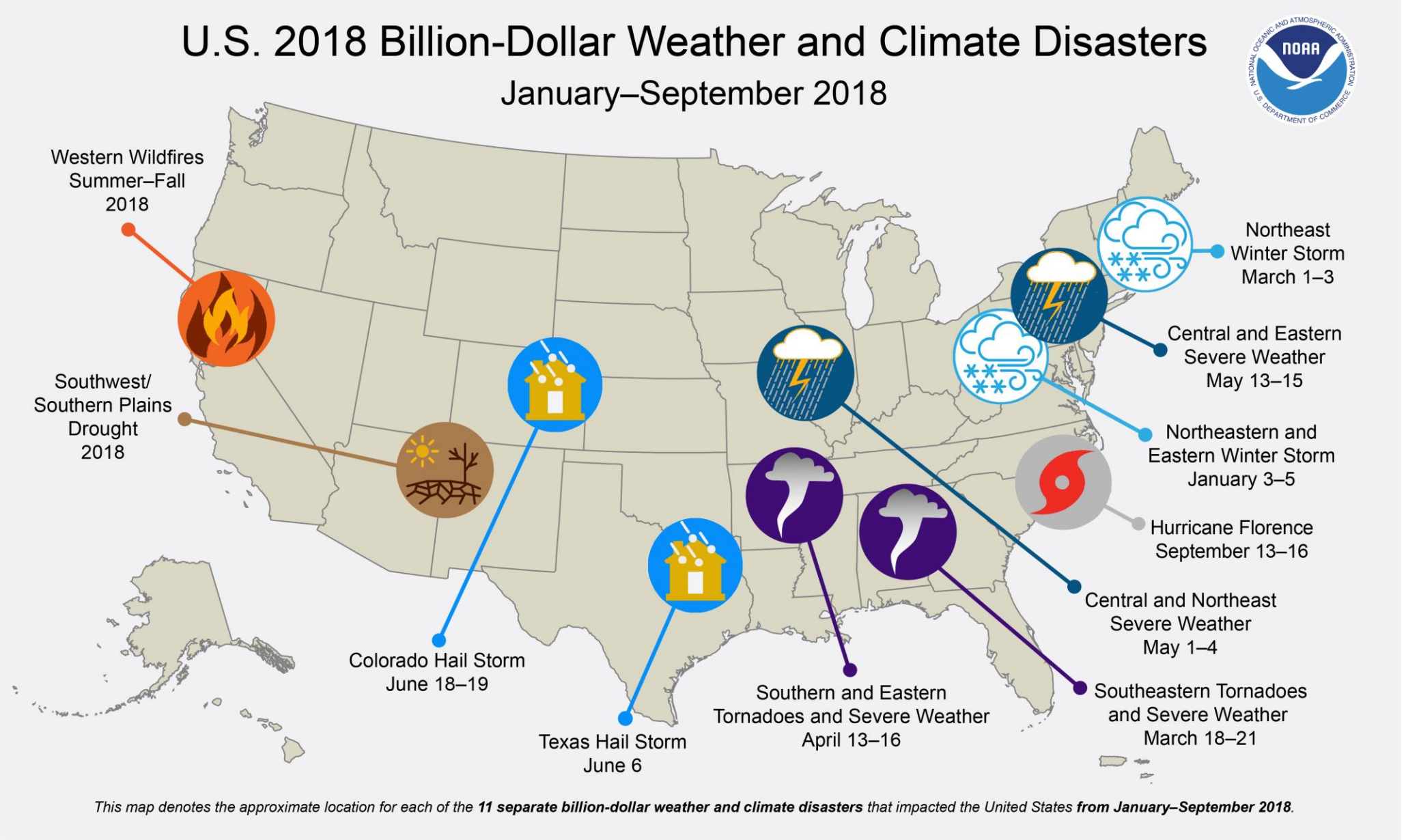
RESILIENCY FUNDING OPPORTUNITIES

CAMPBELL DELAHOYDE

ABOUT NASEO AND STATE ENERGY DIRECTORS

- NASEO is the only national organization whose membership includes the governor-designated energy directors and their offices – *over 3,500 state energy professionals* – from each of the 56 states, territories, and District of Columbia
- NASEO engages with federal energy policy and regulatory officials and private sector energy organizations on behalf of the states. NASEO's structure includes six regions and various topical energy committees
- State Energy Directors and their offices have broad policy and program responsibility over all energy sectors, with over **80 percent** having direct access to the governor and/or relevant cabinet secretary
- State Energy Directors advise and support their governors and state legislators with **50 percent** of the State Energy Directors serving as the governor's energy advisor, and others function in an expert supporting role
- NASEO addresses resilience through energy initiatives, and partners with the federal government through the U.S. Department of Energy (DOE), FEMA, the U.S. Department of Homeland Security, the U.S. Environmental Agency (EPA), among others, to promote resilience through:
  - **Energy security for critical infrastructure, facilities, and homes**
  - **System-wide energy efficiency**

WHY RESILIENCE?



Source: National Oceanic and Atmospheric Administration's National Centers for Environmental Information. U.S. Billion-Dollar Weather and Climate Disasters: Overview. https://www.ncdc.noaa.gov/billions/. Accessed on October 12, 2018.

WHY INVEST IN RESILIENCE?

Prevent or minimize future damage and costs of disasters

Significant financial benefits from resilience investments

Combine local priorities with energy considerations

Complex and expansive energy networks touch all aspects of our lives, are often overlooked

Enable quicker, more efficient, and less complicated responses during emergencies

HURRICANE HARVEY DISASTER RECOVERY FUNDING AND FINANCE INVENTORY

FUNDING AND FINANCE INVENTORY: FEDERAL SOURCES

- ***Low Interest Disaster Loan Program—Small Business Administration (SBA)***
  - **Target Applicants:** Homeowners and renters in declared disaster areas
  - **Key Program Features:**
    - Loans cover losses not fully covered by insurance or other means. Up to $200k to repair or replace property to pre-disaster condition or up to building code.
    - Loan increases may be available to make improvements that protect the property from future disasters (retaining walls, seawalls, sump pumps, safe rooms, storm shelters, elevation and relocation of utilities).
    - Local governments may wish to examine and update building codes to ensure rebuilt homes are built to be resilient and/or energy-efficient to the extent possible.
    - Eligible recipients may also request complementary mitigation loans; granted in addition to the approved disaster loan up to 20%/$2 million of the property

FUNDING AND FINANCE INVENTORY: FEDERAL SOURCES (CONTINUED)

- ***Economic Adjustment Assistance (EAA) Disaster Recovery Program—Economic Development Administration, U.S. Department of Commerce***
  - **Target Applicants:** District Organization of an EDA-designated Economic Development District; Indian Tribe or a consortium; State, county, city, or other political subdivision of a State; institution of higher education or consortium; or public or private non-profit organization or association acting in cooperation with officials of a political subdivision of a State
  - **Key Program Features:**
    - Supports financial resilience and economic recovery, strategic planning, and public works construction. Funds may be used for basic emergency home repairs to enable sheltering-in-place.
    - Eligible emergency work may include utilities essential for water, hot water, HVAC, and food preparation, as well as securing and weatherproofing properties.
    - EEA funds are flexible, and can be applied toward both strategic planning and public works/infrastructure
    - Projects and efforts can be hazard-agnostic, long as efforts address direct consequences of relevant disaster

