

Introductions

□ What is the Volpe Center?

- Est. in 1970
- U.S. DOT Office of the Assistant Secretary for Research and Technology (OST-R)
- Multimodal research and innovation center in Cambridge, MA
- Supports all DOT modal administrations and other government clients



Credit: USDOT Volpe Center

□ Who are we?

- Cross-disciplinary team working on climate change adaptation challenges with support from DOT Office of Research, Development and Technology

Agenda

1. **Project Background**
2. **Existing DOT Climate Change Adaptation Tools and Resources**
3. **Gaps and Opportunities**
4. **Questions and Comments**
5. **“Dots” Exercise**



Credit: Steve Hillebrand/USFWS

Project Background

- ❑ Developed during 2013 Volpe Innovation Challenge
- ❑ Internal competition to develop innovative ideas to support our customers in advancing transportation for the public good
- ❑ Judged by high-ranking officials from U.S. DOT modal administrations
- ❑ OST-R supported expansion beyond initial seed funding

Volpe
INNOVATION CHALLENGE



Credit: USDOT Volpe Center

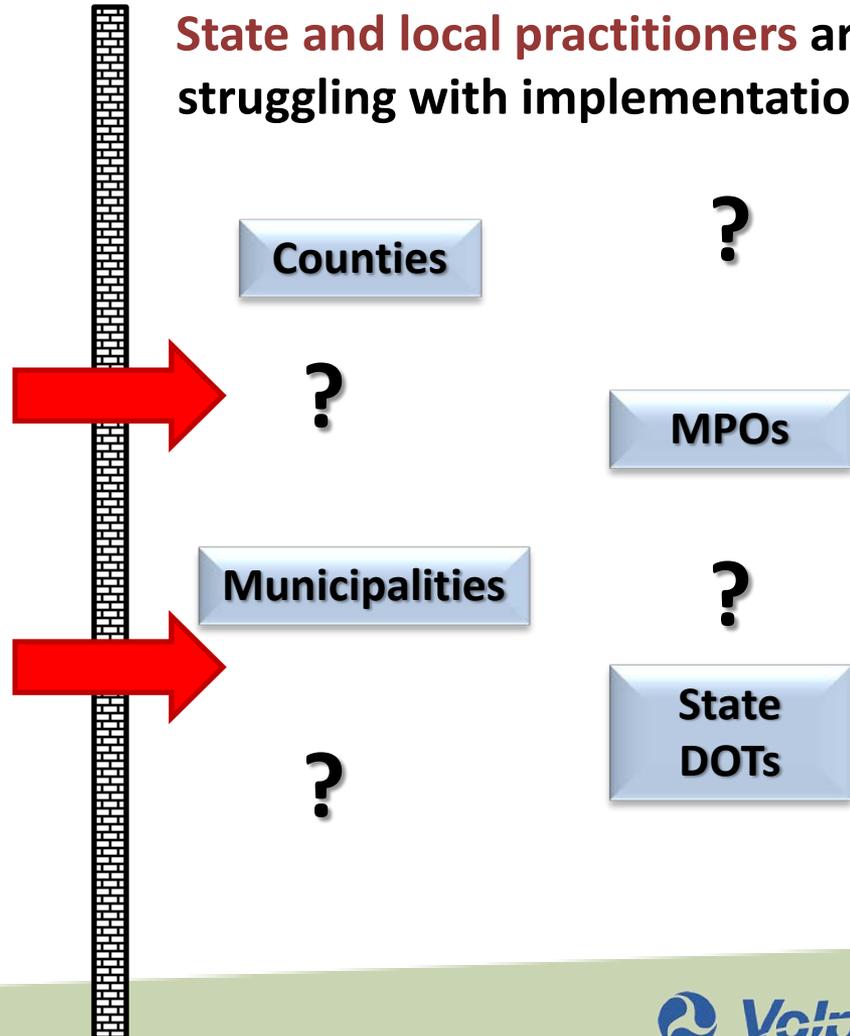
Project Background

Federal agencies are developing excellent resources, tools, data



However...

