Appendices

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- Research Data Curation Presentations
- Promoting a Culture of Research Presentations

APPENDIX A: Full Agenda

CDOT Applied Research & Innovation Branch

Peer Exchange

February 28-March 1, 2023 | 8:30AM-5:00PM

CDOT HQ, Auditorium Westroom 159

MEETING PURPOSE: Shared understanding of experiences, challenges, and best practices amongst State Transportation Research Managers and USDOT

CDOT PEER EXCHANGE DAY ONE (FEB. 28)	
TIME	**AGENDA ITEM**
8:30	**Welcome and Introductions**
9:15	**Overview of State R&I Programs** • State Presentations • Group Discussion **Objective:** *Familiarize and understand the work of each state research branch*
11:30	**LUNCH**
1:00	**Topic 1: Leading Pooled Fund Projects**

	• Presentation: Tricia Sergeson, Federal Highway Authority–Transportation Pooled Funds • State Experiences • Group Discussion **Objective:** *Review best practices of leading and participating in pooled fund projects and better understand how to overcome common challenges*
	Recap Day 1 and Preview Day 2

CDOT PEER EXCHANGE DAY TWO (MAR. 1)

TIME	AGENDA ITEM
8:30	**Review Day 1, Preview Day 2**
8:45	**Topic 2: Research Data Curation** • State Experiences • Presentation: Leighton Christiansen, National Transportation Library–Bureau of Transportation Statistics • Group Discussion **Objective:** *Update and discussion of best practices and federal requirements regarding data curation, writing data management plans, data hosting, and public access/open science*
11:30	**LUNCH**

1:00	**Topic 3: Promoting a Culture of Research** • State Experiences • Group Discussion **Objective:** *How to foster an appreciation for Research & Innovation throughout state transportation departments as they change through retirement and turnover*
3:30	**Roundtable Reflection** **Objective:** *Discuss what takeaways each state will bring home to share and put into practice*
4:30	**Exchange Recap, Housekeeping, and Adjourn**

OPTIONAL DAY THREE (MAR. 2): 8:30 AM. Central 70 Walking Tour with Stacia Sellers. 3543 E. 46th Ave, Denver, CO 80216. Dress for weather

APPENDIX B: Participant Contacts

Name	Agency	Title	Email
Steve Cohn	CDOT	Research Program Director	steve.cohn[at]state.co.us
David Reeves	CDOT	Engineering and Maintenance Program Manager	david.reeves[at]state.co.us
Thien Tran	CDOT	Research Engineer / Program Manager - Structure, Hydraulics/Hydrology, Geotechnical, Pavement & Materials	thien.tran[at]state.co.us
Bryan Roeder	CDOT	Environmental and Planning Research Program Manager	bryan.roeder[at]state.co.us
Sarah Zepeda	CDOT	Research Librarian	sarah.zepeda[at]state.co.us
Meteb Mejbel	CDOT	Air Quality Research Intern	meteb.mejbel[at]state.co.us
Tricia Sergeson	FHWA	TPF Program Manager	patricia.sergeson[at]dot.gov
Aaron Bustow	FHWA–Colorado Division	Transportation Planner	Aaron.Bustow[at]dot.gov
Jen Harper	MoDOT	Research Director	Jennifer.Harper[at]modot.mo.gov
Amanda Laib	ITD	Senior Research Analyst	Amanda.Laib[at]itd.idaho.gov
Emily Parkany	VTrans	Research Manager	emily.parkany[at]vermont.gov
Hua Xiang	MDOT	Deputy Director of Policy and Research	hxiang[at]mdot.maryland.gov
Leighton Christiansen	NTL-BTS	Data Curator	leighton.christiansen[at]dot.gov

APPENDIX C: Action Items

The following list of action items was shared directly after the meeting to support greater idea-sharing and aid in the preparation of this report.

CDOT
- ➔ Follow up with NTL-BTS regarding Research Brief cataloging

ITD
- ➔ Share Pavement Structural Evaluation with Traffic Speed Deflection Devices Success story with FHWA
- ➔ Share program request form template with all participants

MDOT
- ➔ Share knowledge management "best-practice" documents
- ➔ Share 2017 survey with all participants as an example

MoDOT
- ➔ Touch base about HIVE2 specs with VTrans
- ➔ Share "value statements" with VTrans
- ➔ Connect with Tricia regarding innovation challenge ideas that need to be crash-tested

VTrans
- ➔ Touch base about HIVE2 specs with MoDOT
- ➔ Share surveymonkey questions with all participants

FHWA-TPF
- ➔ Connect with MoDOT regarding innovation challenge ideas that need to be crash-tested
- ➔ Check what federal agencies (e.g. EPA, DOE) outside of FHWA have participated as TPF partners and share with CDOT
- ➔ Share FMIS access email with State DOTs
- ➔ Look into states who overcame struggles to lead TPF Projects and share with all participants
- ➔ Set aside time at the RAC summer meeting or schedule a webinar to further discuss state hurdles of leading TPF studies

NTL-BTS
- ➔ Share Data Curation Network contacts with the group
- ➔ POTENTIAL: Group to re-meet with NTL regarding State DOT data curation network

All
- ➔ Share any feedback on new FMIS Fund Transfer Process with FHWA
- ➔ Share any Pooled Fund success stories with FHWA
- ➔ RESOURCE: reach out to Enid White at Wyoming DOT for Data Management Plan support
- ➔ POTENTIAL: Group to re-meet with NTL regarding State DOT data curation network

APPENDIX D: Shared Documents

ITD Research Program Request Form

ITD RESEARCH PROGRAM

PROJECT REQUEST FORM

1. TITLE:

2. SUBJECT AREA:
(e.g., Pavements, Bridges, Environment, Maintenance, Safety, Planning, Management, etc.)

3. PROBLEM STATEMENT:
What problem would be addressed by this project?

How is ITD impacted by the problem?

4. LITERATURE SEARCH SUMMARY:
Describe how your proposed research differs from, or will build upon, the existing body of research found in a review of relevant literature (do not include the literature search results). If no search is performed, explain why it was not needed. Literature searches can be conducted on TRID (http://trid.trb.org), which includes the Research in Progress database (http://rip.trb.org/). An excellent resource on conducting literature searches is Transportation Research Circular "E-C194: Literature Searches and Literature Reviews for Transportation Research Projects" (specifically Part I, pages 1-18) available at https://onlinepubs.trb.org/onlinepubs/circulars/ec194.pdf.

5. RESEARCH PROPOSED:
What are the objectives of the proposed project?

Is the proposed work an extension of past research efforts?

What tasks do you envision?

What deliverables/outputs will be produced?

How will the research results be implemented?

6. ANTICIPATED BENEFITS/OUTCOMES:

How will the information and deliverables generated from the project be used to solve the problem?

How will the proposed research further the accomplishment of ITD's long-range goals and/or key focus areas?

What practical benefits will result from the work proposed, and how can they be measured? (cost savings, process efficiencies, accidents reduced, lives saved, etc. – please be specific)

7. RESEARCHER/CONSULTANT SELECTION:

Note - Research may be conducted by universities or private research firms. New legislation (section 67-2332A, Chapter 23, Title 67 of Idaho Statute) requires that contracts with Idaho universities be competitively solicited. Due to this requirement, the ITD Research Program competitively bids contracts of research projects. Problem statements need to be developed in-house by department staff to help ensure a level playing field when projects are put out to bid

Is there a well-supported reason the project can/should not be competitively bid?

____ *Yes*
____ *No*

If you selected yes, please explain the unique qualifications of the researcher or circumstances that would support a sole source selection or exemption from competitive bidding requirements.

8. ESTIMATE RESEARCH PERIOD AND FUNDING NEEDED:

Estimated Length of Project: **_____ months**
Estimated Cost for the Project: **$_____**

PROJECT SPONSOR:

(Each project request must be signed by a project sponsor –section manager or above – who will champion the project through implementation. The sponsor will designate a project manager to provide day-to-day technical oversight of the project, approve the final scope of work, review all project deliverables, and takes the lead in facilitating implementation of recommendations when the research is completed.)

Name: _____ **Title: _____**

Signature: _____

PROPOSED ITD PROJECT MANAGER:

(The project manager will be responsible for ITD's technical oversight of the project. The project manager chairs the technical advisory committee (TAC), schedules periodic meetings between the researchers and the TAC, reviews and

approves project-related invoices, coordinates technical review of all deliverables by the TAC, and coordinates implementation planning efforts.)

Name: _____ **Title: _____**
E-mail:_____ **Phone #: _____**

ITD STAFF DEVELOPING THIS REQUEST:
Name: _____ **Title: _____**
E-mail:_____ **Phone #: _____**

Submit completed forms by Friday, March 17th to:

Ned Parrish
Research Program Manager
Ned.Parrish@itd.idaho.gov
208-334-8296

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MDOT Knowledge Management Documents

Top 10 "What PIs Should Know" for MDOT SHA Research Projects

1. **Include the time to develop, write, and edit the final report in the project timeline in the proposal.** *Too often this happens after the anticipated completion date and adds another six – 12 months to the project.*
2. **Find out what costs can be reimbursed by MDOT SHA before submitting the proposal.** *Examples of ineligible* costs include computer equipment, publication costs and travel to conferences (unless requested by MDOT SHA). Knowing this helps avoid delays!
3. **Set a meeting schedule at the beginning of the project.** *Regular communication is critical to a successful outcome!*
4. **The project manager is the primary contact for all project related communication.** *For MDOT SHA projects there are generally two project managers: one in the Research Division and one in the technical office. Please make sure that these individuals are included in all correspondence and discussions.*
5. **Set deadlines for responses to questions and for reviewing information.** *All project team members are expected to respond in a timely fashion. If there is a problem getting a response from MDOT SHA team members, notify the project manager in the Research Division immediately*.
6. **Notify the project managers as soon as problems come up on a project.** *Do not wait for the next meeting or quarterly report submission. It helps avoid unnecessary delays.*
7. **Keep the customer in mind when writing the final report.** *The report is for MDOT SHA staff so it should be concise (this is not a thesis or dissertation!), easy-to-read, and thoroughly edited. Avoid redundancies, difficult to understand terms, and equations (they can go in the appendix).*
8. **Provide at least a 30 day notice of any presentations that will be made on MDOT SHA sponsored projects.** *MDOT SHA would like the courtesy of being able to review what will be presented and may want to attend if possible (e.g. TRB Annual Meeting).*
9. **Notify the project manager of any publications, papers, or media attention related to an MDOT SHA sponsored project.** *When an article or a story appears in the media, MDOT SHA's Office of Communications often receives inquiries. It helps to let them know in advance so that they are not caught off guard and are prepared to respond*.
10. **The Research Division appreciates project photos.** *If you have good pictures from the lab or field visits, please email them to the project manager in the Research Division. They can be used in the Research Annual Report and to help promote the research program and partnerships.*

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Best Practices for Project Managers

Here are some tips that can help you succeed in your role as a project manager:

1. **Manage the project, don't let it manage you!** You are the project manager and therefore are responsible for oversight of the project. Being passive in this role is a big mistake. Maintain control and if you are struggling with something, seek guidance.

2. **Make frequent contact with technical lead and P.I.** Communication is the key to success and critical to identifying problems. It is better to identify a potential problem early on than to mitigate the damage once it's too late.

3. **Manage the scope of work and monitor the schedule and budget.** Make sure a progress report is received at the end of each quarter. Review the scope of work to determine how the project is progressing in terms of schedule and budget.

4. **Focus on implementation from the very beginning.** Ask questions such as "How will this affect MDOT SHA?" "Who will have to be on board with the research?" "Will training be required?" "Do future modifications/enhancements need to be considered?" "Are there future costs that need to be considered?"

5. **Involve people from all technical areas that would benefit from or be impacted by the project results.** Being too broad is better than being too narrow.

6. **Guard against scope creep.** With scope creep, a series of small changes — none of which appear to affect the project individually — can accumulate and have a significant overall impact on the project. Many projects fail because of scope creep, and the project manager needs to be diligent in working with the technical lead to make sure they get what they want from the project in a timely and cost-effective manner.

7. **Identify risks up front.** Some risks are inherent in a complex process-improvement project that affects every person in a technical office. Other risks may include the PI not having the right level of expertise or overall unfamiliarity with the technology.

8. **Continue to assess potential risks throughout the project.** Perform a quarterly assessment to determine whether other risks/issues have surfaced that need to be managed.

9. **Look for warning signs**
   - A small variance in schedule or budget starts to get bigger, especially early in the project.
   - You discover that activities you think have already been completed are still being worked on. For example, data you thought has been provided by the technical office is still not.
   - Deliverable quality starts to deteriorate. For instance, some expected functionalities of a simulation model will not be enabled due to lack of recent data.
   - Time allocated for quality-control steps, validation of models, and evaluation of results starts to be cut back from the original schedule. Don't cut back on the activities that ensure the work is done correctly.
   - If these situations occur, raise the issue, and put together a plan to proactively ensure that the project stays on track.

10. **Resolve issues as quickly as possible.** Issues can cause big problems. The project manager should manage issues proactively to ensure that they are being resolved. If there is no urgency to resolve the issue or if it has been on-going for some time, it may not really be an issue. It may be a potential problem (risk), or it may be an action item that needs to be resolved at some later point. Real issues, by their nature, must be resolved with a sense of urgency.