FUNDING AND FINANCE INVENTORY: FEDERAL SOURCES

- ***Community Development Block Grant-Disaster Recovery (CBGD-DR)--U.S. Department of Housing and Urban Development (HUD)***
  - **Target Applicants:** Eligible States, cities, and counties: state agencies, non-profits, economic development agencies, and businesses.
  - Funds are based on unmet recovery needs. **Key Program Features:**
    - CDBG-DR funding can supplement recovery assistance programs administered by FEMA, SBA, and USACE. MUST include local citizen participation. Grantee's Action Plan must be posted for public comment.
    - CDBG-DR funds may be used to improve structures beyond their original condition, including funds to improve longevity or lower operating costs using green building techniques, including Energy Star-Certified Housing Units.
    - Can support resiliency for energy infrastructure through public-private partnerships with demonstrable benefits

FUNDING AND FINANCE INVENTORY: FEDERAL/STATE SOURCES

- ***Partial Repair and Essential Power for Sheltering (PREPS)—Texas General Land Office, FEMA***
  - **Target Applicants:** Homes that sustained less than $17,000 in FEMA verified loss. FEMA determines an applicant's eligibility for the PREPS program.
  - **Key Program Features:**
    - Supplements emergency sheltering when communities are faced with needs that significantly exceed existing capacity. Provides immediate, temporary repairs. As a Hurricane Harvey Public Assistance program, FEMA pays for 90 percent of the expenses, and the GLO will use up to $75,000,000 of the CDBG-DR Harvey allocation to cover repairs performed on homes.
    - $20,000 cap, +25% for Access and Functional Needs
    - Funds may be used for basic, emergency home repairs to enable sheltering-in-place.
      - Eligible emergency work may include utilities essential for backup power, water, hot water, HVAC, and food preparation, as well as securing and weatherproofing properties.
    - State will identify and pay contractors, ensure compliance with all local, state, and federal codes

DEEP DIVE: DISASTER RECOVERY REFORM ACT OF 2018 (DRRA)

- ***Pre-Disaster Hazard Mitigation Grant Program/ Building Resilient Infrastructure and Communities (BRIC) Program—FEMA***
  - **Target Applicants:** States, Territories, federally-recognized tribes and local communities
  - **Key Program Features:**
    - Planning and project grants support implementation of a sustained pre-disaster natural hazard mitigation program and public awareness-raising efforts. Local communities may sponsor applications on behalf of homeowners, businesses, and nonprofits and then submit the applications to their State Emergency Management Agency.
    - Funds can support mitigation, resilient infrastructure projects, planning, and program management costs. The "Resilient Infrastructure Competitive Funding" project type provides the opportunity to advance capital projects on a community level, ready for investment that will reduce risks, prevent loss of life and leads to significant savings by reducing damage from future disasters and lowering flood insurance premiums.
    - 6% set-aside from the Disaster Relief Fund

NASEO & BRIC

Through BRIC, FEMA seeks "*to invest in projects that drive risk reduction and build capability for communities and is consistent with the three overarching strategic goals in FEMA's 2018-2022 Strategic Plan: Build a Culture of Preparedness, Ready the Nation for Catastrophic Disasters, and Reduce the Complexity of FEMA.*"

Energy-related pre-disaster hazard mitigation projects (electricity and fuels system resilience, energy dependent critical infrastructure, building codes and enforcement) can and have been proven to reduce community risk and should be considered more for Stafford PDM funds. State Energy Offices can serve as the advocate, conduit, and bridge for energy resilience opportunities and state emergency management agencies and communities

ENERGY PROJECT AREAS FOR CONSIDERATION

- Expanded and explicit inclusion of physical energy system mitigation and protection actions;
- Identification of critical facilities and augmentation of their energy assets; and
- Adoption, implementation, and enforcement of up-to-date state or locally-mandated disaster-resistant codes and standards for buildings.

NASEO BRIC ENGAGEMENT STRATEGY

STATE ENERGY OFFICES

AFFILIATES & PARTNERS

U.S. DEPARTMENT OF ENERGY

FEMA

STATE AND LOCAL EMERGENCY MANAGEMENT AGENCIES

COMMUNITIES & CITIZENS

ADDITIONAL RESILIENCE FUNDING SOURCES

- *Tax Relief through the Internal Revenue Service (IRS)*
- *Texas Property Assessed Clean Energy (TX-PACE)—Texas PACE Authority*
- *National Coastal Zone Management and Enhancement Program– National Oceanic and Atmospheric Administration (NOAA)*
- *Public Transportation Emergency Relief Program—Federal Transportation Administration (FTA), U.S. Department of Transportation*

THANK YOU!

Questions?

- Campbell Delahoyde (cdelahoyde@naseo.org)
- Sandy Fazeli (sfazeli@naseo.org)

NASEO
National Association of State Energy Officials

Community Development Block Grants

Texas General Land Office

Community Development & Revitalization

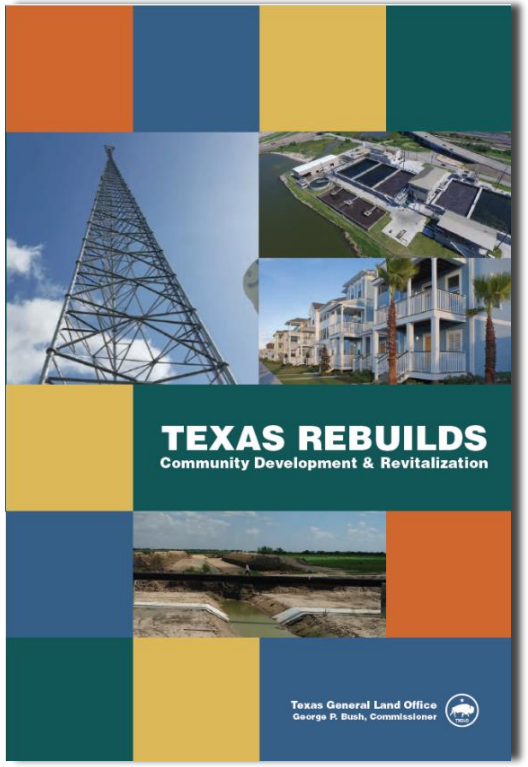
"We work to rebuild communities, to put Texans back in their homes, and to help businesses recover after the trauma of disaster."