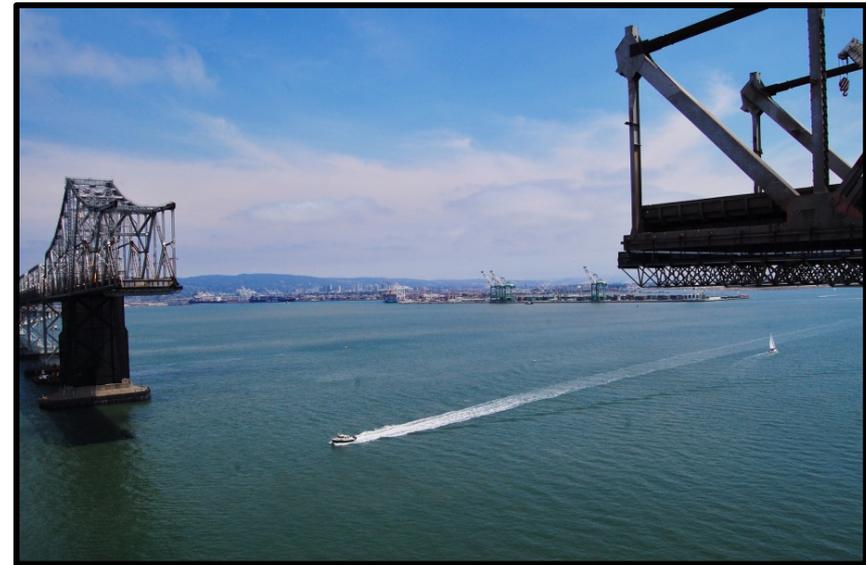
State and local practitioners are struggling with implementation



Project Background

□ Project Goals

- Help agencies bridge the gap between federal initiatives and implementation at state, regional, and local levels
- Identify opportunities for DOT and other federal agencies to improve support to practitioners on the ground



Credit: Flickr/Brad Herman

Project Background

□ Project Outline

- **Phase I:** Identify and catalogue federal climate change adaptation tools and resources relevant to the transportation sector
- **Phase II:** Describe an “expert system” that would help practitioners determine which resources are relevant to their situation
- **Phase III:** Complete a retroactive case study of a climate adaptation planning process we supported, describing how the expert system would have helped execute the project and/or changed approach

Project Background

❑ OST-R Funded Extension

- ❑ **Workshops:** Gather feedback from agencies and practitioners through a series of three workshops paralleling each phase
- ❑ **Identify Gaps and Opportunities:** Listen to what is working and what isn't through informal conversations with practitioners, reviewing pilot reports, and through workshops



Credit: USFWS

DOT Climate Change Adaptation Tools and Resources

□ Phase I Objectives

- Compile a comprehensive list of DOT resources oriented to state, regional, and local agencies
- Include information that will make these resources more accessible and understandable

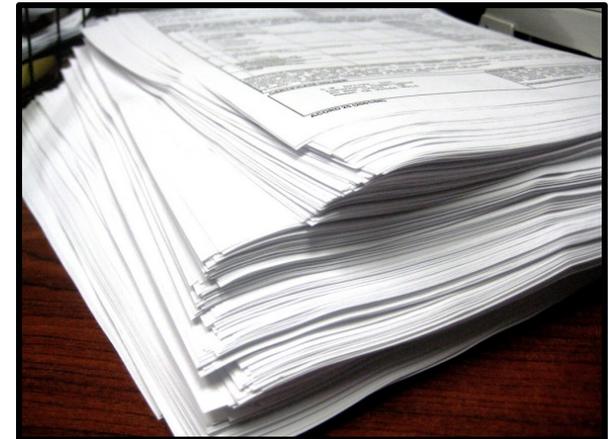
□ Phase I Process

- Online search for DOT agency climate change adaptation tools and resources
- Categorized resources by type, modal relevance, project type relevance, and scale applicability
- Vetted lists with each DOT agency in early 2015

DOT Climate Change Adaptation Tools and Resources

□ Phase I Results

- 290 resources identified across U.S. Government
- 69 DOT resources identified
- DOT Resources:
 - 1 analysis framework (FHWA)
 - 12 climate-change analysis tools
 - 56 data sources, references, case studies
- Most DOT resources from FHWA, OST-R/Climate Center, and FTA