11. **Emphasize the importance of a well-written project report.** Reports should not exceed 75 pages and should be written with practitioners, not academics, in mind.

12. **If equipment (over $500 unit price) has been purchased by the University for the project, please discuss and document how it will be handled upon completion of the project.**

13. **Always ask other project managers or your supervisor for direction or insight if you have questions or concerns.**

VTrans Survey Example

BMD Benefits Kickoff Discussion

- Eager to make sure that we're getting everyone involved in what we'll get out of the project
- We want to consider project benefits
- We want everyone thinking about how we will use/implement the project
- We are hoping to be able to tell a story about the impact and value of this project

Today/Going Forward

- Today
  - We want to quickly review the survey results
  - We want to lead a short discussion of additional benefits and implementation
- Going Forward
  - Expect more surveys and discussions

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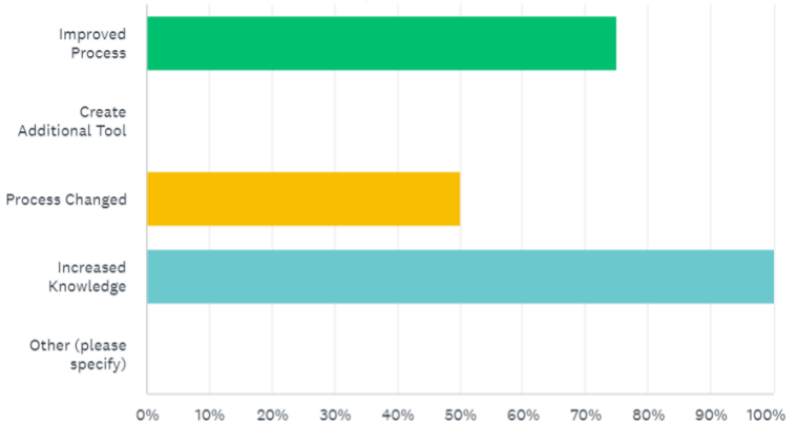
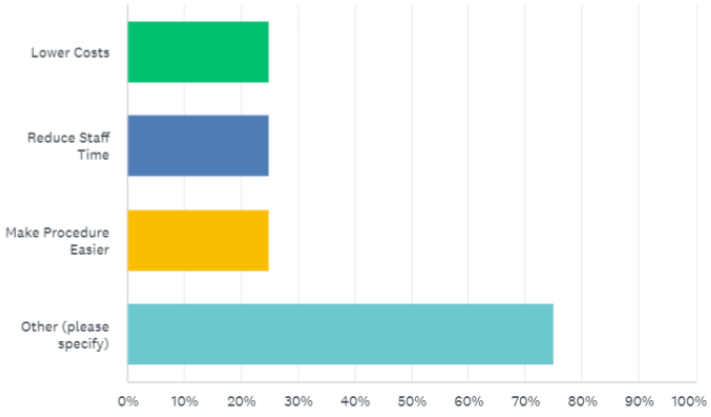
What type of improvement will this project accomplish?



How will this research make things easier?



Improve construction quality through implementation of new quality testing protocols

Increase confidence in testing results

It will not “make things easier”

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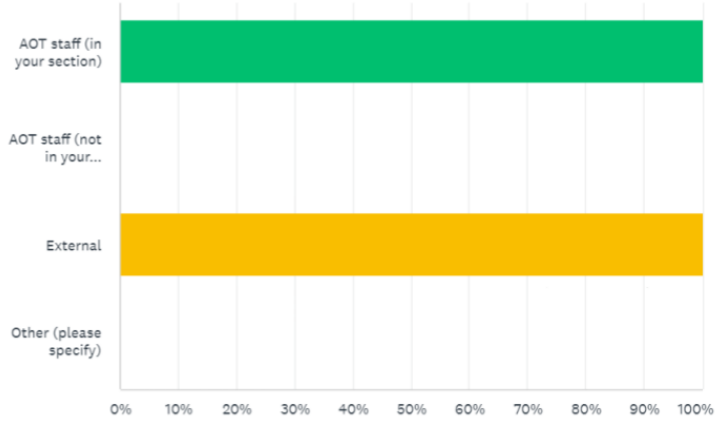
Who are the stakeholders for this research?



What do you think the benefits will be?

Enhance VTrans understanding of HMA performance test inter-laboratory repeatability increase producer familiarity with standard protocols for HMA performance tests framework for updates to specifications

The biggest benefit from this project will be a more fundamental understanding of how the paving industry within VT (and the NE region) is doing in terms of conducting performance testing, and whether there are remedial steps that need to be taken as an Agency policy moving forward. It is important to understand how variability and precision play a role in conducting these tests, as well as what the reproducibility is amongst our regional partners.

A better understanding of the applicable tolerance for performance testing, which will inform our specification updates

Increase the confidence in test results from HMA mix design testing

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How do you plan to use the results of this project?

As the lab (performing the work), we will deliver data to AOT. It is anticipated that the results would be used to inform engineering decisions regarding HMA Performance Test requirements in project specifications moving forward, or to use this program annually as a quality check on producers submitting test data to AOT for acceptance

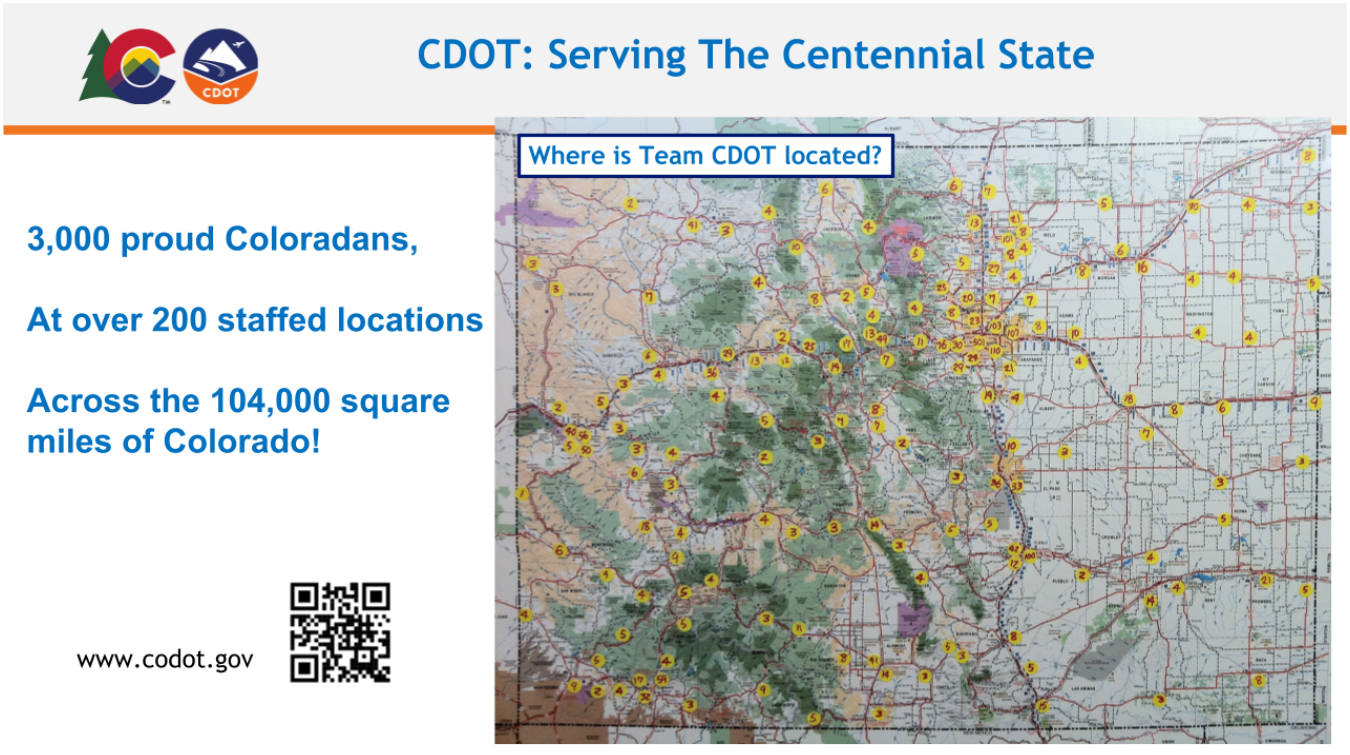
To update the specifications for HMA Mix Design Requirements

The most likely outcome from this project, in my opinion, is that changes to the Agency's specimen preparation procedures described in the Mix Design Submittal Policy will be made based on findings from this project. For example, one possible change is that some results in the cracking tests (the I-FIT and IDEAL-CT) may be deemed "invalid" if the coefficient of variability (COV) is above a certain threshold, or that an "outlier" procedure may need to be added for analyzing the results. Another possible outcome is that all performance testing for mix design approval would be mandated to take place within the Agency's Central Laboratory. This would likely occur if the variability between results obtained in this study are determined to be too high, as there is differing accounts throughout the industry in regards to whether specimen preparation procedures may be considered a major source of variability.

APPENDIX E: Presentations

State Research Overview Presentations

CDOT Applied Research and Innovation Branch
February 28, 2023

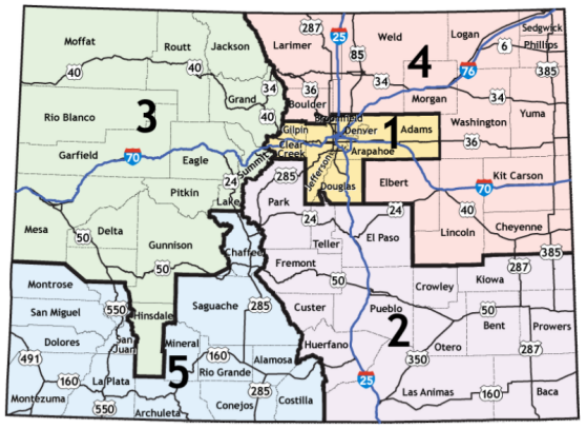


CDOT Facts and Regions

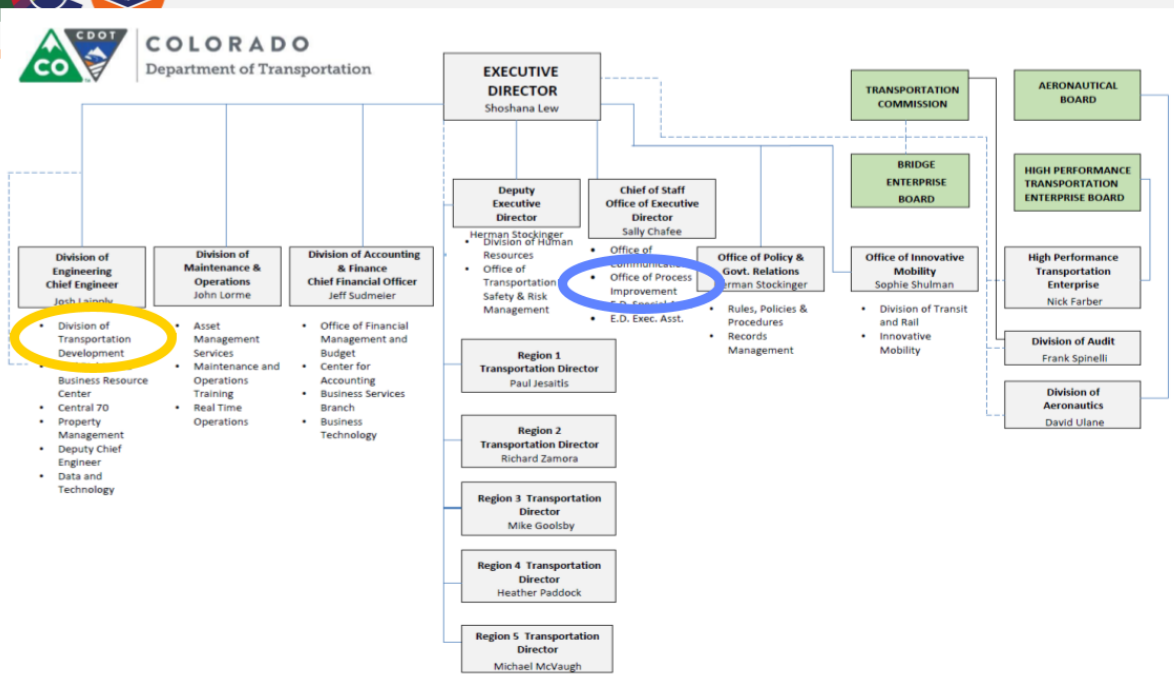
- **22,966 lane miles**
- **3,460 bridges and major structures**
- **9,074 Center Lane Miles of highway**
- **33 billion miles of annual vehicle travel**

- **866 snowplows**
- **7 million lane miles plowed each year**
- **35 mountain passes kept open**
- **278 of 522 avalanche paths monitored**

- $11M/$41M in transit/aviation grants admin
- $5 million in federal grants for safe driving
- **In CO: 65,000 EVs; target 940,000 by 2030.**



Organizational Structure



Division of Transportation Development

Division Director
Darius Pakbaz (acting)

- Applied Research and Innovation — Steve Cohn
- Environmental Branch — Jane Hann
- Information Management — Erik Sabina
- Multimodal Planning — Marissa Gaughan
- Performance and Asset Management — William Johnson
- Freight Mobility and Safety — Craig Hurst

Office of Process Improvement (Innovation)

Director
Gary Vansuch

Mission Statement

The mission of the Applied Research and Innovation Branch (ARIB) is…

To conduct a program of high-quality, applied research, advancing solutions to the increasingly complex needs confronting Colorado's transportation future.