George P. Bush

Texas General Land Office Commissioner

Community Development & Revitalization

*Since 2011, GLO-CDR is implementing projects and programs across Texas, utilizing more than **$13 billion** in HUD CDBG-DR funds.*



These funds are helping Texans to recover from:

- Hurricanes Rita, Ike, Dolly and Harvey;
- 2011 Wildfires; and
- The 2015/2016 Storm and Flood Events

CDBG - Mitigations Funds ($4.3 Billion)

- HUD Federal Register Notice pending

2018 CDBG - Disaster Recovery Funds ($46.4 Million)

- HUD Federal Register Notice pending

Funding Timeline

0

12

24

0 – 12 Months

Disaster Declaration
FEMA/TDEM

3 – 24 Months

SBA Loans & Private Insurance

12 – 24 Months

Congressional Appropriation/ HUD Publishes Federal Register

14 – 26 Months

GLO Publishes Action Plan

15– 27 Months

Method of Distribution & Fund Allocation

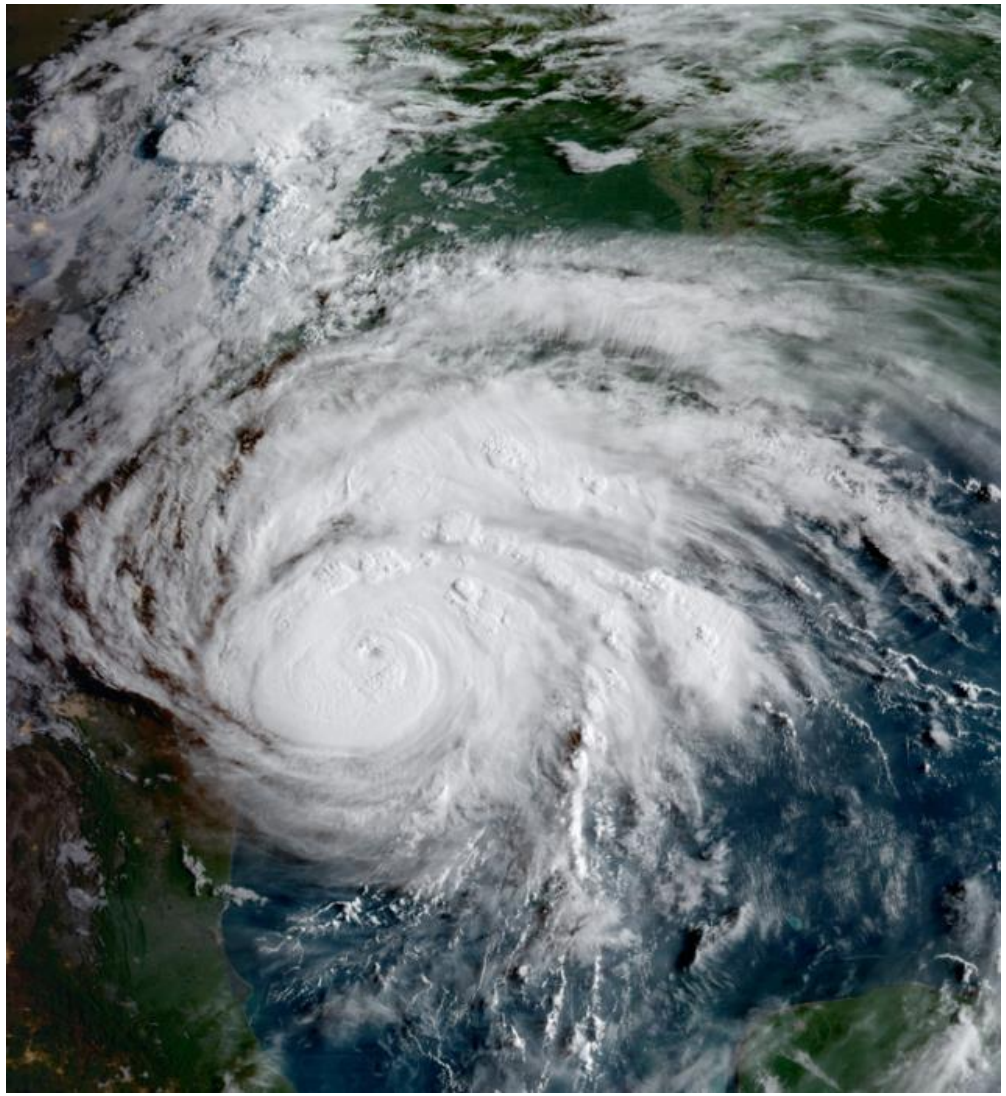
CDBG-DR Harvey Recovery

Harris County & City of Houston:

- $1.23 and $1.27 Billion

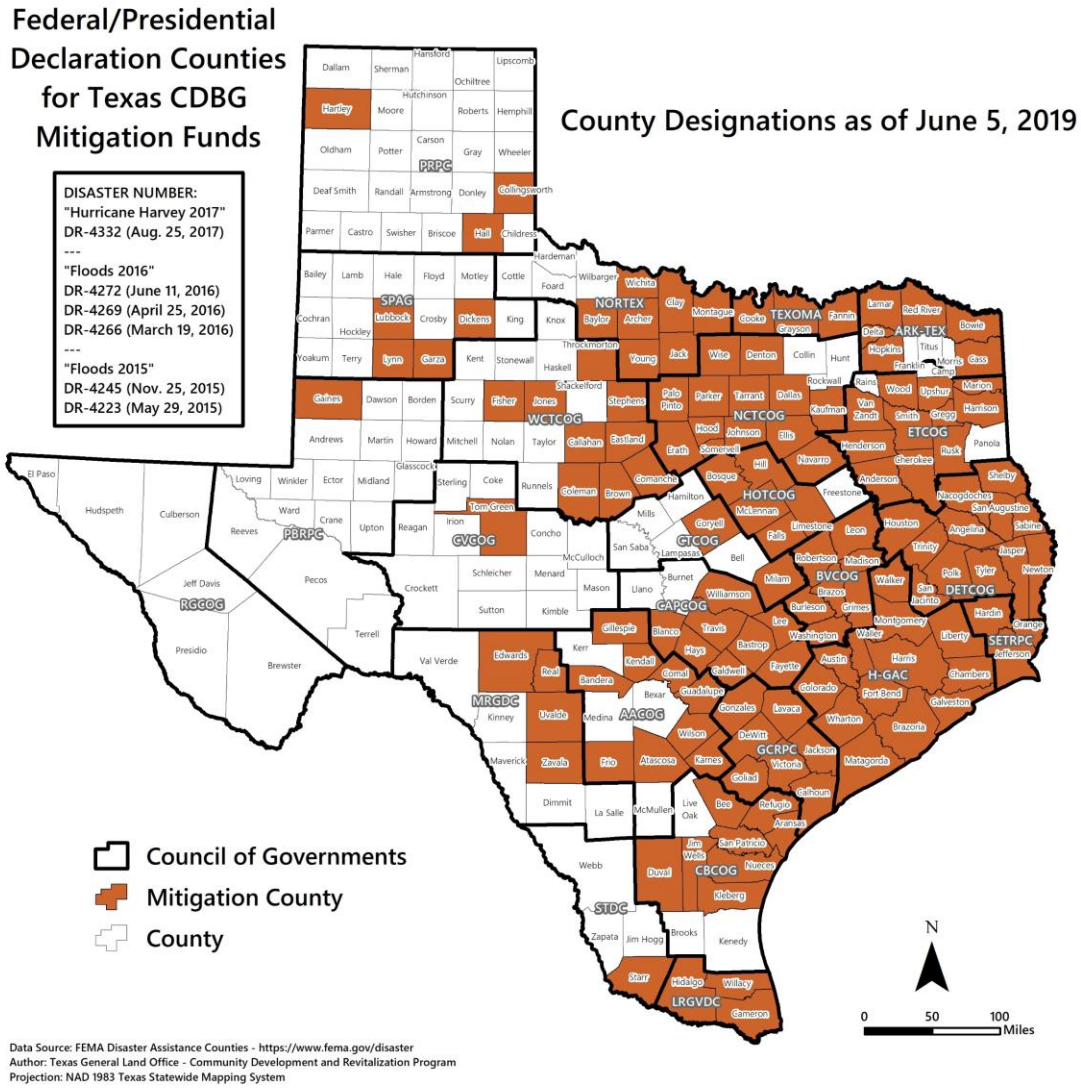
Program Allocations:

- Homeowner Assistance: $1.3 B
- Local Buyout/Acquisition: $275 M
- Homeowner Reimbursement: $100 M
- Affordable Rental: $487 M
- Local Infrastructure: $413 M
- Economic Revitalization: $100 M
- State Planning: $137 M



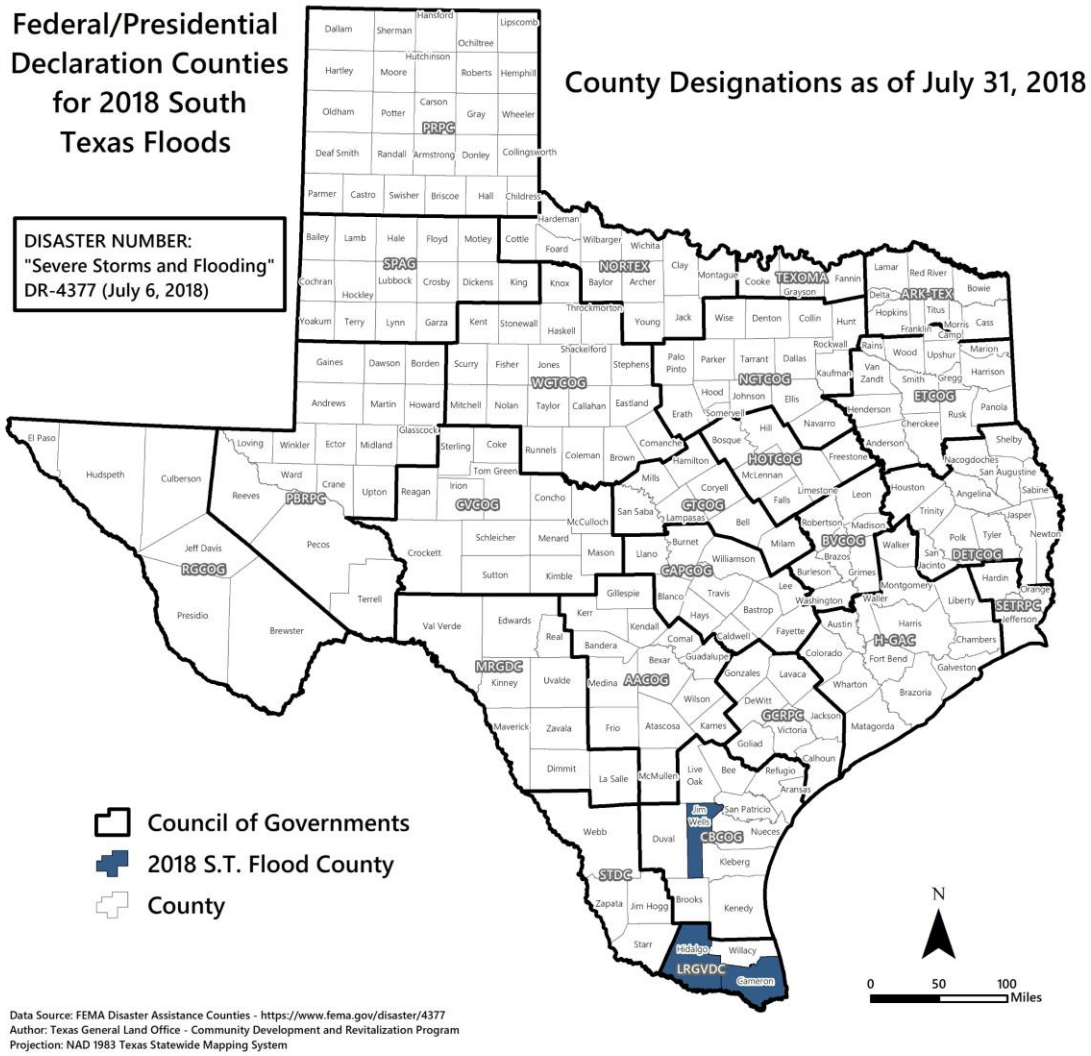
CDBG-DR Mitigation Funding

- **$4.3 billion**
  - 2015 Floods, 2016 Floods, and Hurricane Harvey
  - 140 Counties Eligible
- **HUD Federal Register Notice pending**
- **Mitigation Stakeholder Input**



CDBG-DR 2018 Funding

- **$46.3 million**
  - Cameron, Hidalgo, Jim Wells Counties
- **HUD Federal Register Notice pending**



Procurement Guidance

Must Follow Provisions of:

- 2 CFR § 200.318 – 326

High Level Details:

- More stringent law or regulation will apply.
- Documented procurement procedures.
- Distinction between methods of procurement.
- Review recovery.texas.gov website for Procurement/Contracting Resources

Procurement Guidance – State Laws

Must Review Provisions of:

- **Chapter 252**: Construction Bidding Procedures → Municipal
- **Chapter 262**: Construction Bidding Procedures → County
- **Texas Government Code – Chapter 2253**: Public Work Performance and Payment Bonds
- **Uniform Grant Management Standards**: Texas Comptroller of Public Accounts
- **Conflict of Interest**: Texas Government Code Chapter 573 and Local Government Code Chapter 171

*More stringent law or regulation will apply.

