

# AASHTO DOT Resilience Workshop

November 7, 2017

Deliverable from Fast Forward Collaboration

# Understanding Purpose and Objectives



**PURPOSE:** The conference intends to provide the opportunity for attendees to share ideas and to build more resilient and effective Departments of Transportation nationwide.



**OBJECTIVES:** In an engaging and creative environment, we will:

- Discuss existing practices and challenges to implementing resiliency
- Learn about successful practices around the country
- Be a part of a larger resiliency effort taking part over the next 12 months in preparation for the 2018 conference
- Develop specific guidance and recommendations for being proactive in DOT resiliency efforts.
- Increase understanding of how efforts can be implemented at DOTs around the nation and develop a more complete understanding of the direct and indirect impacts and costs associated with disaster events by:
  - Understanding responsibilities of DOT's before, during, and after negative events
    - Understanding the life cycle of an adverse event, from advance warning to resumption of normal service and everything in between.
  - Understanding responsibilities of ALL affected departments
  - Identifying multiple response pathways for any disruption quickly and reducing time and resources to attain a state of normality / to progress to further higher stages of operational performance



Welcome from Paula Hammond & Opening Remarks from Josh DeFlorio

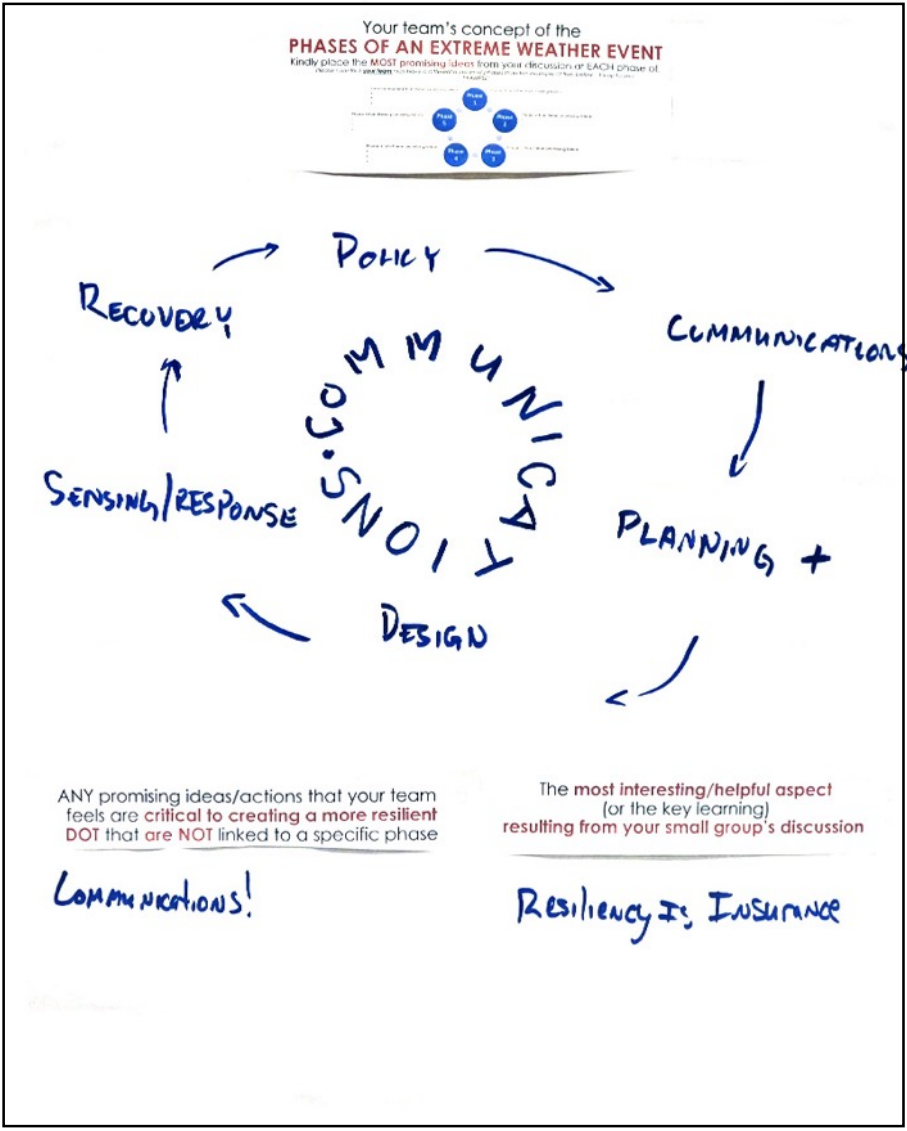




## Breakout: Outlining the Actions Toward a Resilient DOT

Summarizing Questions to report back to larger group:

- Using your team's concept of the **phases of an extreme weather event**, which ideas are THE MOST promising for EACH phase?
- What are the MOST promising actions your team feels are **critical to creating a more resilient DOT** that are not linked to a specific phase?