In short, research with results that get used

6

Traditional Research Areas ("the 4 pillars")

Environmental & Water Quality, Planning	Safety and Operations; Pooled Fund mgmt.	Pavement & Materials	Structures, Hydraulics, & Geotech
Examples • Wildlife crossings • Endangered Species • Wetlands and Mitigation • Road-wetland interaction • Living Snow Fences • Noise impacts • Wildland fire recovery	Examples • De-icing products and best practices • Truck Ramp improvements • Striping reflectivity performance • Traffic Modelling • Bicycle and Pedestrian safety	Examples • Concrete and asphalt advances • Bonding and overlays • Reclamation/refurb of pavements • Aging processes	Examples • Bridge Scour prediction tools • Bridge rehabilitation • Slope stability (sUAS project) • Flood prediction and alerting • Soil mechanics • Various hydrology projects with USGS

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ARIB has begun to expand the breadth and depth of our research portfolio.

Research Broader Look

Breadth

Exploring Emerging Areas and Topics

- ❑ Cybersecurity
- ❑ Machine Learning
- ❑ Greenhouse Gas and Air Quality
- ❑ Mobility modeling
- ❑ UAS
- ❑ Alternative Fuels (hydrogen, electric)

Research Areas of Emphasis

Depth

Areas of Emphasis

Research areas where

- a focused research effort can provide substantial benefits to Colorado.
- easy to answer, "Why is Colorado leading this research rather than other states?"
  - Perhaps due to natural features (terrain, climate, built environment, …), or because of strong research programs in Colorado's universities, consulting firms, or national laboratories.

- ❑ Mitigating Wildlife Vehicle Collisions and Improving Safe Wildlife Passage
- ❑ Construction and Operations/Maintenance impacts on Air Quality
- ❑ Post Wildfire effects - focused on hydrology and debris flow

Other Important Activities

CDOT Research Library

AASHTO and NCHRP National Level Representation

NCHRP NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

AASHTO

Colorado Local Technical Assistance Program (LTAP)

Local Technical Assistance Program - LTAP
Serving Colorado's Local Road & Bridge Agencies

Colorado State Transportation Innovation Council Incentive Program

STIC
State Transportation Innovation Councils

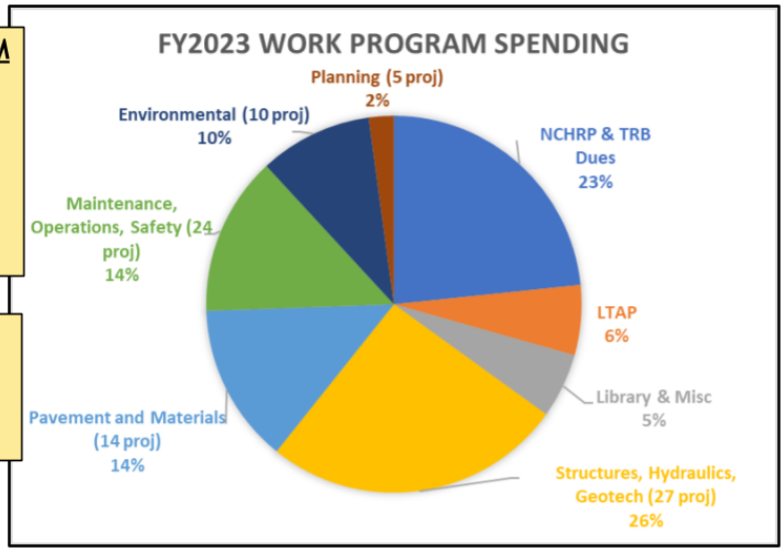
T2 (Technology Transfer) Program

Spending and Stats

Total FY2023 Program Spending: $3.5M
- Mostly SPR-B.
- Non-salary.
- Includes FY2022 carryover

TPF spend $450K (25 projects)
(Distributed into pie-chart categories)

Research Branch
- **5 staff**
- **89 Work Program Projects**



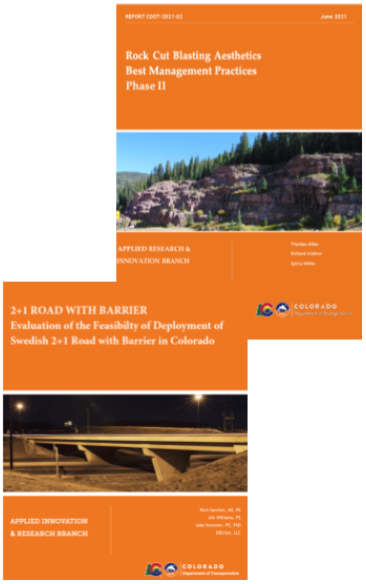
Research Cycle – typical steps and timing

We conduct 2 rounds of Problem Statement Evaluation) each year

- Problem Statement deadlines are mid-February and mid-August
- **Each Problem Statement MUST have a CDOT Champion**
- Initial light screening to accept, decline, or defer
- Problem Statements are grouped by topic
- **Oversight Team** (SMEs, for each topic) provides advice on need, feasibility, applicability. A subset are forwarded to the RIC
- The **Research Implementation Council (RIC)** provides advice on importance to CDOT
- Final selection by the ARIB Manager, DTD Director, & CDOT Chief Engineer
- Final approval is with FHWA

From submission deadline to final selection is about 2.5 months

- Funded Problem Statement ideas move on to Active Research Studies
  Procurement and contracting can be slow
- Completed Research Studies move on to Implementation



Concluding Thoughts

- Research solves problems
- Research prepares for the future
- Research is a cooperative and team process

- Research needs flexibility. Procurement processes are challenging

- Documenting its value and benefit is part of the job
- Communicating research outcomes magnifies their value
- Not all research can be implemented
- Some risk-taking is essential

CDOT Applied Research and Innovation Branch
February 28, 2023

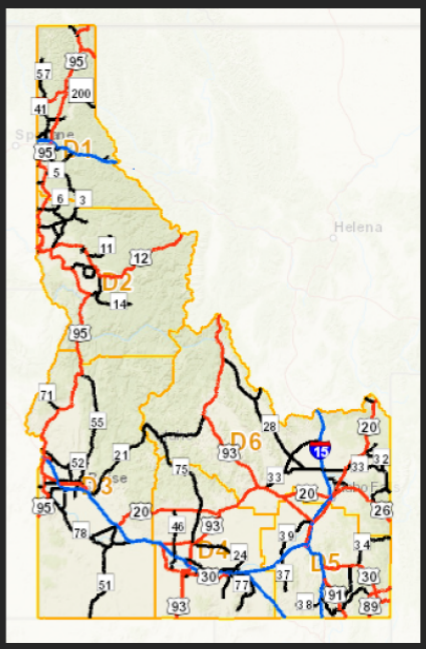
Idaho Transportation Department Research and Innovation Overview

YOUR *Safety*
YOUR *Mobility*
YOUR *Economic Opportunity*

Amanda Laib
Senior Research Analyst
February 28, 2023

ITD General Overview

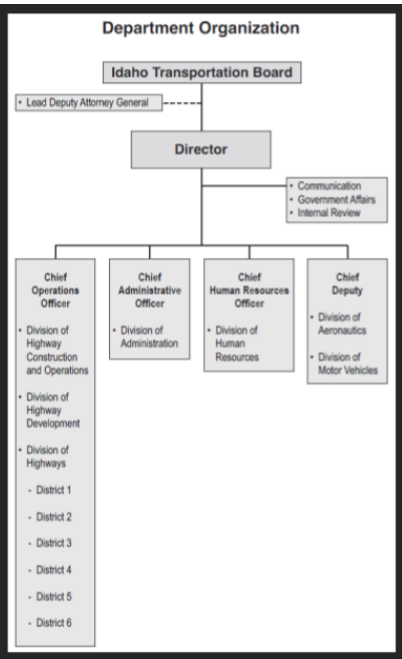
- Serve population of 1.78 million
- $1.35 billion budget in FY23
- Highways
  - Approximately 5,000 centerline miles
  - More than 1,800 bridges
  - Oversee funding for local roads/LHTAC, 288 local agencies
- DMV Services
  - Partner with Idaho Counties
  - 1.33 million licensed drivers
  - 1.43 million registered vehicles and trailers
- Aeronautics
  - 126 unrestricted public-use airports
  - 60 general aviation and community airports
  - 31 state operated airstrips
- Public Transportation
  - 63 public transportation providers

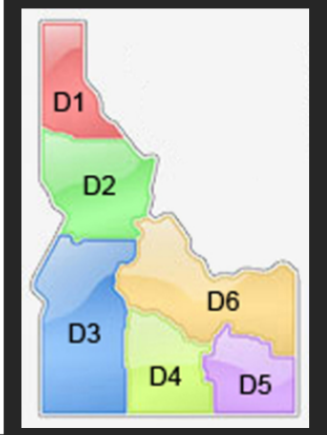


YOUR *Safety* • • • ▶ YOUR *Mobility* • • • ▶ YOUR *Economic Opportunity*

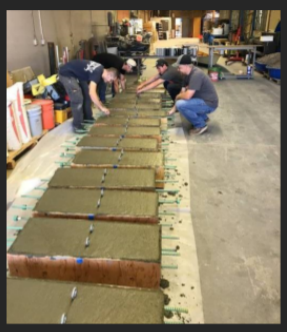
ITD Organization

- 1648 FTEs
- Six Headquarters Divisions
  - Highways Development
  - Highways Construction and Operations
  - Motor Vehicles
  - Aeronautics
  - Administration
  - Human Resources
- District Highways Division
  - 6 Districts





YOUR *Safety* • • • ▶ YOUR *Mobility* • • • ▶ YOUR *Economic Opportunity*



IDAHO TRANSPORTATION DEPARTMENT

RESEARCH REPORT

Development of a Correlation between CoreLok® and AASHTO T 85 Tests for Specific Gravity of Coarse Aggregates used in Idaho

RP 286

By

Sunil Sharma, Emad Kassem, and Jaxon Dean

University of Idaho

Prepared for

Idaho Transportation Department

ITD Research Program, Contracting Services

Highways Construction and Operations

February 2023

Correlation between AASHTO T 85 and CoreLok Tests for Coarse Aggregates 1

YOUR *Safety* • • • • • • • • • • ▶

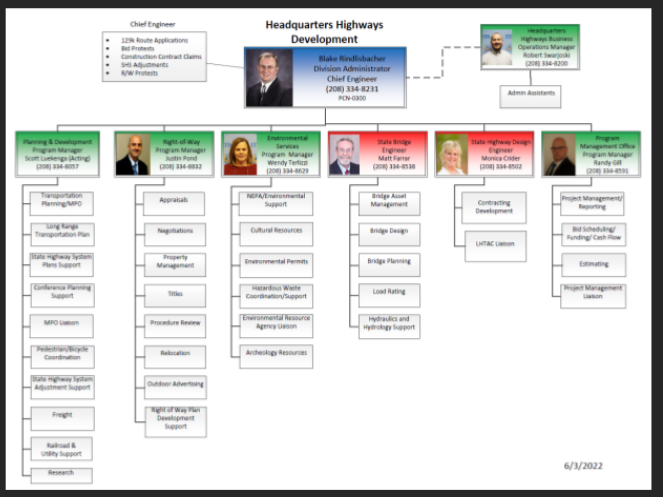
YOUR *Mobility* • • • • • • • • • • • • • • ▶

YOUR *Economic Opportunity* • ▶

Research

ITD Research Program

- Located in Planning and Development Services Section of Highways Development
- 2 FTEs
  - Research Program Manager (Ned Parrish)
  - Sr Research Analyst (me)
- Projects overseen by:
  - Project Sponsors
  - Project Managers designated by sponsor
  - Technical Advisory Committees



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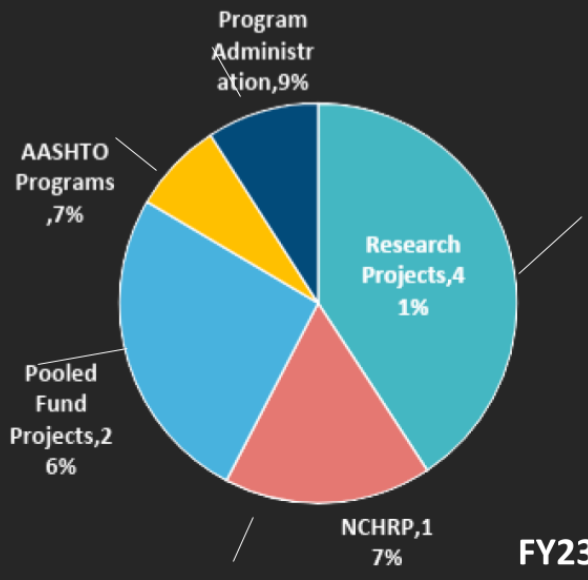
FY23 Research Program Budget