Survey & Resources

Online Survey (10-15 Minutes)

www.surveymonkey.com/r/GLO_Mitigation

Website

recovery.texas.gov

Email

cdr@recovery.texas.gov

Resources

“Procurement & Contracting for Local Governments” on our Website

FEMA
406 Mitigation for Public Officials

July 2019

FEMA

Topics of Relevance

- Guiding Policy and Program Overview
- Objectives and Key Criteria for Eligibility
- Work flow to a proposal and examples of HM 406 Mitigation
- How FEMA determines Cost Effectiveness
- Common misconceptions interpreting FEMA 406
- Special Considerations

FEMA

406 Genesis & Statutory Authority

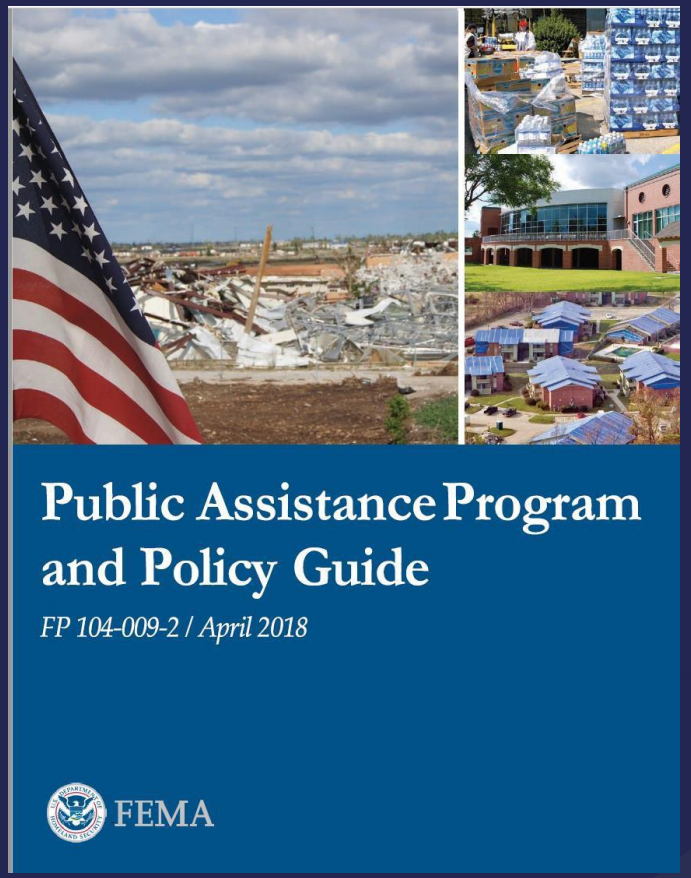
Section 406 (e) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act **(Stafford Act)** describes the **Public Assistance (PA)** program and provides funding for the repair, restoration, and replacement of damaged facilities, and for related mitigation measures.

The regulations governing 406 Hazard Mitigation in the PA program are contained in **Title 44 of the Code of Federal Regulations (CFR)**, Public Assistance Project Administration. **Part 206** of the Code outlines the PA program procedures, eligibility and funding, including general guidelines for Section 406 mitigation.

FEMA

406 Mitigation Guiding Document

The Public Assistance Program and Policy Guide (PAPPG), Version 3, is the guiding document for the PA recovery program, including 406 Mitigation.



FEMA

Objective and Criteria for Eligibility

406 Mitigation Objective: Reduce or eliminate future damages to facilities impacted by the disaster with cost effective modifications, additions or relocation.

Criteria for Eligibility:

- **Must be *technically feasible***
- ***Reduce or prevent future damage* to eligible PA projects from a similar disaster in the future**
- **Must be *cost effective* according to FEMA Policy**
- **Compliant with all environmental and historic preservation laws**
- **All state and local codes triggered by a 406 proposal are included in evaluation**

FEMA

Criteria for Eligibility: PA Permanent Work Facilities

Emergency Work

A. Debris Removal
B. Emergency Protective Measures

} Not Eligible for 406 Funding

Permanent Work

C. Roads and Bridge Work (including culverts and appurtenant facilities)

D. Water Control Facilities (irrigation canals, channels and sedimentation basins)

E. Buildings and Equipment (police/fire stations, schools, hospitals, contents)

F. Utilities (storm and sanitary sewers, water treatment and delivery systems)

G. Parks, Recreation, and Other Facilities (pools, mass transit, docks, beaches)

FEMA

How do we get to a 406 Mitigation Proposal

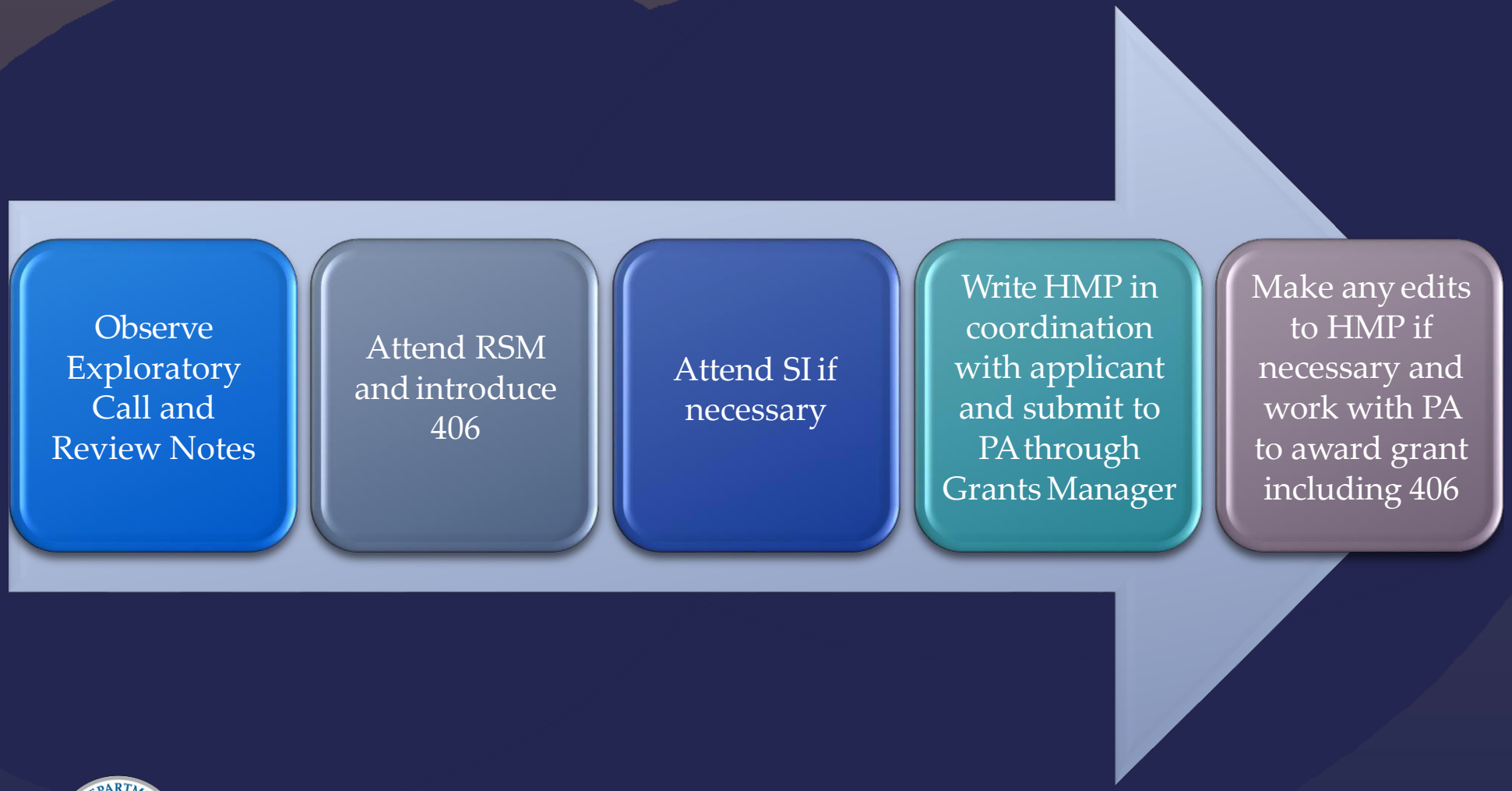
- **Mitigation Opportunities:** May be identified during
  - Exploratory Call
  - Recovery Scoping Meeting (RSM)
  - Site Inspection (SI)