Team's output reported back to group

- 
- Success Factors** ①
- COMMUNICATIONS
- ① Policy - Explicit statement of Resiliency goal  
- We hall - Administration/Governor
  - ② Communication - Active coordination In/Out Agency  
- Champions / Advocates  
- Inter-State Learning
  - ③ Planning  
- Prioritization and Vulnerability assessment  
- Environmental - NEPA, How will we implement  
- Develop methodology for Risk and Resiliency framework  
- Operations - Traffic Systems + Maintenance  
- Asset Management System  
- Financial Planning - ER Fund plan/methods  
- Resiliency is Insurance
  - ④ Design  
- Incorporate Climate Change  
- Criteria for recovery  
- Lifecycle costs (incl. recovery)
  - ⑤ Sensing + Forecasting - tools & partners  
Response (During Event)  
Continuity of Operations - Staff, materials  
Emergency Operations  
Public Communication Before/During/After  
Internal Comms  
Agency-wide Emergency Response Plan of Action/Redundancy  
- ER training exercises
  - ⑥ Recovery (Past event) - Critical assets open

Team's working wall



Your team's concept of the PHASES OF AN EXTREME WEATHER EVENT

Kindly place the MOST promising ideas from your discussion at LAC in phase of the event that you think will be most helpful to your organization through the event.

**ADAPTIVE DESIGN (PRE)**

**SYSTEMS IN PLACE (PRE)**

**FORMAL DEBRIEFING (LESSONS LEARNED) (POST)**

**TRAINING (RESILIENCE) → MULTIPLE FUNCTIONS (PRE)**

**COMMUNICATIONS (INTERNAL + EXTERNAL) ALL**

**PRE-EVENT COORDINATION (PRE)**

**STAFF OR PROCESS FOCUS (PRE)**

**INSTITUTIONAL MEMORY**

ANY promising ideas/actions that your team feels are critical to creating a more resilient DOT that are NOT linked to a specific phase

The most interesting/helpful aspect (or the key learning) resulting from your small group's discussion

**COMMUNICATIONS**

- LEARNING ORG.
- FINANCIAL MGT.
- STAMP PLAN
- RISK → ASSET MGT

**INSTITUTIONALIZE LEARNING + ORG. MEMORY**

**TAP**

Team's output reported back to group

**PRE** **POST** **2**

**EMERG. RESPONSE + IMPLEMENTATION OF TRP** **DAMAGE ASSESS** **DEBRIS MGT** **Short Term Fixes**

**EVENT**

**COMMUNICATIONS**

**Recovery Focus** **PROGRAM + FINANCIAL PLAN** **RECOVERY ACTIONS** **FINANCIAL MGT.**

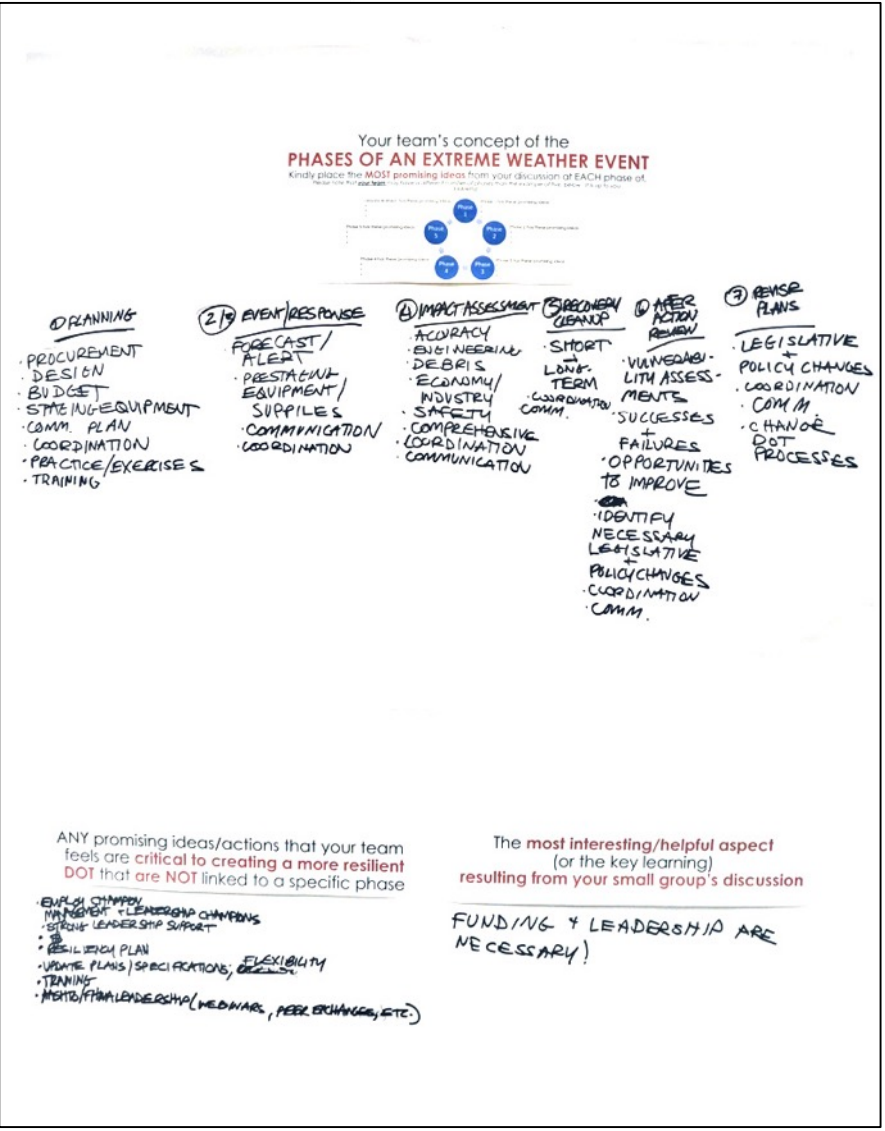
**DATA** **VULNERABILITY ASSESSMENT** **STAFF CAPABILITY/ENGAGEMENT** **LESSONS LEARNED**

**HUMAN VIEW** **CRITICAL ASSETS + PLAN + LEADS**

**PREPARATION CONTRACTS** **PROJECT DEVELOPMENT** **IMPROVEMENTS**

**ASSET MGT**

Team's working wall



Team's output reported back to group



Team's working wall



Your team's concept of the  
**PHASES OF AN EXTREME WEATHER EVENT**  
 Kindly place the MOST promising ideas from your discussion of EACH phase of...