FY23 Budget = $2.35 Million

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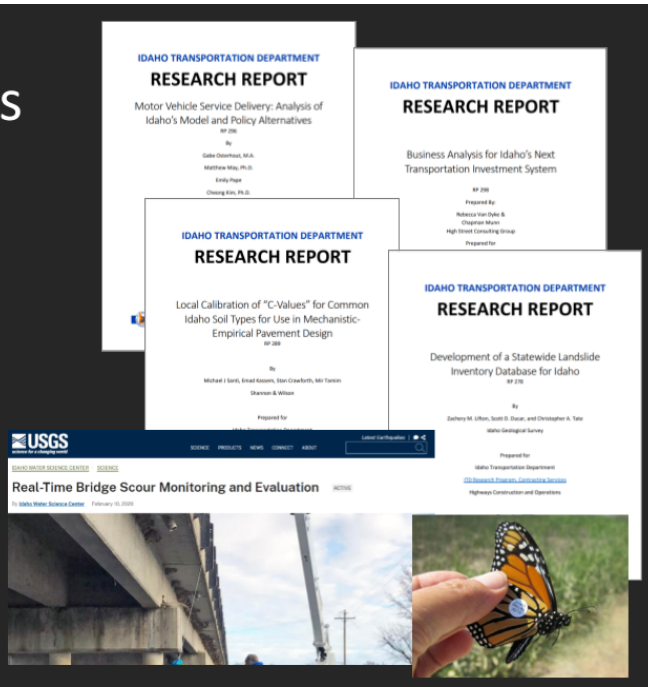
Research Program Focus

- Program Mission:
  - Support RD&T activities addressing ITD's strategic goals and initiatives
  - Enhance ITD's ability to deliver efficient and effective services
  - Offer practical solutions to problems facing the Department
  - Develop new tools/technologies and facilitate their implementation
- Broad focus
- Seek to address needs across ITD



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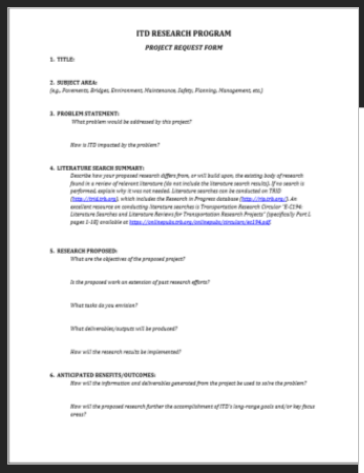
Research Project Selection Process


ITD RESEARCH PROGRAM
PROJECT REQUEST FORM

1. TITLE:

2. SUBJECT AREA:
(e.g., Pavements, Bridges, Environment, Maintenance, Safety, Planning, Management, etc.)

3. PROBLEM STATEMENT:
What problem would be addressed by this project?

How is ITD impacted by the problem?

4. LITERATURE SEARCH SUMMARY:
Describe how your proposed research differs from, or will build upon, the existing body of research found in a review of relevant literature (do not include the literature search results). If no search is performed, explain why it was not needed. Literature searches can be conducted on TRID (http://trid.trb.org), which includes the Research in Progress database (http://rip.trb.org/). An excellent resource on conducting literature searches is Transportation Research Circular "E-C176: Literature Searches and Literature Reviews for Transportation Research Projects" (specifically Part I, pages 1-10) available at https://onlinepubs.trb.org/onlinepubs/circulars/ec176.pdf

5. RESEARCH PROPOSED:
What are the objectives of the proposed project?

Is the proposed work an extension of past research efforts?

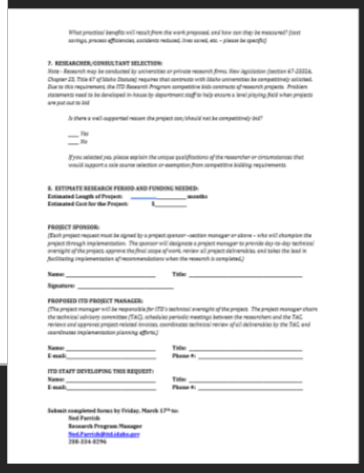
What tasks do you envision?

What deliverables/outputs will be produced?

How will the research results be implemented?

6. ANTICIPATED BENEFITS/OUTCOMES:
How will the information and deliverables generated from the project be used to solve the problem?

How will the proposed research further the accomplishment of ITD's long-range goals and/or key focus areas?


What practical benefits will result from the work proposed, and how can they be measured? (cost savings, process efficiencies, accidents reduced, lives saved, etc. – please be specific)

7. RESEARCHER/CONSULTANT SELECTION:
Note - Research may be conducted by universities or private research firms. Nov legislation (section 67-2332A, Chapter 23, Title 67 of Idaho Statute) requires that contracts with Idaho universities be competitively solicited. Due to this requirement, the ITD Research Program competitive bids contracts of research projects. Problem statements need to be developed in-house by department staff to help ensure a level playing field when projects are put out to bid.

Is there a well-supported reason the project can/should not be competitively bid?

___ Yes
___ No

If you selected yes, please explain the unique qualifications of the researcher or circumstances that would support a sole source selection or exemption from competitive bidding requirements.

8. ESTIMATE RESEARCH PERIOD AND FUNDING NEEDED:
Estimated Length of Project: _____ months
Estimated Cost for the Project: $_____

PROJECT SPONSOR:
(Each project request must be signed by a project sponsor –section manager or above – who will champion the project through implementation. The sponsor will designate a project manager to provide day-to-day technical oversight of the project, approve the final scope of work, review all project deliverables, and takes the lead in facilitating implementation of recommendations when the research is completed.)

Name:_____ Title: _____
Signature: _____

PROPOSED ITD PROJECT MANAGER:
(The project manager will be responsible for ITD's technical oversight of the project. The project manager chairs the technical advisory committee (TAC), schedules periodic meetings between the researchers and the TAC, reviews and approves project related invoices, coordinates technical review of all deliverables by the TAC, and coordinates implementation planning efforts.)

Name: _____ Title: _____
E-mail: _____ Phone #: _____

ITD STAFF DEVELOPING THIS REQUEST:
Name: _____ Title: _____
E-mail: _____ Phone #: _____

Submit completed forms by Friday, March 17th to:
Ned Parrish
Research Program Manager
Ned.Parrish@itd.idaho.gov
208-334-8296

- Call for research ideas in January
- Research requests due in March
- Research requests may be submitted by:
  - ITD program managers
  - SMEs and past research PMs
  - FHWA Division Office staff
  - LHTAC
- Solicit project ideas from:
  - ITD strategic goal teams
  - Innovation stewards
- Project requests must be signed by manager who:
  - Advocates for the need to do the project
  - Commits to supporting implementation of outcomes

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Research Project Selection Process

- ITD Research Advisory Council
  - Broad-based group of agency leaders and FHWA division advisor
  - Reviews and ranks research requests
  - sets funding priorities
- Requestors make elevator pitch at annual meeting in April

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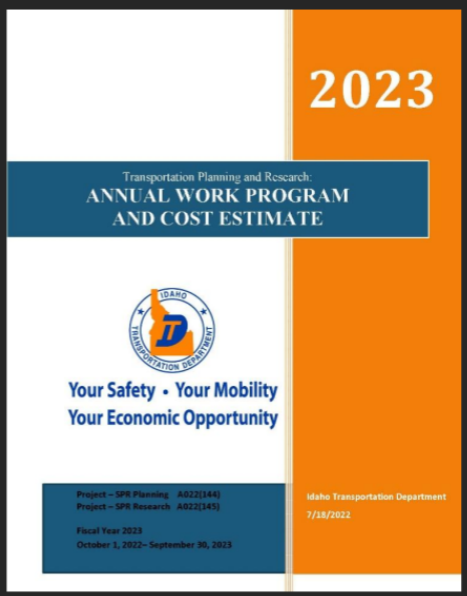
Budgeting and Work Program

- Budget developed and approved internally
- Approved projects are listed in SPR Work Program – Part B
  - Submitted to FHWA typically in late June



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Emcees Alex Deduck (D3) and Drue Hatfield (D1) go through housekeeping items to kick off 2018 Leadership Summit.

ITD contingent at the event, L to R: Beth Thompson, Jake Legler, D.J. Price, Mike Garrett, Laura Meyer, Char McArthur, David Nichols, Angela Monson, Vince Trimboli, Jet Johnstone, Bill Kotowski and Carl Horn.

Innovation

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Innovation at ITD

2011 – Innovation identified as a strategic focus area at ITD

2014 – Innovative Business Practices team formed to foster a culture of innovation within the dept.

- Led by CAO, Char McArthur (ret)
- Comprised of agency leaders and staff from across ITD

2016 – Continuous Improvement Office created to support innovation initiative (1-2 staff + intern(s))

Our Mission:

Your Safety.

Your Mobility.

Your Economic Opportunity.

To achieve its mission, the Idaho Transportation Department adopted a new strategic plan in 2011 with three primary goals:

- Commit to having the safest transportation system possible
- Provide a mobility-focused transportation system that drives economic opportunity
- Become the best organization by continually developing employees and implementing innovative business practices

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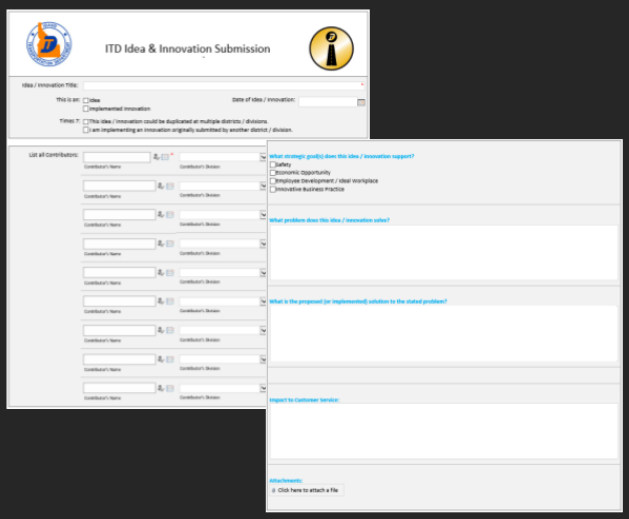
ITD Innovation Clearinghouse

- SharePoint site created in 2015
- Automated tool used to capture:
  - Innovative Ideas
  - Implemented innovations
- Any ITD staff member can enter ideas or innovations



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Innovation Stewards

- Innovation Stewards team formed in Fall of 2015
- Stewards designated in each ITD Division and District
  - Volunteers with passion for innovation
  - Assist staff in their work area with idea generation and implementation support

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Employee Recognition

- Best of the Best Awards
  - Annual recognition in 5 categories:
    - Safety
    - Mobility & Economic Opportunity
    - Resource Stewardship
    - Customer Service
    - Ideal Workplace
- Kimbol Allen Award
  - Recognition of Excellence in Innovation

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Innovate ITD! Results

- Since 2014, more than 1,800 ideas submitted and 1,300 innovations implemented
- Growth in culture of innovation among employees
- Recognition from outside ITD
  - Support from Governor and Idaho Legislature
  - Two-time finalist for Innovative Company of the Year in Idaho
  - Innovate ITD top US entry for the 2020 Gartner Communications Awards "Small Idea, Big Impact" award

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Biggest Challenges

- Determining "top down" priorities of research
  - Meet with ITD strategic goal teams annually
  - However, most ideas generated "bottom-up"
- Lack of dedicated research project managers
  - Department program staff take on extra duties to manage projects
  - Spinning plates and juggling at the same time

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Other Challenges Implementation and Innovation

- Moving research into practice
  - Build implementation support (training, draft specifications, etc.) into project tasks and deliverables
  - Rely on project sponsors to champion implementation
- Supporting agency innovation
  - Share information about research and innovation nationally (EDC, NCHRP) with ITD staff
  - But limited capacity to support implementation of national research and innovations

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Thank You

YOUR *Safety* • • • • • • • • • • • ▶
YOUR *Mobility* • • • • • • • • • • • • • • • ▶
YOUR *Economic Opportunity* • ▶

Amanda Laib
Sr Research Analyst
amanda.laib@itd.idaho.gov

COLORADO
Department of Transportation

Maryland's Research Program

Overview &

Topic 1: Leading Pooled Fund Projects

Topic 2: Research Data Curation

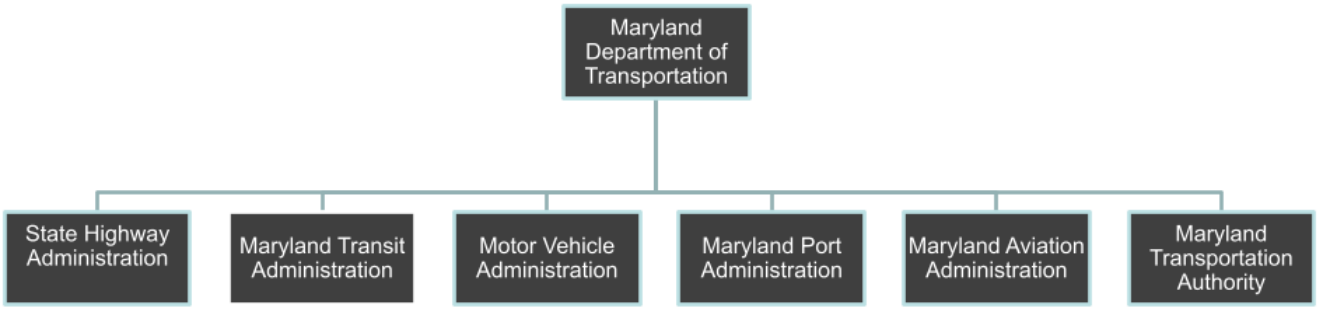
Topic 3: Promoting a Culture of Research