- **Mitigation Alternatives:** May be provided to the Applicant based on the type of damage and options observed on the Site Inspection.

- **Hazard Mitigation Proposal (HMP): Proposed (conceptual not designed) e**nhancement to the facility to reduce or eliminate future damages that has a written scope of work and itemized costs.

FEMA

How do we get to a 406 Proposal?



FEMA

Examples of 406 Mitigation Projects

Drainage improvements

Storm Drain outfall protection with geo-pavers
(ArmorLoc) & rip rap

FEMA

Examples of 406 Mitigation Projects

Erosion Control

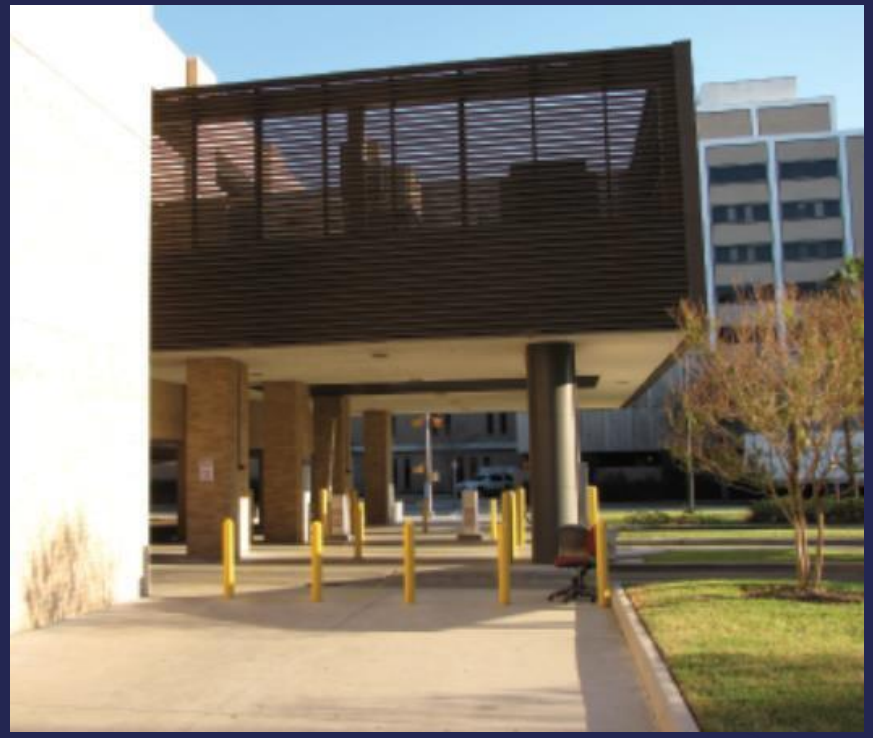
Slope protection at box culvert entrance

The willow cuttings planted throughout the embankment lend root cohesion and stability to the structural earth wall.

FEMA

Examples of 406 Mitigation Projects

Elevation



Emergency generator elevated above flood levels at the University of Texas Medical Branch, Hurricane Ike (Galveston, TX, 2008).

FEMA

Examples of 406 Mitigation Projects

Floodwalls*

Typical masonry floodwall with engineered closures, which protected the Oak Grove Lutheran School in Fargo, ND from flooding in 2001 (source: Flood Control America, LLC

FEMA

Examples of 406 Mitigation Projects

Wind Retrofits

Cables were attached to prevent the cowling from blowing off. Typhoon Paka (Guam, 1997)

This condenser had supplemental attachment straps to hold it in place during Typhoon Paka (Guam, 1997)

FEMA

Examples of 406 Mitigation Projects Roof Covering Modification

Modified Bitumen Roof covering instead of single ply for resiliency against higher wind speeds in Coastal areas

FEMA

How FEMA determines Cost Effectiveness

Every dollar spent on mitigating must prove to reduce future losses related to damages from future similar events.

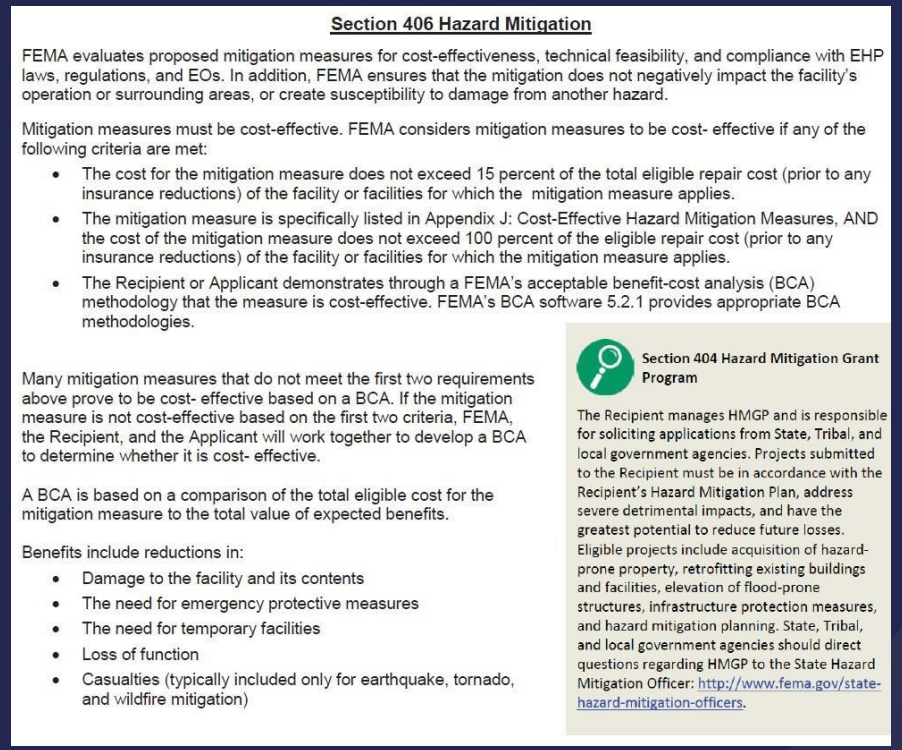
$$= \frac{\text{406 Hazard Mitigation Proposal (HMP) Costs}}{\text{Cost to restore the facility (}\textit{and sometimes contents}\text{*)}} \; ?$$

FEMA

How FEMA determines Eligible, Cost Effective 406 Mitigation Funding

There are three ways Cost Effectiveness can be established (based on criteria outlined in PAPPG V.2., PAGE 99).