1. POLICY/LEADERSHIP IS KEY
2. IMPROVE ER PROCESS
3. LONG RANGE VIEW FOR DECISION
4. INTERNAL COMMUNICATION + TRAINING
5. EXTERNAL COMMUNICATION + EDUCATION
6. PARTNER COORDINATION
7. COMPLEMENTATIVE DATA INTERACTION

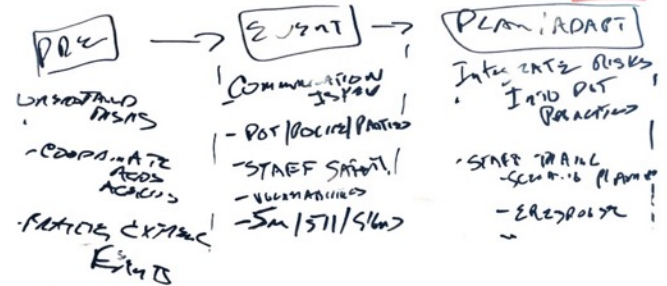
ANY promising ideas/actions that your team feels are critical to creating a more resilient DOT that are NOT linked to a specific phase

The most interesting/helpful aspect (or the key learning) resulting from your small group's discussion

- 8.) DEFINE POLICY FOR RISK
- 9.) FUNDING REQUIREMENTS

Team's output reported back to group

NOTES



RESILIENT DOT RECOMMENDATIONS

- IDENTIFY EVENTS
- ACKNOWLEDGE CLIMATE RISK
  - INTEGRATING INTO DOT
- MORE RESILIENT SYSTEMS -> RISK TO CLIMATE CHANGE
  - REGULATORY CHANGES
  - LESS
- > NEED FOR CENTRALIZED DATA MGMT SYSTEMS TO ENSURE COORDINATION
- > DATA INTEGRATION INTO PROGRAM
- > INDICATORS OF EVENT IMPACT TO COMMUNICATION TO STATEHOOD

Team's working wall



Your team's concept of the **PHASES OF AN EXTREME WEATHER EVENT**  
 Kindly place the MOST promising ideas from your discussion on EACH phase of...

**Plan/Prepare**

**Assess "Level" of Event & Response**

**Response** - utilize existing plans/check-lists  
 • Coordination w/in agency + outside other state agencies  
 Federal agencies, locals

**Post-event Assessment** - Fold lessons learned back into Plans & checklists

ANY promising ideas/actions that your team feels are **critical to creating a more resilient DOT** that are **NOT** linked to a specific phase

The **most interesting/helpful aspect** (or the key learning) resulting from your small group's discussion

Technology → Predictive analytics  
 Data driven decision making  
 Institutional/organization support  
 - Integrated into how you do business

**Controlled Failure**  
**land use policies**

Team's output reported back to group

Resiliency has to be integrated into how you do business.

• Consideration Institutional/organizational

**5**

**Phases**

- "Oh S \*t" phase

Part of Planning phase } ops & maintenance staff are most knowledgeable - They know the trouble spots  
 - How do we engage them?  
 - Bring together ops w/ planning - Break down silos  
 weather events = time to prepare

**Level of Event** } understand both  
**Level of Response** } - check lists

**Coordination across agency & Govt** (FEMA - Other Fed Agency, Gov's office + other agencies, Universities)  
 - Set expectations

**Follow existing Plans (conduct exercises)**  
 Evacuations  
 → Planning w/ feedback loop to identify potential improvements

**Post Event** → Recovery & Bringing System back  
 coordinate w/ other agencies to monitor/assess.  
 Prediction? Technology & data, Models + apps  
 → Decision making

**Education & Outreach on event preparation** (1-pagers presentations)  
 - public; state legislators  
 - staffers

**Development** - Population increases  
 Institutional at DOT

Team's working wall

Your team's concept of the **PHASES OF AN EXTREME WEATHER EVENT**  
 Kindly place the MOST promising ideas from your discussion at EACH phase of recovery.