Hua Xiang
Deputy Director, Policy and Research
Maryland Department of Transportation
State Highway Administration

MARYLAND

General Information

Organizational Structure:



MARYLAND

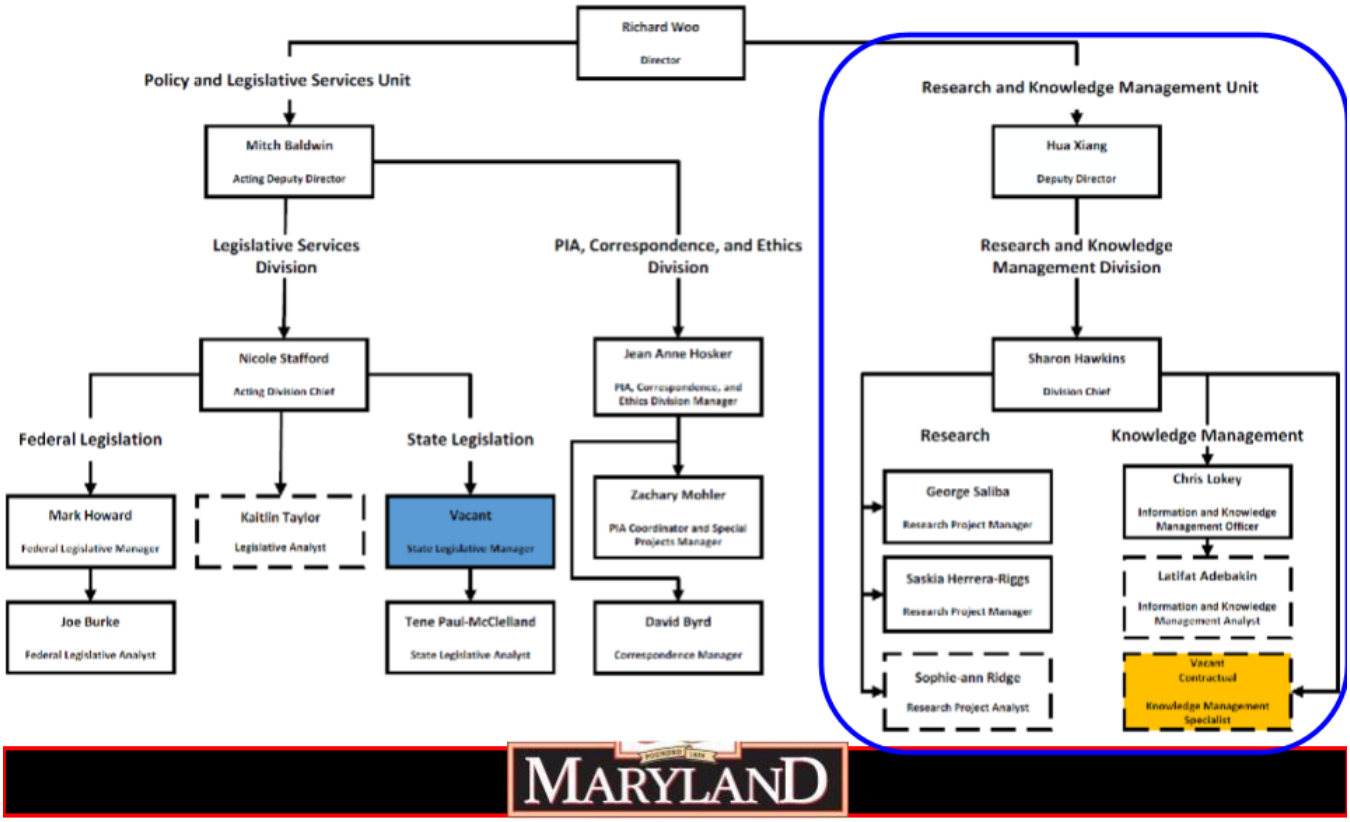
General Information

Organizational Structure:

- Located at the State Highway Administration, a modal administration within MDOT
- Division within the Office of Policy and Research
- Office reports directly to the State Highway Administrator
- Pre-2020: Three full-time employees
- Office Re-org in 2021: Knowledge Management was added to the Division (org chart next slide).

MARYLAND

Office of Policy and Research



COLORADO
Department of Transportation

Overview

2019

Research was a 3-person team.

2022

5-person Research + 3-person KM

MARYLAND

General Information

Annual Budget:

- Research program is approximately $4.4M/year (FY 2023)
- Approximately $3.9M in federal funds
- Approximately $500K in state matching funds

MARYLAND

PROGRAM OVERSIGHT

Oversight Roles:

- FHWA – federal requirements
- MDOT SHA Administrator & Deputies – Agency Needs
- Director of Policy and Research – Supervisory Role
- Deputy Director of Policy and Research – Program Management

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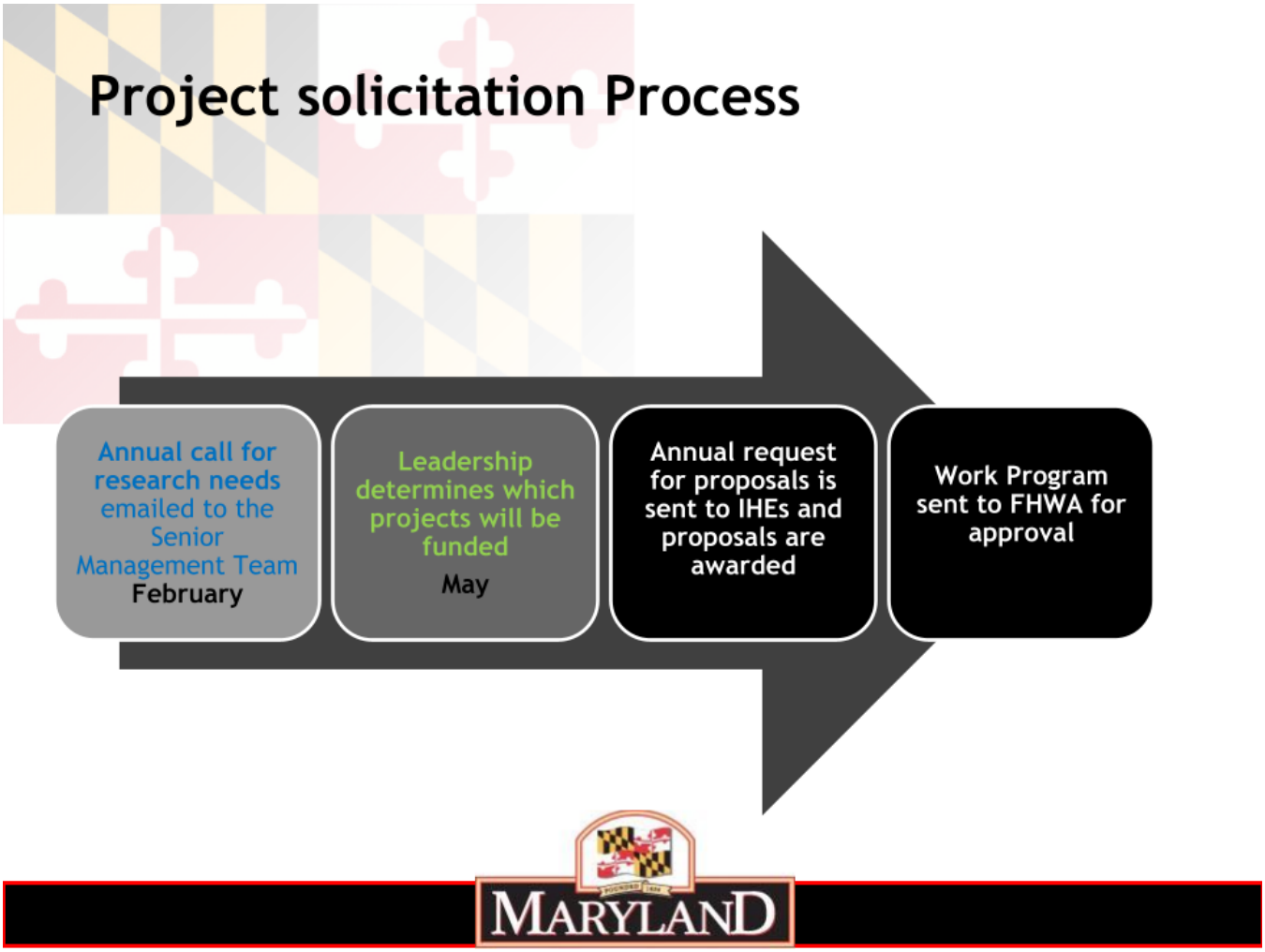

Project solicitation Process
Annual call for research needs emailed to the Senior Management Team
February
Leadership determines which projects will be funded
May
Annual request for proposals is sent to IHEs and proposals are awarded
Work Program sent to FHWA for approval
MARYLAND

Project Solicitation Process

Research Needs Form

RESEARCH IDEA LIST

Office Name:
Coordinator Name:

Ranking	Research Idea		Technical Champion
1	**Title**		
	The problem needing solution		
	Anticipated Benefits		
	Urgency		
	Desired deliverable?		
2	**Title**		
	The problem needing solution		
	Anticipated Benefits		
	Urgency		
	Desired deliverable?		
3	**Title**		
	The problem needing solution		
	Anticipated Benefits		
	Urgency		
	Desired deliverable?		

Check list:

- Has the prioritized list been approved by your Senior Manager?
- Have you identified a champion for each idea?
- Were all of the research idea forms less than two pages in length?
- If the idea is best suited for a consultant, does your office have open-end agreements with the potential consultants?

**Important notes to the coordinator:*

- Please do NOT talk with professors or consultants about these topics.
- The due date for this list is February 28th, 2018.
- If you need a meeting to discuss the research ideas between the Research Division (RD) and your Senior Manager, please inform RD by February 14th. The meeting should happen before the due date.
- The RD will work with you and your identified champion to write the Request for Proposal once a research idea is selected.

Project OVERSIGHT

Technical Lead:

- Evaluate research proposals
- Serve as the point-of-contract for technical questions
- Coordinate internal data collection
- Attend project meetings
- Review progress reports and invoices
- Review/approve deliverables
- Disseminate research results

MARYLAND

Project OVERSIGHT

Administrative Lead:

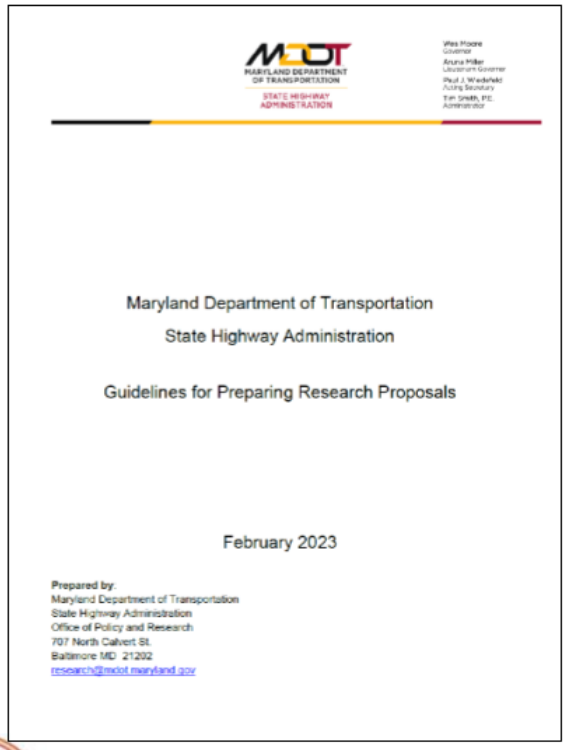
- Project Manager in the Research Division
- Responsible for overall project management
- Coordinates and facilitates project meetings
- Troubleshoots problems
- Ensures that quarterly reports, invoices, and deliverable are submitted in a timely fashion and adhere to requirements.
- Disseminates and promotes research results to external groups (FHWA, TRB, other states)

MARYLAND

Project OVERSIGHT

Report Guidelines:

- Proposals (19 pages)
  - Overview of research program
  - Research administration
  - Instructions for preparing and submitting proposals
  - Important dates
  - Key points for Proposers



MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Maryland Department of Transportation
State Highway Administration

Guidelines for Preparing Research Proposals

February 2023

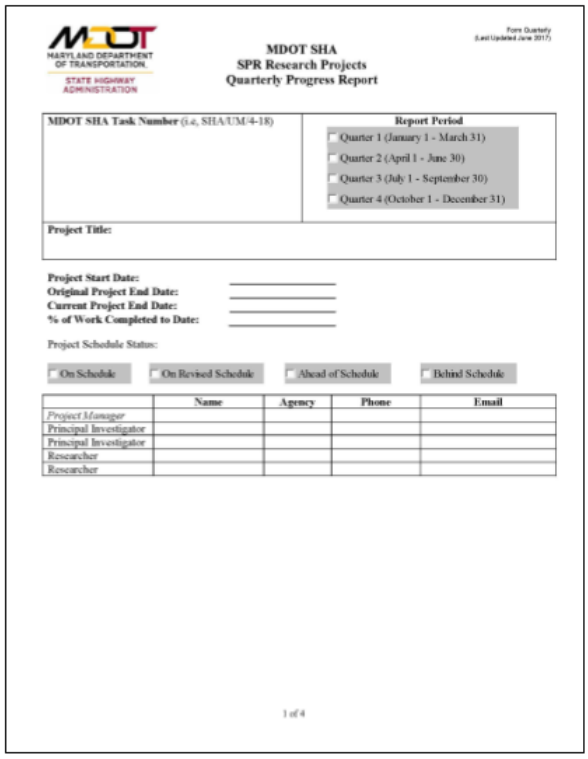
Prepared by:
Maryland Department of Transportation
State Highway Administration
Office of Policy and Research
707 North Calvert St.
Baltimore MD 21202
research@mdot.maryland.gov