- **15%:** Mitigation measures may amount up to 15% of the total eligible cost of the eligible repair work (by site).
- **100% (Appendix J):** Certain mitigation measures have been pre-determined to be cost effective, as long as the mitigation measure does not exceed 100% of the eligible cost of the eligible repair.
- **BCA:** A Benefit Cost Analysis may be performed for mitigation proposals that fall outside the predetermined cost effective measures.



Section 406 Hazard Mitigation

FEMA evaluates proposed mitigation measures for cost-effectiveness, technical feasibility, and compliance with EHP laws, regulations, and EOs. In addition, FEMA ensures that the mitigation does not negatively impact the facility's operation or surrounding areas, or create susceptibility to damage from another hazard.

Mitigation measures must be cost-effective. FEMA considers mitigation measures to be cost- effective if any of the following criteria are met:

- The cost for the mitigation measure does not exceed 15 percent of the total eligible repair cost (prior to any insurance reductions) of the facility or facilities for which the mitigation measure applies.
- The mitigation measure is specifically listed in Appendix J: Cost-Effective Hazard Mitigation Measures, AND the cost of the mitigation measure does not exceed 100 percent of the eligible repair cost (prior to any insurance reductions) of the facility or facilities for which the mitigation measure applies.
- The Recipient or Applicant demonstrates through a FEMA's acceptable benefit-cost analysis (BCA) methodology that the measure is cost-effective. FEMA's BCA software 5.2.1 provides appropriate BCA methodologies.

Many mitigation measures that do not meet the first two requirements above prove to be cost- effective based on a BCA. If the mitigation measure is not cost-effective based on the first two criteria, FEMA, the Recipient, and the Applicant will work together to develop a BCA to determine whether it is cost- effective.

A BCA is based on a comparison of the total eligible cost for the mitigation measure to the total value of expected benefits.

Benefits include reductions in:

- Damage to the facility and its contents
- The need for emergency protective measures
- The need for temporary facilities
- Loss of function
- Casualties (typically included only for earthquake, tornado, and wildfire mitigation)

Section 404 Hazard Mitigation Grant Program

The Recipient manages HMGP and is responsible for soliciting applications from State, Tribal, and local government agencies. Projects submitted to the Recipient must be in accordance with the Recipient's Hazard Mitigation Plan, address severe detrimental impacts, and have the greatest potential to reduce future losses. Eligible projects include acquisition of hazard-prone property, retrofitting existing buildings and facilities, elevation of flood-prone structures, infrastructure protection measures, and hazard mitigation planning. State, Tribal, and local government agencies should direct questions regarding HMGP to the State Hazard Mitigation Officer: http://www.fema.gov/state-hazard-mitigation-officers.

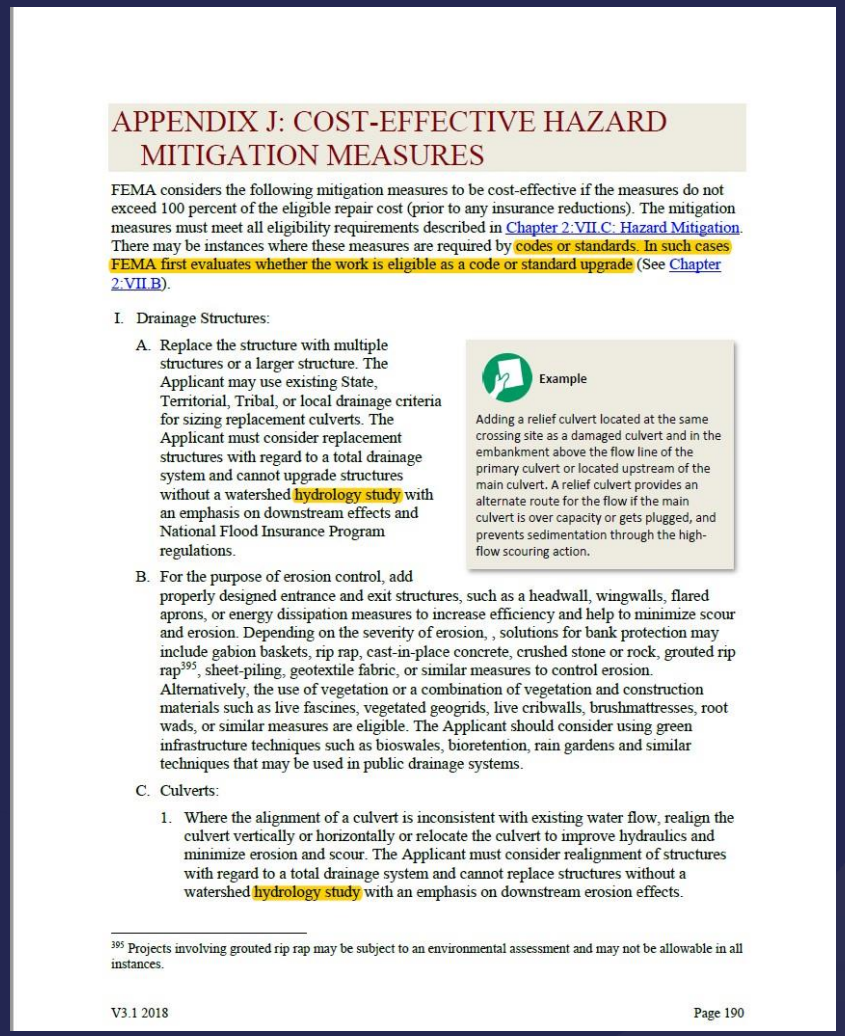
FEMA

How FEMA determines Eligible, Cost Effective 406 Mitigation Funding

PAPPG, Appendix J:

Appendix J of PAPPG includes criteria and several pages of mitigation treatments that have been pre-determined to be cost effective up to 100% of the repair costs of the damaged element. It is organized by facility type.

Base the 100% on the actual damage being mitigated at the facility, not the overall costs of the Project.



APPENDIX J: COST-EFFECTIVE HAZARD MITIGATION MEASURES

FEMA considers the following mitigation measures to be cost-effective if the measures do not exceed 100 percent of the eligible repair cost (prior to any insurance reductions). The mitigation measures must meet all eligibility requirements described in Chapter 2:VII.C: Hazard Mitigation. There may be instances where these measures are required by codes or standards. In such cases FEMA first evaluates whether the work is eligible as a code or standard upgrade (See Chapter 2:VII.B).