Credit: Flickr/Sara Grajeda

Feedback from Practitioners

□ Background

- Informal conversations with practitioners at 7 (★) state, regional, and local government agencies working on climate adaptation
- Reviewed 5 final and 10 (★) draft FHWA adaptation pilot project reports for recommendations and gaps



Feedback from Practitioners

1. General
2. Data and Research
3. Vulnerability and Risk Assessments
4. Implementation
5. Modeling and Mapping
6. Evacuation and Disaster Planning
7. Asset Management
8. Outreach and Communication
9. Cost/Benefit Analysis

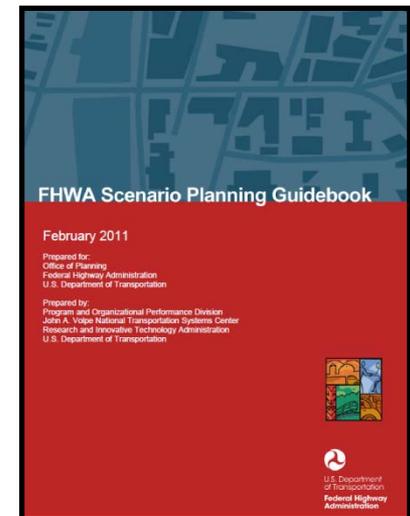


Credit: NYC Transit

Feedback from Practitioners

□ General

- Handbook/distilled information for practitioners beginning to work on climate change vulnerability and adaptation
- Continue to integrate climate adaptation planning with general scenario planning



Credit: FHWA

Feedback from Practitioners

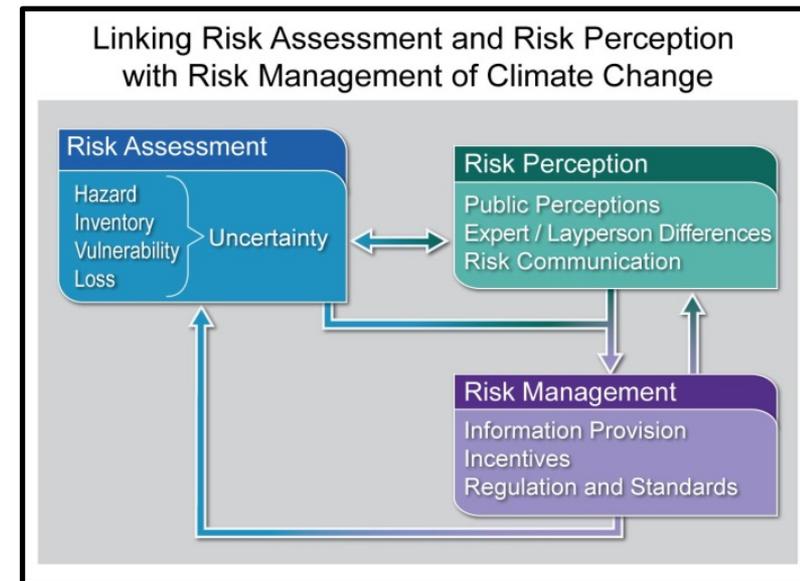
□ Data and Research

- Consistency among datasets
 - Across agencies, among states/regions
- Access to / development of less common datasets
 - Erosion, wildfire, landslide risk
 - Infrastructure impacts (e.g., salt water effects on infrastructure, high heat effects on pavement)
- National standard for agency data on own facilities/assets
- Historical data, geospatial data, design features of existing infrastructure

Feedback from Practitioners

□ Vulnerability and Risk Assessments

- Fine-scale modeling of multiple interacting, complex issues
- Potential additions to vulnerability assessment
 - Cost, environmental justice, ecological impacts
- Guidance on assessment scale options
- Guidance on risk-tolerance thresholds



Credit: Emily Cloyd, U.S. Global Change Research Program; National Climate Assessment 2014

Feedback from Practitioners

❑ Implementation

- Guidance on incorporating climate change risk assessment and solutions into existing processes (e.g., design)
- Guidance on low-cost/add-on incremental improvements
- Updated inputs into design processes