MARYLAND

Project OVERSIGHT

Report Guidelines:

- Progress Reports - Modeled after FHWA's TPF quarterly report
  - Project Description
  - Deliverables
  - Progress this quarter
  - Anticipated work next quarter
  - Significant results
  - Circumstances affecting project
  - Potential Implementation



MDOT SHA
SPR Research Projects
Quarterly Progress Report

MDOT SHA Task Number (i.e, SHA/UM/4-18)	Report Period
	Quarter 1 (January 1 - March 31) Quarter 2 (April 1 - June 30) Quarter 3 (July 1 - September 30) Quarter 4 (October 1 - December 31)
Project Title:	

Project Start Date: _____
Original Project End Date: _____
Current Project End Date: _____
% of Work Completed to Date: _____

Project Schedule Status:

On Schedule | On Revised Schedule | Ahead of Schedule | Behind Schedule

	Name	Agency	Phone	Email
Project Manager				
Principal Investigator				
Principal Investigator				
Researcher				
Researcher				

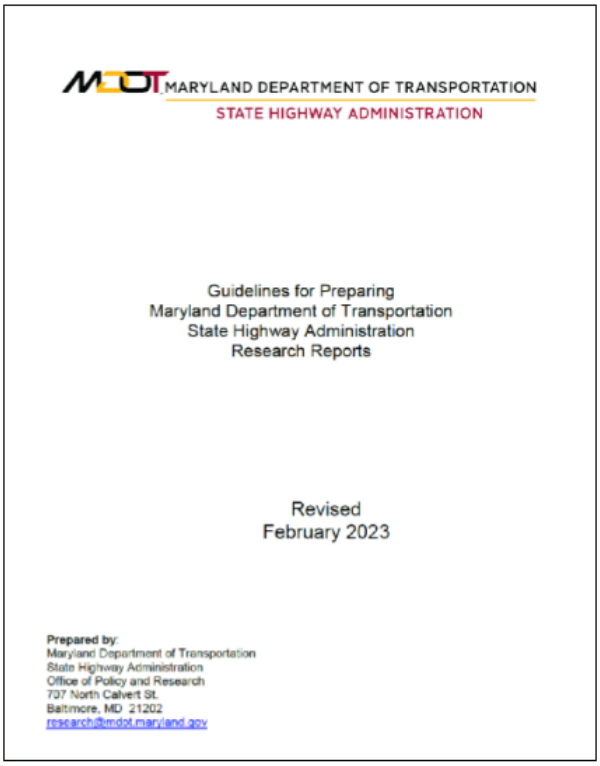
1 of 4

MARYLAND

Project OVERSIGHT

Report Guidelines:

- Final Reports (13 pages)
  - General Requirements
  - Deliverable Requirements
  - Best Practices for Reports
  - Appendices
    - Report Cover
    - Technical Documentation Page
    - Two-Page Summary



MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Guidelines for Preparing
Maryland Department of Transportation
State Highway Administration
Research Reports

Revised
February 2023

Prepared by:
Maryland Department of Transportation
State Highway Administration
Office of Policy and Research
707 North Calvert St.
Baltimore, MD 21202
research@mdot.maryland.gov

MARYLAND

Project OVERSIGHT

Best Practices for Reports:

- Remember the audience for the report. The report should not read like a thesis or dissertation. It should be written for a transportation professional, be concise, well-organized, and easy to read.
- Do not use terms that the reader would not understand.
- Avoid redundancies. Do not repeat the same information over and over.
- Length matters. The report should be long enough to achieve its purpose but not a word longer.
- Appearance matters. Remember, the report is for practitioners who want to benefit from and use the information provided. Make it visually appealing and include only useful and easy to view graphics.
- Do not include mathematical equations in the body of the report. If the researcher feels that it is important to include that information, place it in the appendix and refer to it in the report.
- Hire a professional technical editor to review the report thoroughly before it is sent to MDOT SHA. Too often reports have to be returned to the researcher because there are significant errors in spelling, punctuation, and grammar.

MARYLAND

Project OVERSIGHT

Marketing & Implementation:

- Marketing
  - No formal program
  - Post reports and summaries on the web
  - Distribute an email announcing the results
  - Announce final reports in the TRB E-Newsletter
  - Occasionally work with Communications Office for more targeted internal/external (social media) marketing

MARYLAND

Project OVERSIGHT

Marketing & Implementation:

- Implementation
  - Require a discussion on implementation in all research proposals
  - Include an implementation discussion towards the end of each project
  - Include a summary of how MDOT SHA will use the results in the two-page summary
  - Trying to implement a check-in approximately six months after a report concludes to see how implementation is going.

MARYLAND

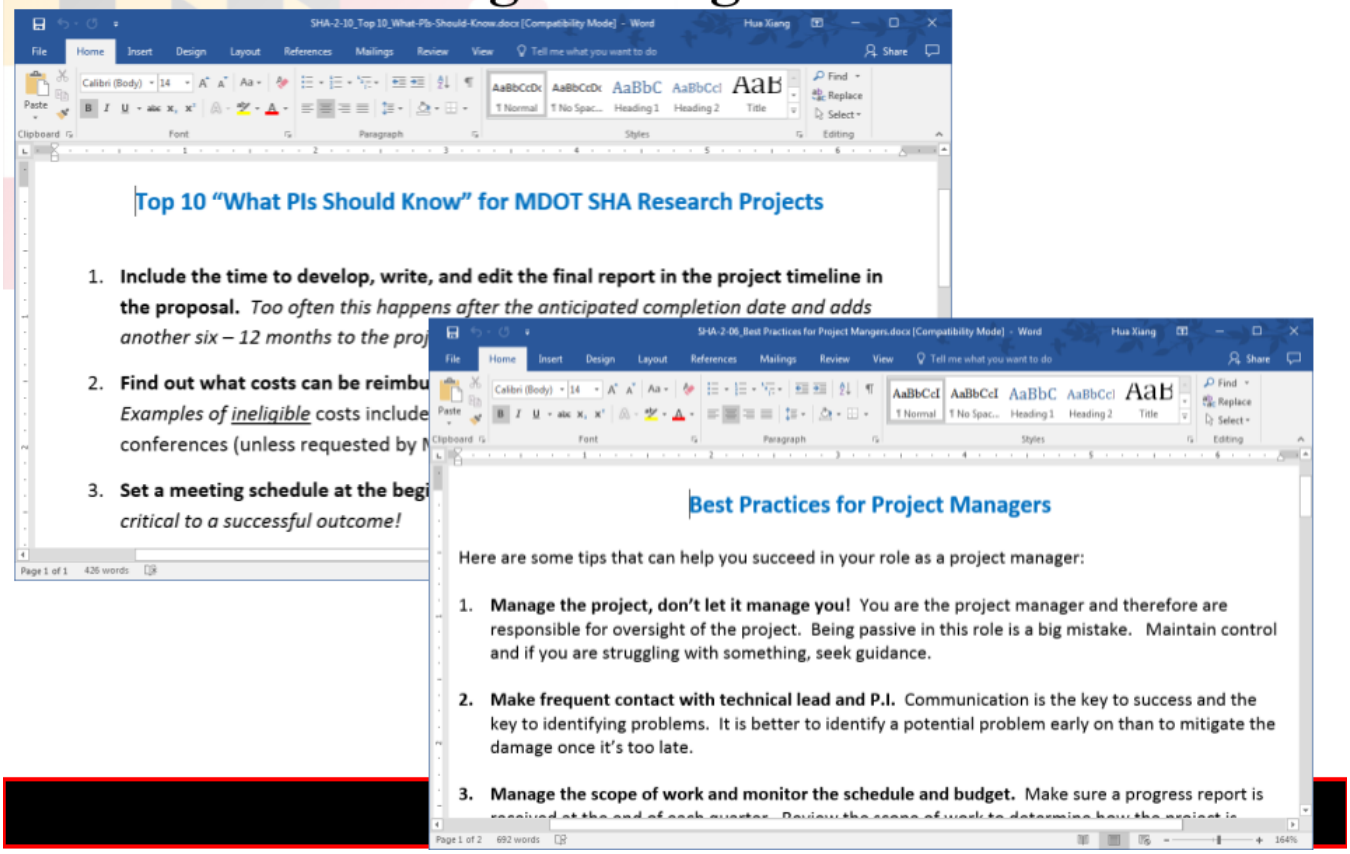
Other Research Duties/Responsibilities

- Support participation in national research programs (NCHRP, TPF, AASHTO TSPs)
- Develop and administer research and technical assistance agreements with IHEs (Currently seven active agreements)
- Develop and administer surveys
- Serve on the AASHTO Research Advisory Committee
- Serve as the TRB State Representative

MARYLAND

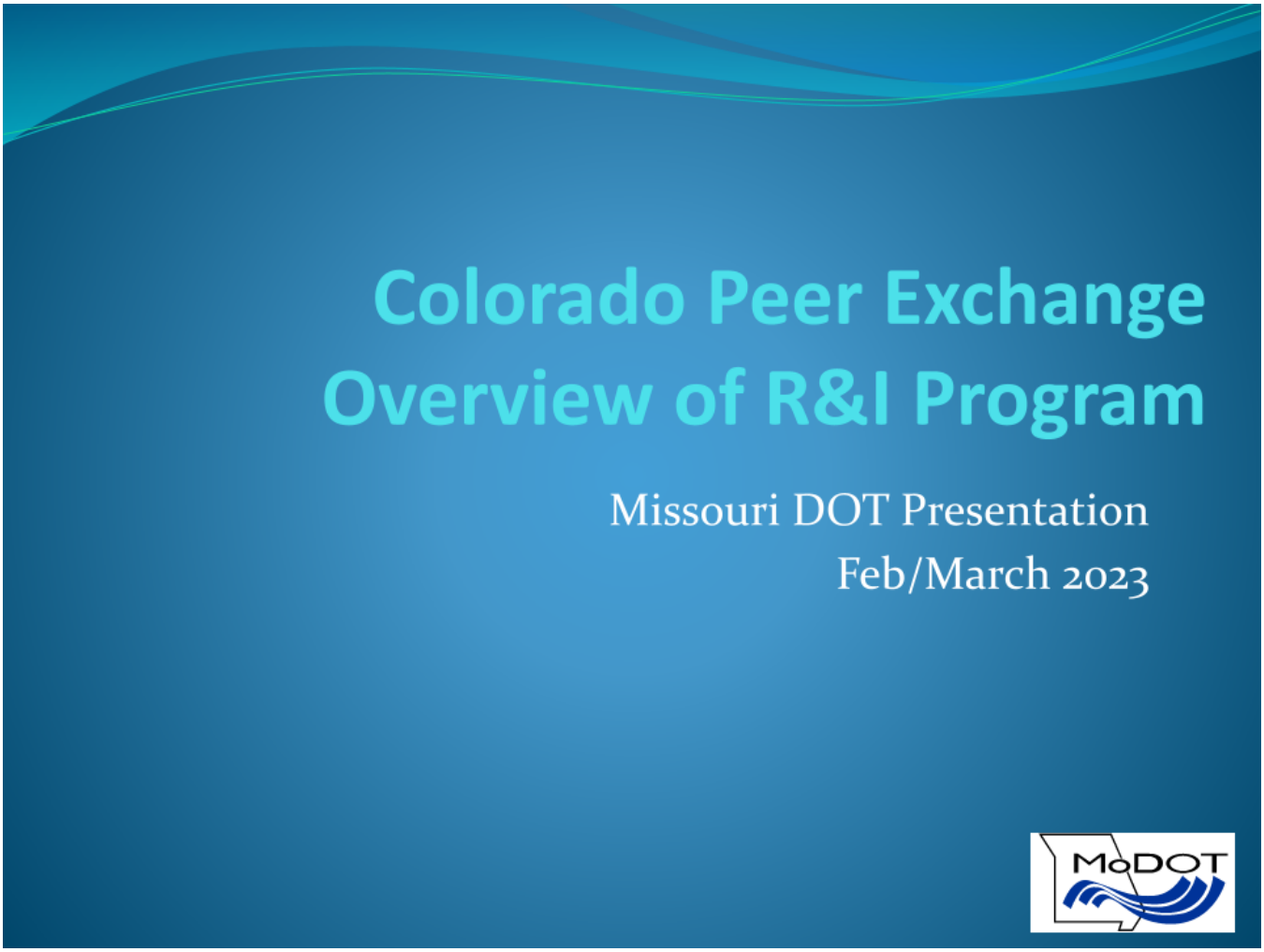
Overview (.)