**HISTORY**  
 ↳ BUT, NON-STATIONARITY systems

**FEEDBACK**

**ASSESSMENT (Always Changing)**  
 (E.G. Hi-H, w/ PROJECTIONS)  
 SCALABLE APPROACHES

**LEADERSHIP** MULTI DISCIPLINE  
 L+little L

**IMBED** IN ALL DEPARTMENTS

ANY promising ideas/actions that your team feels are **critical to creating a more resilient DOT** that are **NOT** linked to a specific phase

The **most interesting/helpful aspect** (or the key learning) resulting from your small group's discussion

Team's output reported back to group

**LEADERSHIP NEEDED** L-88 + institutionalize

PREP vs. RECOVERY / RESPONSE

- ↳ LONG RANGE PLANNING → ID VULNERABILITIES
- ↳ CAP PLANNING / DEVELOPMENT
- ↳ DESIGN / CONSTRUCTION
- ↳ MANAGEMENT / OPS
  - ↳ INCLUDING ASSET MANAGEMENT (ESPECIALLY)
  - ↳ MONITORING
  - ↳ FEEDBACK INTO PLANNING / PRIORITIZATION
  - ↳ CAPTURE KNOWLEDGE FROM FIELD [FORMALIZE]

ASSESS: HISTORY OF DISRUPTION / DAMAGE  
 AS PLANNING TOOL  
 DESIREE / AFTER ACTION NEED

CONSISTENT FUNDING NEEDED

MULTIPLE FEEDBACK LOOPS

↳ SIMPLICITY IS KEY

↳ MAP-21: EVAL AREAS OF REPEATED LOSS  
 ↳ HOW CAN WE LEVERAGE TO ENHANCE RESILIENCE?  
 (OFTEN)  
 ↳ RESILIENCE NEEDS DIVERGED FROM PRIORITIZATION

↳ IMMEDIATE RESPONSE MEASURES V. "PERMANENT" (LOW-TERM) FIX  
 ↳ WHEN DOES A DOT SEEK A BETTERMENT  
 ↳ HOW DO WE THINK BIGGER, MORE BROADLY ABOUT SOLUTIONS AFTER RECOVER  
 ↳ BUILD BACK THE SAME FOR CAT-EX?

↳ FACTORING RESILIENCE INTO CORRIDOR PLANNING BEFORE EVENT (OR post event)  
 ↳ MISS: RETHINKING REBUILDING AFTER REPEAT FAILURES (CAPACITY ISSUES)

↳ UNDERSTANDING THE "EVENT" FOR PLANNING  
 ↳ NOT EVERY AREA HAS A DEFINITION AGENCY  
 ↳ Hi-H CONSIDERS HISTORIC EVENTS  
 HEC-17,25

ASK HOW TO AVOID AGAIN

FUNDING CONSISTENT & MOTIVATING + adequate (workforce)

Team's working wall





Your team's concept of the  
**PHASES OF AN EXTREME WEATHER EVENT**  
Kindly place the MOST promising ideas from your discussion at EACH phase of the event.

1. Planning + Prep
  - long-term planning + risk mitigation
  - short + medium-term prep
2. Storm Prep
3. Weather Ops + Comms
4. Immediate clean-up
5. After-action analysis

ANY promising ideas/actions that your team feels are **critical to creating a more resilient DOT** that are **NOT** linked to a specific phase

The **most interesting/helpful aspect** (or the key learning) resulting from your small group's discussion

Integrating climate mitigation into all regular processes - make "business as usual."

Coordination  
 "know who to call"

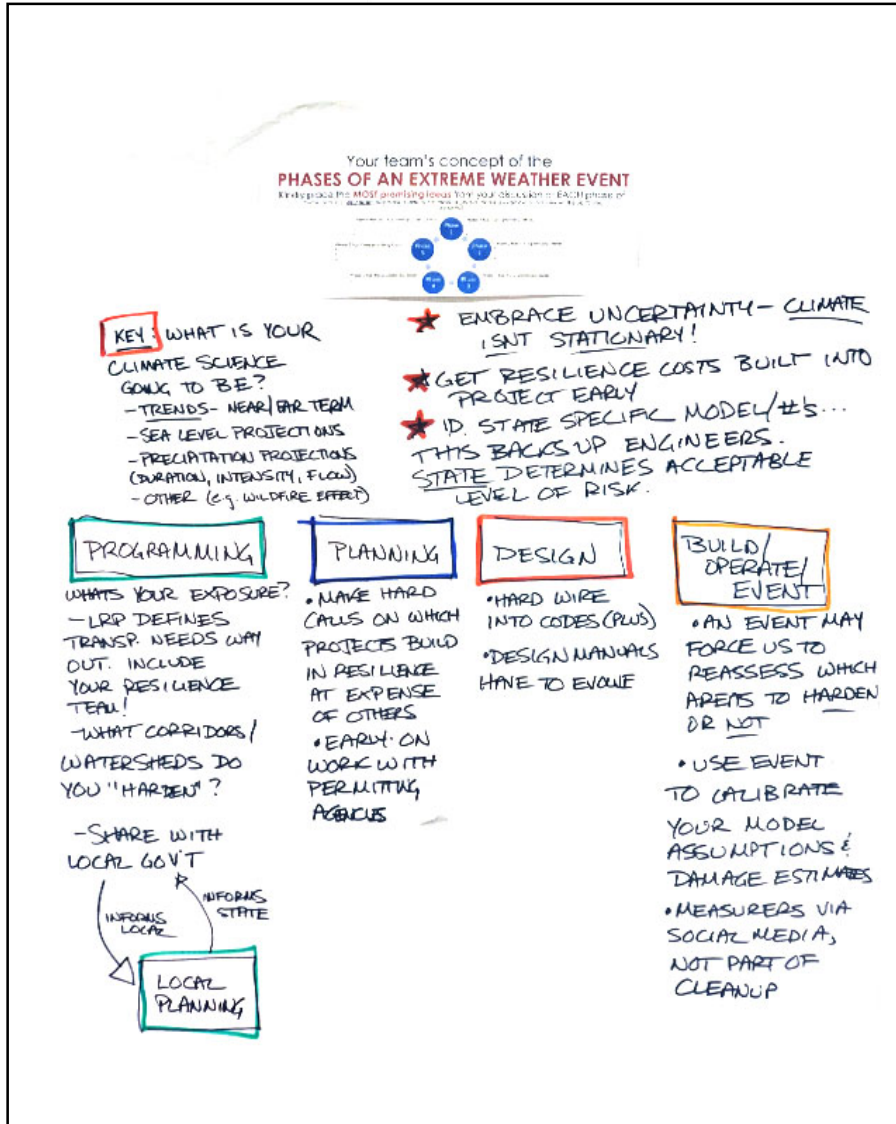
Pre-response  
 Establishing streamlined processes for storm response