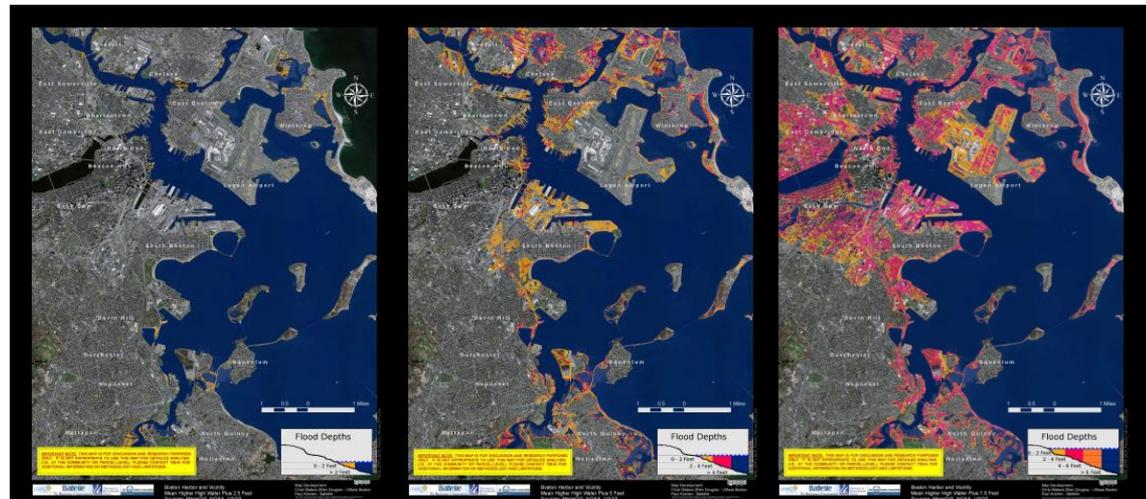


Credit: USFS

Feedback from Practitioners

□ Modeling and Mapping

- Improved modeling of future climate change impacts at transportation project scales
- Improved visualization of future climate change impacts



Credit: Boston Harbor Alliance

Feedback from Practitioners

❑ Evacuation and Disaster Planning

- Modeling of critical link identification, vulnerability and prioritization
- Guidance on using downscaled projections for emergency/evacuation planning

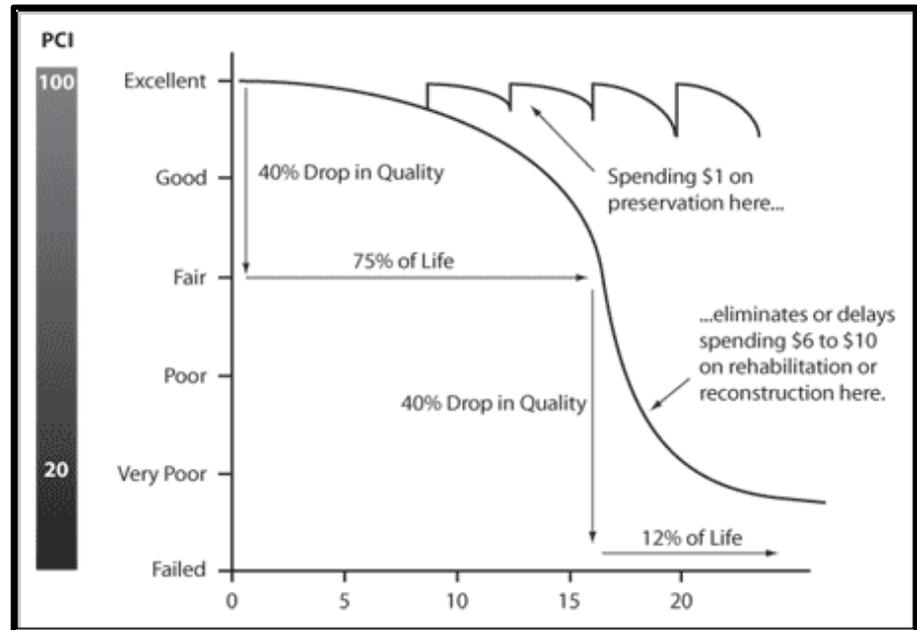


Credit: Flickr/Alex Proimos

Feedback from Practitioners

❑ Asset Management

- Guidance on incorporating climate change projections into asset condition and deterioration projections
- Incorporation of vulnerability assessment into existing asset management tools