25+ Knowledge Management Documents

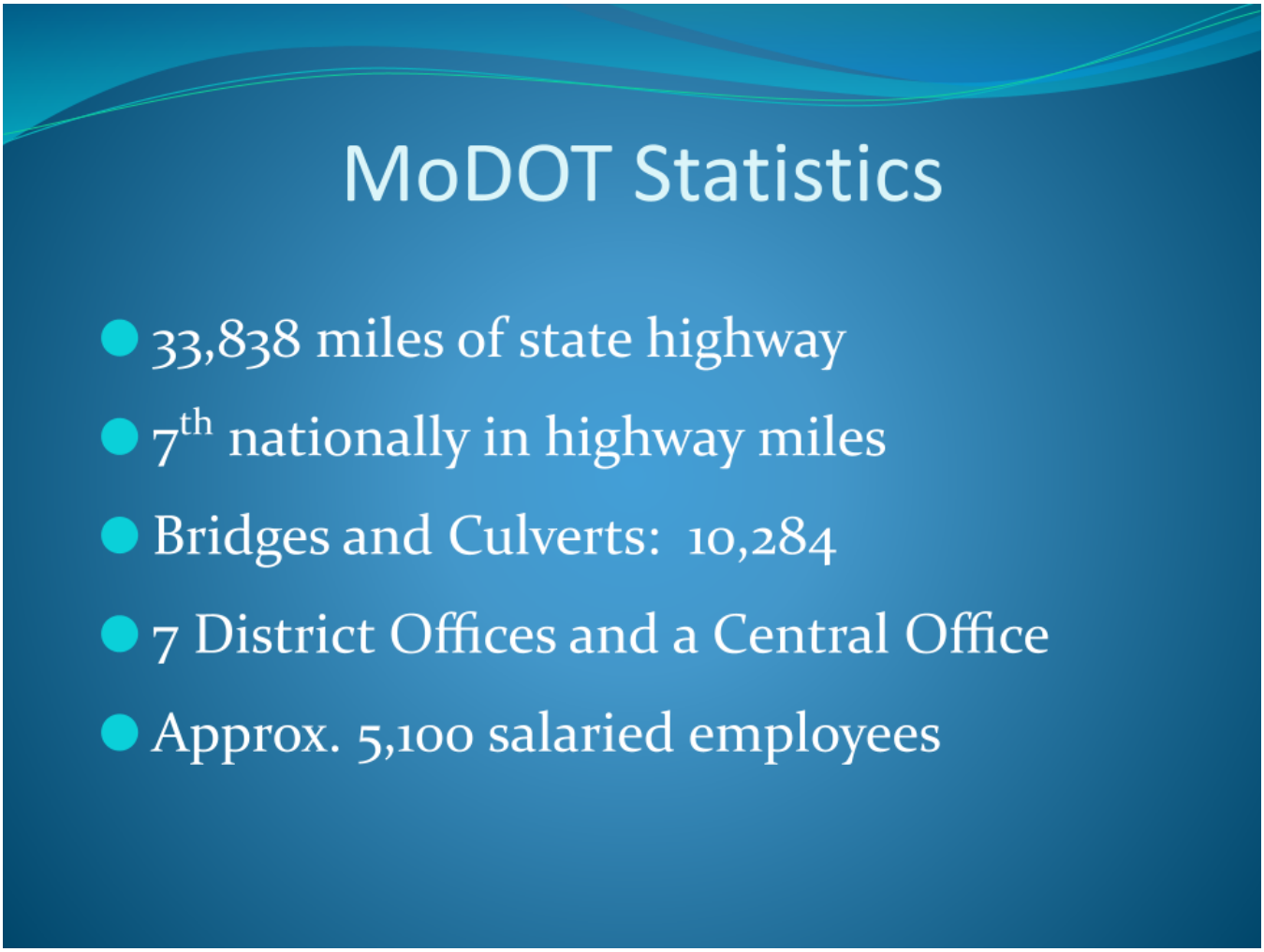


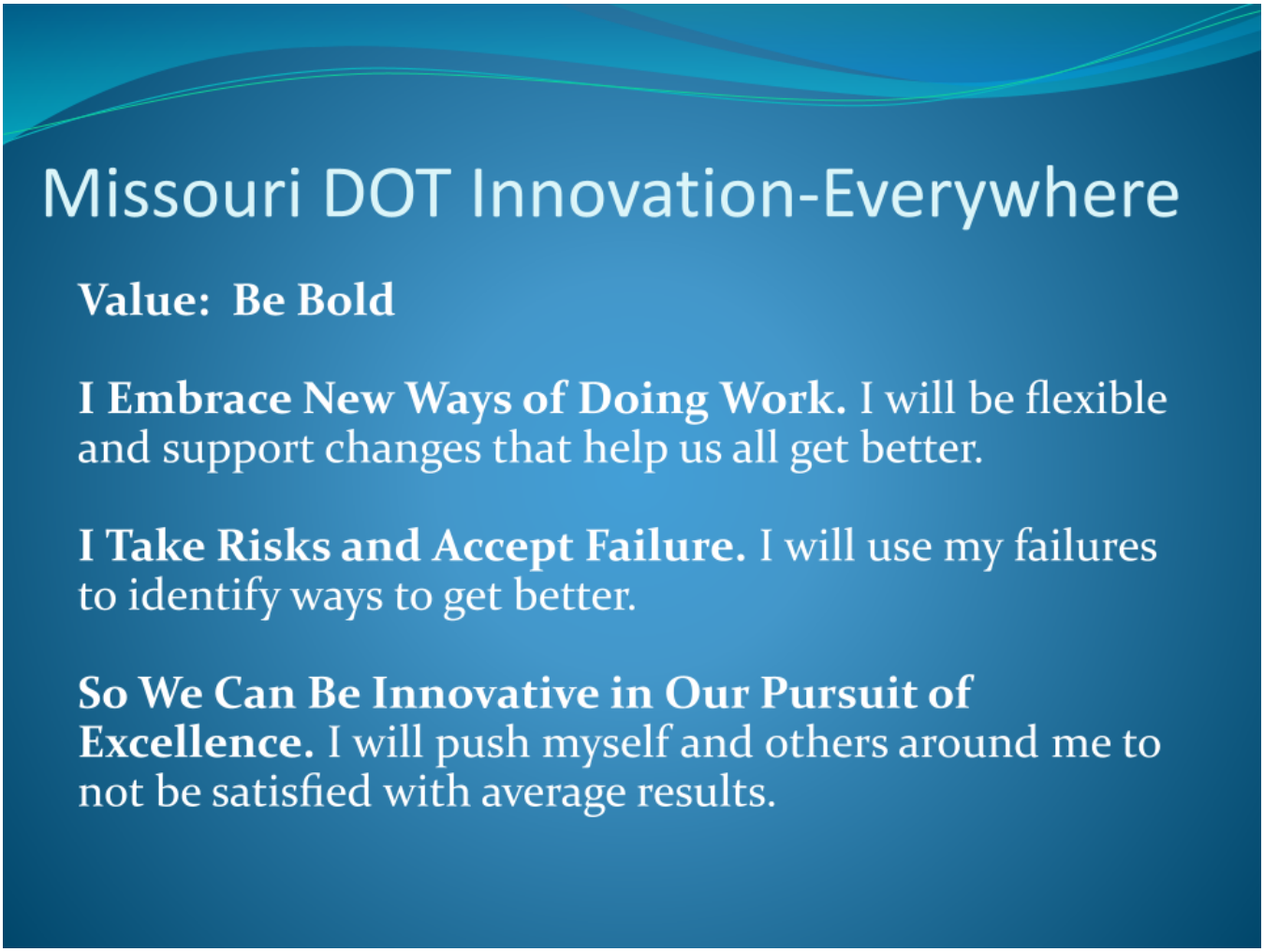
Thank You

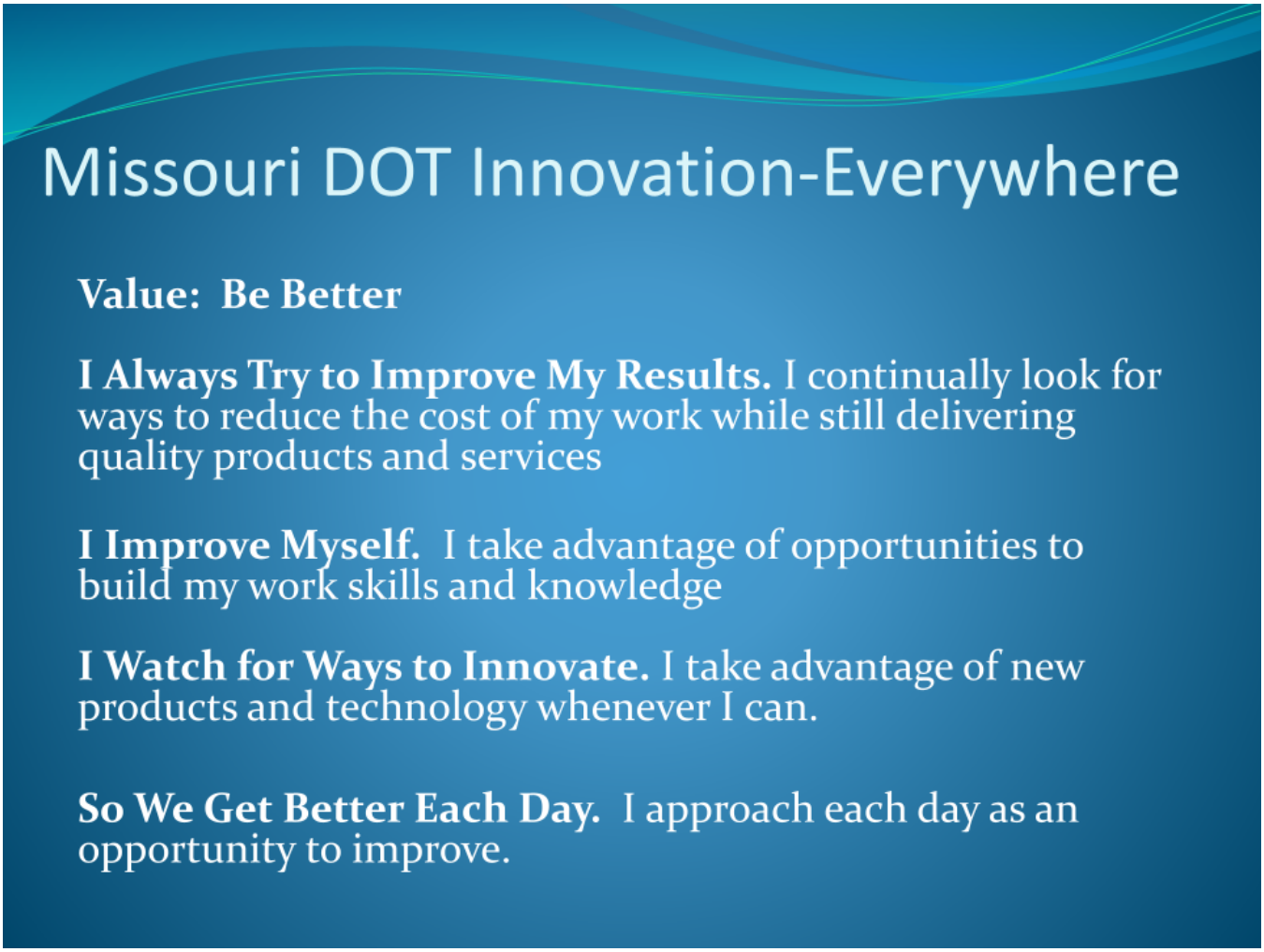
Questions?


Colorado Peer Exchange
Overview of R&I Program
Missouri DOT Presentation
Feb/March 2023
MoDOT

Missouri Statistics
Population 6,137,000
Fuel Tax:
22 cents gasoline and diesel
Ranked 48th Nationally in revenue per mile
Ranked 4th nationally in lowest administrative cost per mile.