Team's output reported back to group

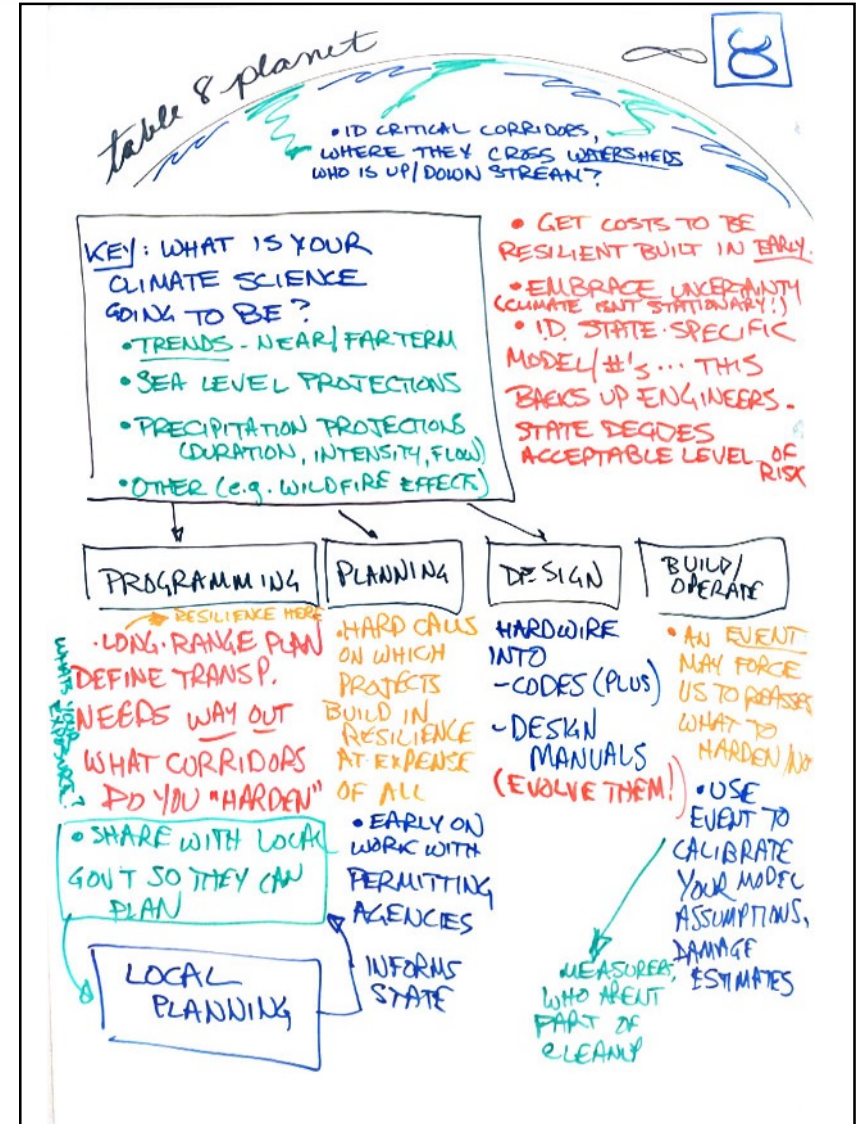
## Leadership Support

- Promote + celebrate work underway
- Integrate resiliency into regular capital planning process
- Understand and treat climate as a risk

Team's working wall

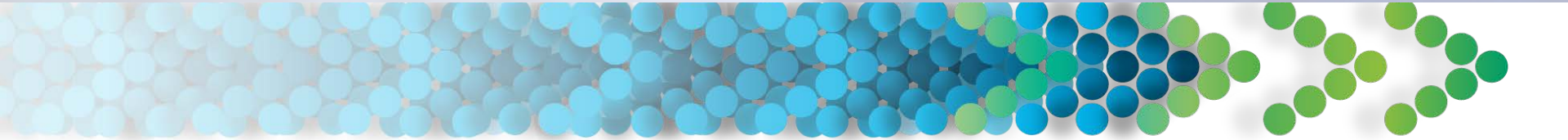


Team's output reported back to group



Team's working wall





## Luncheon & Information Sessions

# Luncheon Information Sessions

**Meg Pirkle:** Georgia (efforts to respond to future vulnerabilities)  
**Therese McAllister:** Ongoing Resiliency Efforts and Lessons Learned: California (legislation, agency policies)  
**Chris Schmidt:** NIST Community Resiliency Framework





Five Teams  
participated in  
this exercise:

Team One  
Team Two  
Team Four  
Team Seven  
Team Eight



## Breakout: Critical Factors for DOT Resilience

### Summarizing Questions to report back to larger group:

- **Understand and align** on what is **critically important to each of the following four State DOT groups** from a resiliency perspective: 1) Budgetary and Policy (leadership); 2) Planning/Environment Group; 3) Engineering Design ; 4) Operations/Emergency Response/Maintenance
- **The #1 critical thing** that feels is **the most important thing** among all discussed that agencies could do to become more resilient. Why is this the most important?