I. Drainage Structures:

A. Replace the structure with multiple structures or a larger structure. The Applicant may use existing State, Territorial, Tribal, or local drainage criteria for sizing replacement culverts. The Applicant must consider replacement structures with regard to a total drainage system and cannot upgrade structures without a watershed hydrology study with an emphasis on downstream effects and National Flood Insurance Program regulations.

Example

Adding a relief culvert located at the same crossing site as a damaged culvert and in the embankment above the flow line of the primary culvert or located upstream of the main culvert. A relief culvert provides an alternate route for the flow if the main culvert is over capacity or gets plugged, and prevents sedimentation through the high-flow scouring action.

B. For the purpose of erosion control, add properly designed entrance and exit structures, such as a headwall, wingwalls, flared aprons, or energy dissipation measures to increase efficiency and help to minimize scour and erosion. Depending on the severity of erosion, , solutions for bank protection may include gabion baskets, rip rap, cast-in-place concrete, crushed stone or rock, grouted rip rap[395], sheet-piling, geotextile fabric, or similar measures to control erosion. Alternatively, the use of vegetation or a combination of vegetation and construction materials such as live fascines, vegetated geogrids, live cribwalls, brushmattresses, root wads, or similar measures are eligible. The Applicant should consider using green infrastructure techniques such as bioswales, bioretention, rain gardens and similar techniques that may be used in public drainage systems.

C. Culverts:

1. Where the alignment of a culvert is inconsistent with existing water flow, realign the culvert vertically or horizontally or relocate the culvert to improve hydraulics and minimize erosion and scour. The Applicant must consider realignment of structures with regard to a total drainage system and cannot replace structures without a watershed hydrology study with an emphasis on downstream erosion effects.

[395] Projects involving grouted rip rap may be subject to an environmental assessment and may not be allowable in all instances.

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How FEMA determines Eligible, Cost Effective 406 Mitigation Funding

Benefit Cost Analysis (BCA):

When the applicant is proposing mitigation where the cost is more than 15% of the damaged element (and it's not listed in Appendix J), OR it is listed in Appendix J but the cost is over 100% of the repair, a Benefit Cost Analysis can be performed to determine if the proposal is cost effective.

Items that can be included in the BCA:

- Category A & B costs from current and past events related to the facility being mitigated.
- Users of the facility where the loss of function impacts them (e.g. roads: traffic counts, treatment plants/utilities: customers).
- Historic damages and frequency at the site that will be mitigated and can be documented.
- Expected Damages, with appropriate analysis and documentation.

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Who proposes the 406 Mitigation Proposal

- The Hazard Mitigation Proposal is the **Applicant's** proposal and the **Applicant's** responsibility to complete if approved.

  - **Incentive:** Federal Share is 90% on DR 4332 TX.

  (404 Mitigation, known as HMGP has a 75% Federal Share)

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Common misconceptions interpreting 406 Mitigation

- **All 406 Hazard Mitigation proposals are eligible up to 100% of the damaged element.**
    - No: Only those items listed on PAPPG, Appendix J, have been predetermined to be cost effective up to 100% of the cost of repair.
- **All Mitigation in an Engineered project is eligible for 406 Funding**
    - No: Only the Project enhancements that reduce or eliminate eligible damage and can be determined to be cost effective are eligible for 406 Funding.
    - Other considerations:
        - Codes & Standards (see 44 CFR, 206.226 (d))
        - Best Construction Practices
        - Improved Project (see page 4,)
- **The cost basis for eligible 406 funding is the overall Project $ amount.**
    - No: The cost basis for eligible funding is the estimate from the CRC for the site/element being mitigated. A Project may have up to 50 sites.

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Common misconceptions interpreting 406 Mitigation (II)

- **406 Mitigation proposals must be an integral part of the damaged element.**
  - No: In some instances, an eligible mitigation measure may not be part of the damaged facility. FEMA will consider these exceptions on a case-by-case basis.

- **406 Mitigation funds may not be applied to an Improved Project.**
  - Funds recommended for mitigation measures may be approved for an improved project if the original facility and its function will be restored and the mitigation work is still needed, is technically feasible, and will be performed as part of the overall project.

- **Any proposal less than 15% of the damages is eligible 406 Mitigation.**
  - No: The mitigation proposal must directly reduce the potential of future, similar disaster damages to the eligible facility.
  - The Hazard Mitigation Proposal (HMP) has several elements that need to be articulated in writing, including why/how it will work.

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Common misconceptions interpreting 406 Mitigation (III)

- **If the mitigation was installed prior to FEMA site visit, it is ineligible.**
  - No: The Applicant may implement mitigation measures after the incident occurs but before the incident is declared or before FEMA has the opportunity to evaluate the measure for eligibility. In these cases, the mitigation work may be eligible if it is cost effective and compliant with EHP laws, regulations and Executive orders.
- **A Reinforced Concrete Pipe (RCP) is the hydraulic equivalent of a same size Corrugated Metal Pipe (CMP).**
  - No. Installing a same size CMP in place of a RCP can significantly reduce hydraulic capacity. If the State DOT cannot provide a hydraulic equivalent table when switching from RCP to CMP, an H&H should be performed to insure proper drainage.

FEMA

Common misconceptions interpreting 406 Mitigation (IV)

- **If the permanent work is complete, add on 406 mitigation is not eligible.**
  - No: There are two types of eligible, "add on" 406 Mitigation.

    1) If the Applicant implements mitigation measures after the PA-funded repair is complete, the mitigation work may be eligible, however, FEMA will not provide PA funding for any duplicative work.

    2) If the previously complete permanent work was completed during emergency response, and could be considered Emergency Protective measures, 406 Mitigation may be eligible at the site. The 406 Mitigation should be cost effective and technically feasible. These types of sites will be considered on a case by case basis. Additional write ups to separate the emergency work from permanent repairs may be necessary.

- **The Hazard Mitigation Proposal can fund an engineering study to come up with a Hazard Mitigation Proposal.**
  - No: Funding for engineering is contingent on having a cost effective Mitigation proposal.

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Summary

- 406 Mitigation is a PA program which comes from Section 406 of the Stafford Act. Public Assistance Program and Policy Guide (PAPPG) is the primary guiding document.
- All eligible, permanent work projects (Cat C-G) are eligible for consideration of 406 Mitigation funding subject to criteria outlined in PAPPG.
- The type of Mitigation being proposed is used to determine whether the proposal is considered cost effective using the 15% or 100% Rule. The estimated cost of restoring predisaster condition is the cost basis for evaluating cost effectiveness.
- FEMA Public Assistance, Mitigation staff or the Applicant may write an HMP.
- The Federal share at the Hurricane Harvey disaster for 406 Mitigation is 90%

FEMA

Questions?

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Working Group

Activity 1: Identify the opportunities for PPPs in each of the identified resilience project areas.

READINESS FOR RESILIENCE

Working Group

Activity 2: Prioritize funding opportunities for identified resilience project areas.

READINESS FOR RESILIENCE

Working Group Report Out, Discussion, and Next Steps.

READINESS FOR RESILIENCE

Adjourn

READINESS FOR RESILIENCE