Credit: FHWA

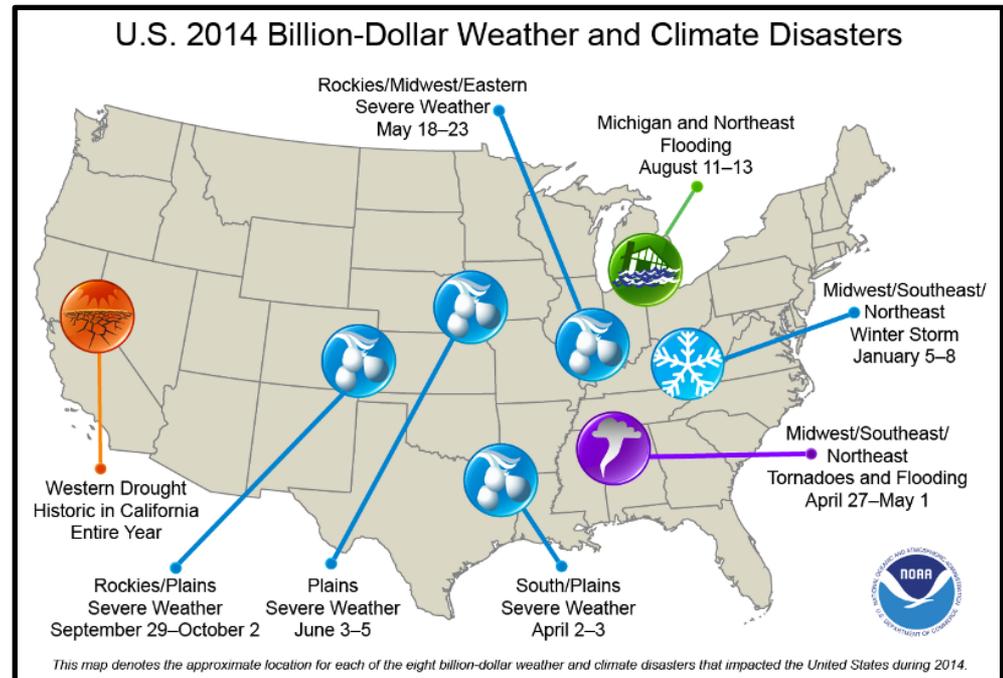
Feedback from Practitioners

- ❑ **Outreach and Communication**
 - Centralization of information
 - Support and training programs
 - Build a community of climate adaptation professionals
 - Visualizations/communication tools

Feedback from Practitioners

❑ Cost-benefit analysis

- Incorporate cost of repair/replacement into vulnerability assessments
- Incorporate economic impacts of asset impairment into analyses



Credit: NOAA

Conclusion

- ❑ **Synthesis highlighted success of DOT agencies in developing climate change adaptation resources**

- ❑ **Opportunity for DOT to use existing tools and resources and adapt across agencies**

- ❑ **Feedback from practitioners suggest there is more to do**
 - Integration of climate change planning into well-established planning tools
 - Better data, visualizations, and outreach/communication tools
 - Expansion of existing models to consider additional issues (e.g., cost)

Next Steps

- ❑ Refine matrix of existing resources
- ❑ Develop “expert system” concept
- ❑ Retroactive case study
- ❑ Further discussions with practitioners
- ❑ Workshops to review project results and facilitate interagency communication on available tools and resources



Questions or Comments?

Dots Exercise

Thank You!

Kristin Lewis, Ph.D.

Environmental Biologist
Energy Analysis and Sustainability
Kristin.Lewis@dot.gov

Benjamin Rasmussen

Community Planner
Transportation Planning
Benjamin.Rasmussen@dot.gov

Kevin McCoy

Community Planner
Transportation Planning
Kevin.McCoy@dot.gov

Jonathan Cybulski

Environmental Protection Specialist
Environmental Science and Engineering
Jonathan.Cybulski@dot.gov