\*\*\* **OPTIONAL BONUS OUTPUT:** A graphic image which captures **the key elements of DOT resiliency to extreme weather events.**

# Output: Budgetary and Policy (Leadership)



**Budgetary and Policy (Leadership)**

Institutionalize Resilience into agency:

- Workflow
- position desc.
- Standards
- etc...

**Budgetary and Policy (Leadership)**

EXECUTIVE LEADERSHIP

BUY-IN & ADVOCACY

**Budgetary and Policy (Leadership)**

- \* LEADERSHIP/ CHAMPIONS FROM EACH DISCIPLINE
- POLITICAL/LEGISLATIVE SUPPORT
- ROI/FUNDING/LONG TERM BENEFITS

**Budgetary and Policy (Leadership)**

- 1) Have a policy
  - a) develop
  - b) integrate
  - c) communicate it
- 2) Whole Life-cycle Cost  
"cost of recovery curve"
- 3) Avoid underestimating

**Budgetary and Policy (Leadership)**

#1 POLICY MANDATE

Also:

- CRITICAL SUCCESS FACTORS + PERF. MEASURES
- Life cycle costing + resilience



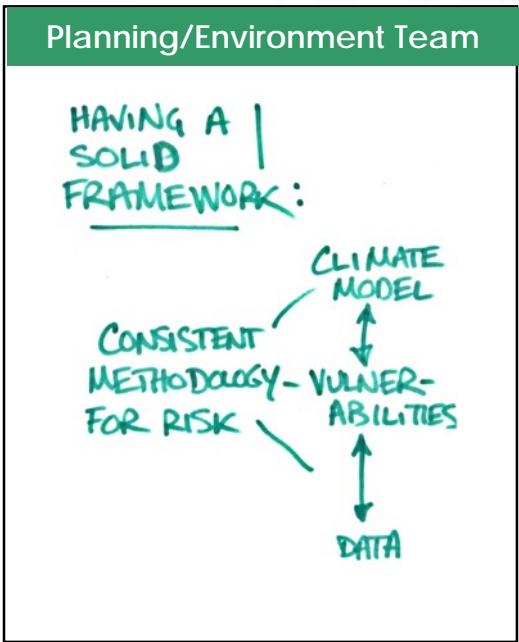
# Output: Planning/Environment Team



Planning/Environment Team

#1 GHG reduction is goal #1

~ Incorporate your state Vulnerability Assessment into NEPA



- Planning/Environment Team
- Vulnerability Assessment
  - Training
  - Impact on Envir.
  - Coordination w/ Envir. Partnering Agencies
  - Asset Mgt.
  - \* Incorporate into Planning/Program/Project Development Processes

Planning/Environment Team

Pre-planning :  
Check to ensure the Vulnerability assessment is completed.

Integrate prioritization into projects, early on.

Resiliency is built-in; buy-in with data and all pertinent departments. (Same page/one goal).

- Planning/Environment Team
- VULNERABILITY ASSESSMENTS -
- DATA
  - CRITICALITY
  -



## Engineering Design

△ the Manual!

△ = Change (v)

## Engineering Design

- ENGINEERS NEED PROCEDURES:
- SCIENCE-BASED
  - REPEATABLE
  - DEPENDABLE IN COURT
  - DESIGN PROCESS & INTEGRATED SCORING (INCORPORATES STATE-ID'S ACCEPTABLE RISK)
  - LIFECYCLE COSTING FOR OPTIONS

## Engineering Design

- DESIGN MANUAL UPDATES (HARD TO DO)
- AASHTO/ FHWA/ TRB/ STATE DOT GUIDANCE/ RESEARCH
- TRAINING
- \* INCORPORATING INTO PLN/ PROGRAMMING/ PROJ DEV PROCESSES

## Engineering Design

- Resiliency should be apart of ALL Phases.
- Incorporated into preliminary designs.
- Bring correct analysis to project; best methods.

## Engineering Design

- GUIDELINES FOR DESIGN
- flexible design
  - Design alternative



## Operations/Emergency Response/Maintenance

Proactive  
Response

## Operations/Emergency Response/Maintenance

- COMMUNICATIONS!
- THESE FOLKS KNOW THINGS. CONNECT THEM TO PLANNERS.
  - LISTEN TO THEM... OR LOSE THEM
  - LEVERAGE WHAT YOU LEARN FROM THEM ABOUT PAST EVENTS TO PREPARE FOR FUTURE ONES!

## Operations/Emergency Response/Maintenance

- EXERCISES
- TRAINING
- \* SOPs AND CONTACTS COORDINATION (INTERNAL/EXTERNAL)
- UPDATES TO EMERGENCY RESPONSE PLAN (COORDINATION INTERNAL/EXTERNAL)

## Operations/Emergency Response/Maintenance

- Program to incorporate broader resiliency requirements
- Prioritize maintenance based on risk
- Communication (ALL)

## Operations/Emergency Response/Maintenance

RESPONSE PLAN  
INFORMED FROM  
PAST EVENTS +  
DE-BRIEFINGS



**Best Thing From Team Discussion**

Use Resilience as the entry point (lever) ~~to~~ for transformational <sup>a</sup> approach for our transportation system.


**Best Thing From Team Discussion**

SHARING INFO AMONGST EACH OTHER

- Best Thing From Team Discussion**
- Leadership / Champion From Each Discipline
  - Incorporate into Planning/Program/Project Development Process
  - Updates to Emergency Response Plan (Coordination Internal/External)

**Best Thing From Team Discussion**

Integration of Resiliency as Part of the culture and daily operations.



**Best Thing From Team Discussion**

Importance of policy mandate



## Budgetary and Policy (Leadership)

Institutionalize  
Resilience into agency:

- workflow
- position desc.
- standards
- etc...

## Planning/Environment Team

#1 GHG reduction  
is goal #1

~ Incorporate your state  
Vulnerability Assessment  
into NEPA



## Engineering Design

$\Delta$  the  
Manual!

$\Delta = \text{Change (v)}$

## Operations/Emergency Response/Maintenance

Proactive  
Response



Best Thing From Team Discussion

Use Resilience as the entry point (lever) <sup>1</sup>/<sub>a</sub> for transformational approach for our transportation system.

DEFINING MEASURES LOOP -

INCLUDE RESILIENCE  
MANAGE EXPECTATIONS (ops)

1

CLEAR MANDATE (B/P)  
RELATIONSHIPS IN PLACE (P.O)

BUDGET PROCESS INCLUDE  
RESILIENCE

MEDIA COMMUNICATIONS CONTROL THE MESSAGE (ops) (B/P)  
BUDGET CUSHION (B/P)

REINFORCING GOVERNANCE  
STRUCTURE (B/P)

★ INSTITUTE/INTE RESILIENCE INTO  
WORK FLOW, POS DESG, STDS, ETC. (P/E)  
"FLEXIBLE" PROGRAMMING  
PROCESS (B/P)

- VULNERABILITY ASSESS. (P/E)

★ G&E MITIGATION IS GOAL #1 FOR ALL DECISIONS (P/E)

- TIE NEPA TO UIC ASSESS

- REVISE DESIGN MAN, POLICY

FOCUS ON CRITICAL CORRIDORS  
PROACTIVE RESPONSE





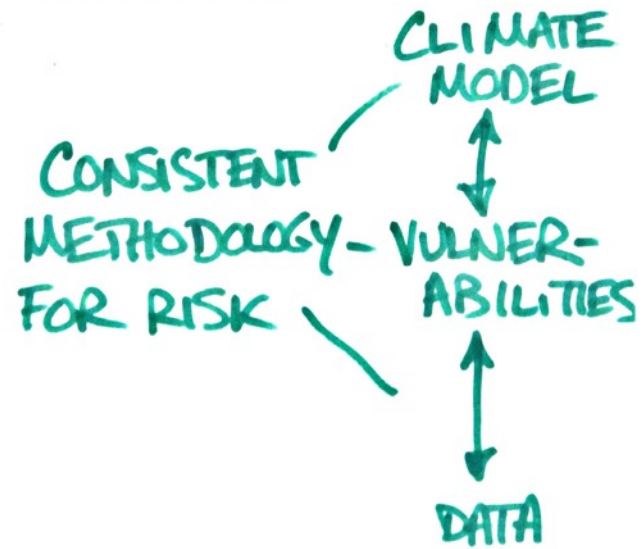
### Budgetary and Policy (Leadership)

EXECUTIVE  
LEADERSHIP

BUY-IN  
&  
ADVOCACY

### Planning/Environment Team

HAVING A |  
SOLID  
FRAMEWORK:



## Engineering Design

ENGINEERS NEED PROCEDURES:

- SCIENCE-BASED
- REPEATABLE
- DEFEND-ABLE IN COURT
- DESIGN PROCESS & INTEGRATED SCORING (INCORPORATES STATE-OF-THE-ART ACCEPTABLE RISK)
- LIFECYCLE COSTING FOR OPTIONS

## Operations/Emergency Response/Maintenance

COMMUNICATIONS!

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Best Thing From Team Discussion

SHARING INFO  
AMONGST EACH  
OTHER



Team's Work Wall

## Budgetary and Policy (Leadership)

- \* LEADERSHIP/  
CHAMPIONS  
FROM EACH  
DISCIPLINE
- POLITICAL/LEGISLATIVE  
SUPPORT
- ROI/FUNDING/LONG TERM  
BENEFITS

## Planning/Environment Team

- Vulnerability Assessment
- Training
- Impact on ENVIR.
- Coordination w/ ENVIR.  
Partnering Agencies
- Asset Mgt.
- \* Incorporate into Planning/Program/  
Project Development Processes



## Engineering Design

- DESIGN MANUAL UPDATES (HARD TO DO)
- AASHTO/FHWA/TRB/STATE DOT GUIDANCE/RESEARCH
- TRAINING
- \* INCORPORATING INTO PLN PROGRAMMING / PROJ DEV PROCESSES

## Operations/Emergency Response/Maintenance

- EXERCISES
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- UPDATES TO EMERGENCY RESPONSE PLAN (COORDINATION INTERNAL/EXTERNAL)



## Best Thing From Team Discussion

- Leadership / Champion  
From Each Discipline
- Incorporate into Planning/Program/  
Project Development Process
- Updates to Emergency  
Response Plan  
(Coordination Internal/  
External)

## BONUS GRAPHIC



Working together  
Building  
a  
Resilient  
DOT !



## BUDGETARY/POLICY

4

- ★ ROI / FUNDING / LONG TERM BENEFITS
- \*★ LEADERSHIP
- ★ CHAMPION FROM EACH DISCIPLINE
- ★ POLITICAL / LEGISLATIVE SUPPORT

## PLN/ENV

- ★ VULNERABILITY ASSESSMENT
- TRAINING
- IMPACT ON ENV
- COORDINATION w/ ENV PARTNER AGENCIES
- ASSET MGT
- \*★ INCORPORATE INTO PLN/PROGRAMMING/PROJ DEV PROCESSES

## ENGINEERING DESIGN

- DESIGN MANUALS UPDATES (HARD TO DO)
- AASHTO/FHWA/TRB GUIDANCE/RESEARCH STATE DOTs
- \*★ INCORPORATE INTO PLN/PROGRAMMING/PROJ DEV PROCESSES
- TRAINING

## OPS/MAINTENANCE/EMER RESP

- \* SOPs CONTACTS
- COORDINATION (INTERNAL/EXTERNAL)
- ★ UPDATES TO EMER RESPONSE PLAN
- COORDINATION INTERNAL & EXTERNAL
- EXERCISES
- TRAINING

## Budgetary and Policy (Leadership)

- 1) Have a policy
  - a) develop
  - b) integrate
  - c) communicate it
- 2) Whole Life-cycle cost  
"cost of recovery curve"
- 3) Avoid underestimating

## Planning/Environment Team

Pre-planning :

Check to ensure the Vulnerability assessment is completed.

Integrate prioritization into projects, early on.

Resiliency is built-in; buy-in with data and all pertinent departments. (Same page/one goal).



## Engineering Design

- Resiliency should be apart of ALL Phases.
- Incorporated into preliminary designs.
- Bring correct analysis to project; best methods.

## Operations/Emergency Response/Maintenance

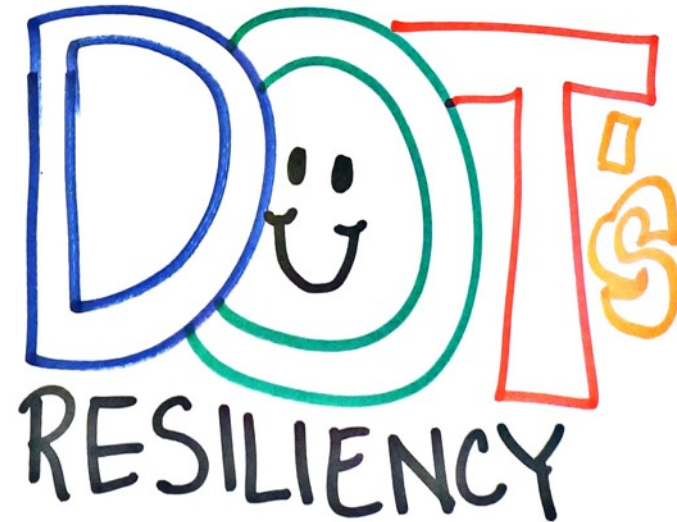
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- Prioritize maintenance based on Risk
- Communication (ALL)

Best Thing From Team Discussion

Integration of  
resiliency as  
Part of the culture  
and daily operations.



BONUS GRAPHIC



Note: Team did not use work wall

## Budgetary and Policy (Leadership)

#1  
POLICY MANDATE

Also:

- CRITICAL SUCCESS FACTORS + PERF. MEASURES
- Life cycle costing + resilience

## Planning/Environment Team

VULNERABILITY  
ASSESSMENTS -

- DATA
- CRITICALITY
-





## Engineering Design

### GUIDELINES FOR DESIGN

- flexible design
- Design alternative

## Operations/Emergency Response/Maintenance

RESPONSE PLAN  
INFORMED FROM  
PAST EVENTS +  
DE-BRIEFINGS

Best Thing From Team Discussion

Importance  
of policy  
mandate

BONUS GRAPHIC





## ① Budgetary / Policy (Leadership)

- 2. add critical success factors / PM's
- 3. incorporate resilience in Life-Cycle Cost
- 1. policy mandate / impetus for resiliency
  - factor resiliency in capital programming / project budgeting / selection
  - update policies / guidelines for various functions
  - establish criteria for prioritization, allocation and selection

## ② Planning / Environment

- inventory of infrastructure and climate data
- 1 - vulnerability assessment (feedback to capital programming)
  - natural systems as mitigation strategies
  - role of system/assets in serving community
  - collaboration w/ regulatory agencies
  - co-benefits (transp & environment)

## ③ Engineering Design

- Guidelines for Flexible Design
- Design Alternatives

## ④ Operations / ER / Maintenance

- Incorporate in Engineering Design / Planning / Policy
- Post-event de-Briefing
- 1. Response Plan informed by past events
  - Tabletop Exercises
  - Communications
  - Institutional Relations
  - Feedback to Asset Management → Planning









Thank You  
from Fast  
Forward  
Collaboration



Any questions? Contact us!

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