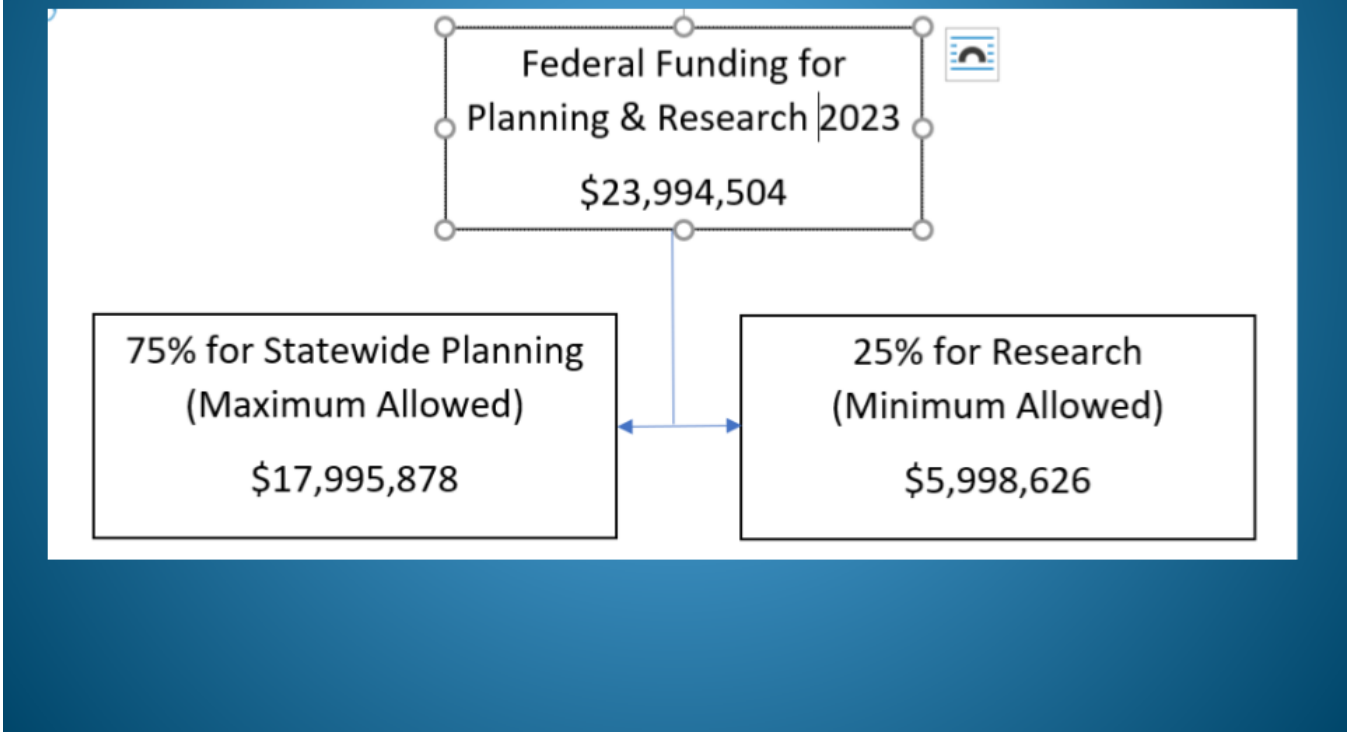

MoDOT Statistics
33,838 miles of state highway
7th nationally in highway miles
Bridges and Culverts: 10,284
7 District Offices and a Central Office
Approx. 5,100 salaried employees

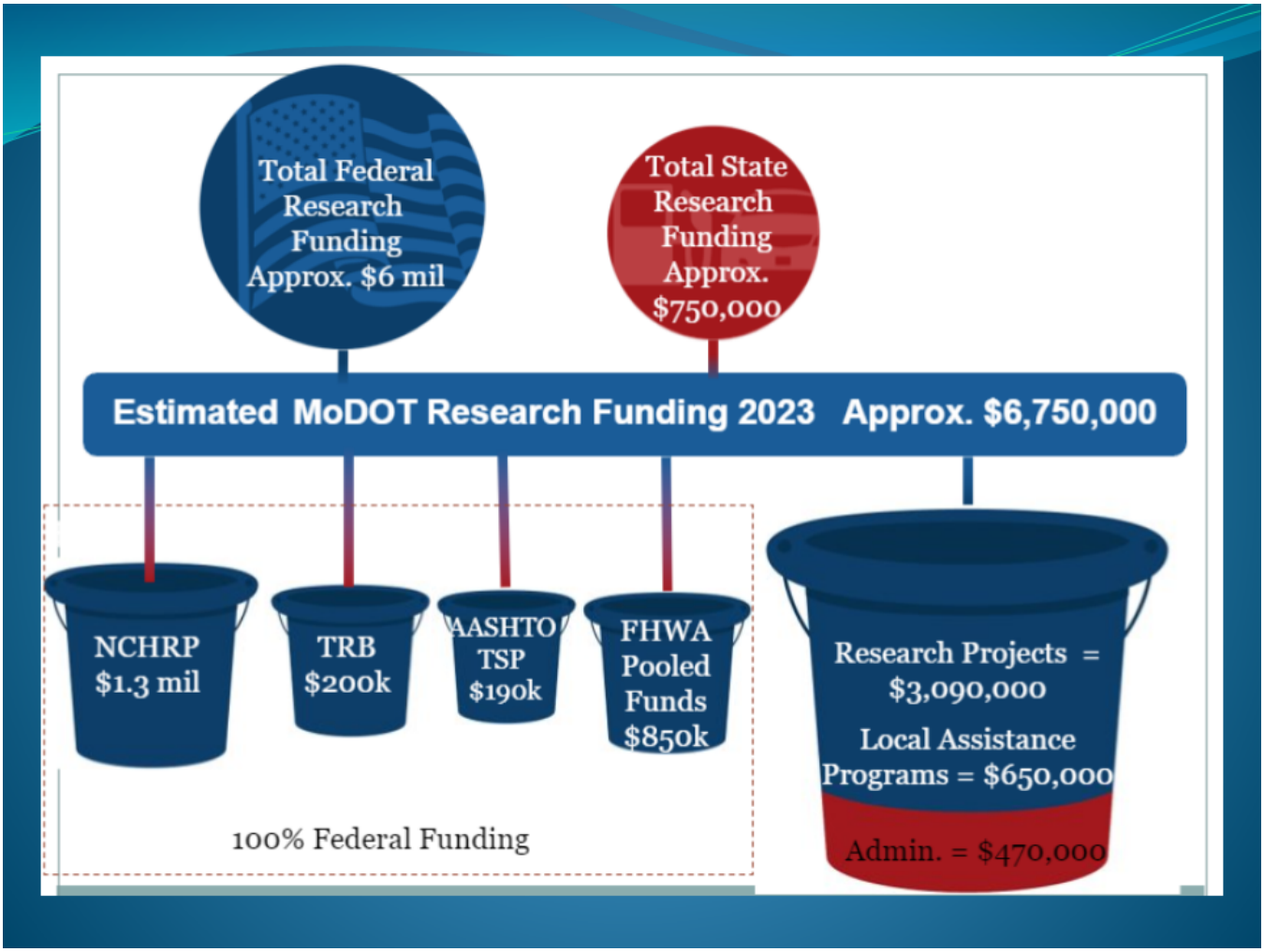

Missouri DOT Innovation-Everywhere
Value: Be Bold
I Embrace New Ways of Doing Work. I will be flexible and support changes that help us all get better.
I Take Risks and Accept Failure. I will use my failures to identify ways to get better.
So We Can Be Innovative in Our Pursuit of Excellence. I will push myself and others around me to not be satisfied with average results.

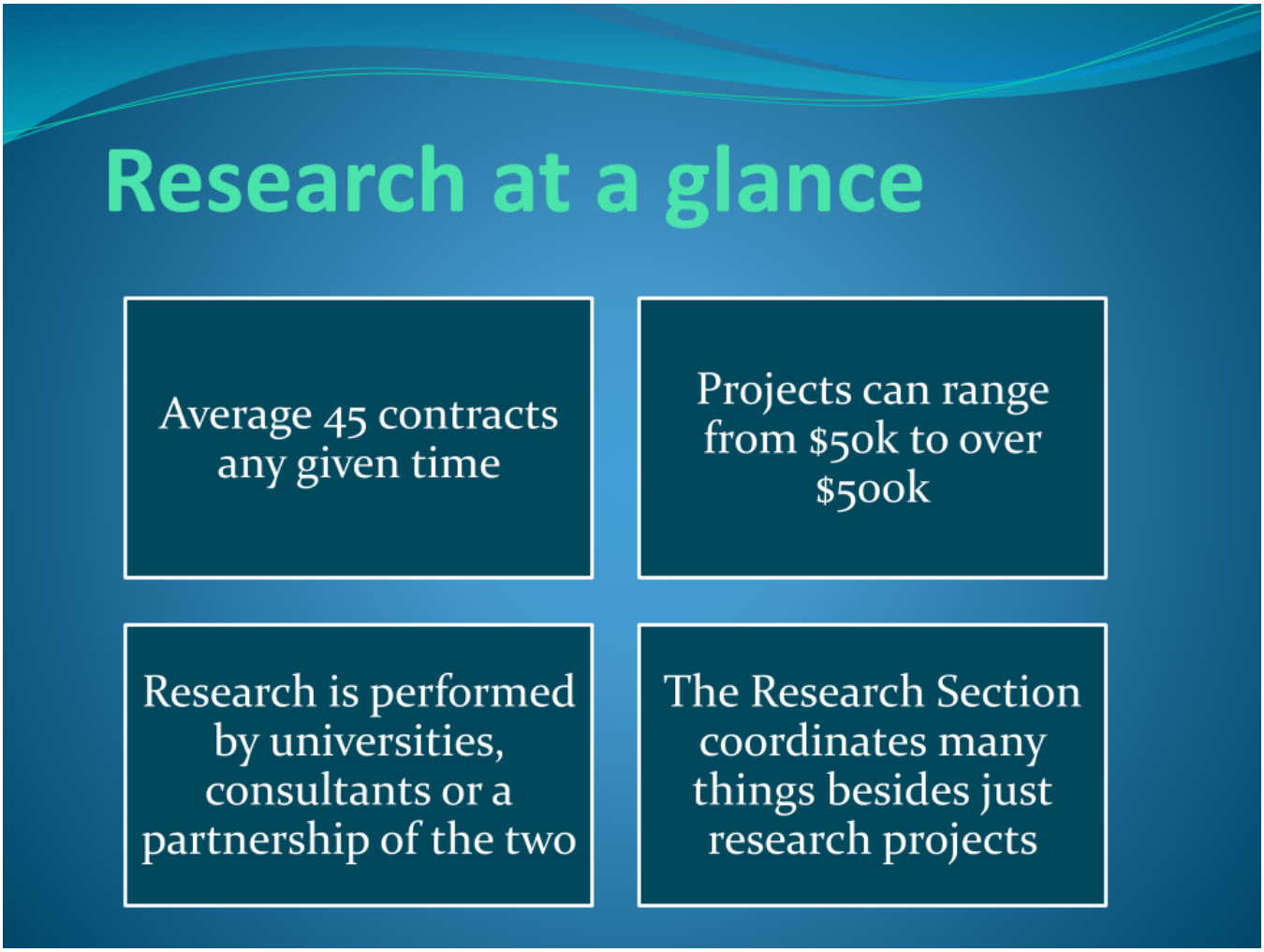

Missouri DOT Innovation-Everywhere
Value: Be Better
I Always Try to Improve My Results. I continually look for ways to reduce the cost of my work while still delivering quality products and services
I Improve Myself. I take advantage of opportunities to build my work skills and knowledge
I Watch for Ways to Innovate. I take advantage of new products and technology whenever I can.
So We Get Better Each Day. I approach each day as an opportunity to improve.

Who and where we are
Section within MoDOT's Construction and Materials Div.
Jen Harper-Research Director
Brent Schulte, Jenni Hosey and Scott Breeding-Research Analysts
Lauren Bielecki-Research Librarian (Contract Employee)

Federal research funding




Total Federal Research Funding Approx. $6 mil
Total State Research Funding Approx. $750,000
Estimated MoDOT Research Funding 2023 Approx. $6,750,000
NCHRP $1.3 mil
TRB $200k
AASHTO TSP $190k
FHWA Pooled Funds $850k
100% Federal Funding
Research Projects = $3,090,000
Local Assistance Programs = $650,000
Admin. = $470,000


Research at a glance
Average 45 contracts any given time
Projects can range from $50k to over $500k
Research is performed by universities, consultants or a partnership of the two
The Research Section coordinates many things besides just research projects

Research idea generation
Research Section meets with divisions and districts
Call for ideas from external research partners
Host MoDOT Research Needs Day

Research Focus

Projects that are practical and implementable

Projects that make things safer

Projects that make us more efficient

Projects that make our system last longer

Areas of MoDOT we work with

Innovations Challenge

- Tool and Equipment Best Practices
  - Items fabricated or modified by MoDOT employees
- Project Best Practices
  - Exceptional results for transportation users or internal operations
- Productivity Best Practices
  - Improvements to office and field processes, materials, and products
- https://www.youtube.com/watch?v=3SIe5W70y7A

Innovations Challenge Prizes

- 1st Round at District or Central Office level
  - $75/person and chance to compete at statewide event
  - Up to 18 winners in each district and Central Office
- Statewide
  - Top 12 winners receive $425/person
  - Can earn from $1000-$10,000 for their district budget
  - "Peoples Choice" award & 3 Director's Awards

Innovation Funding

- $1 million is provided each year to implement approved innovations
- Maintenance Division has set up a "store" where districts can purchase items
- Implementation Challenge:
  - Items that need to be crash tested

Research Section-Unofficial Innovation Program
Part of Construction and Materials Division
Contracts research with external organizations
Coordinates EDC Initiatives & MoSTIC
Help connect innovative companies and MoDOT staff

For more information
Jen Harper
MoDOT Research Director
jennifer.harper@modot.mo.gov
573-526-3636

Vermont AOT Research Overview

Emily Parkany, Research Manager
Vermont Agency of Transportation
Colorado Research Peer Exchange
February 28, 2023

OVERVIEW

- When Research was part of the Materials Lab, there was more staff and more field and internal research.
- Now, two staff and greater emphasis on research management
  - External research projects led by VTrans
  - Maximizing utilization of external payments
    - Pooled funds including NETC
    - National Cooperative Highway Research Program/TRB
  - Regional University Transportation Center (U of Maine)

EXTERNAL RESEARCH PROCESS (VTRANS-LED)

- Solicit research ideas by December each year
- Match with VTrans technical Champions by early January
- Champions prepare Research Project Statements in January
- Solicit Letters of Interest from Qualified Researcher List in February
- Qualified Researchers responded to RFP in December
  - 12 selected: 5 universities and 7 consultants
- Champions select research teams based on Letters of Interest
- Proposals due March 15
- Champions present to Bureau Directors (March 31) who decide on projects to fund

CURRENT EXTERNAL RESEARCH PROJECTS

- 20-3 Rectangular Rapid Flashing Beacons
- 21-0 Research Evaluation
- 21-1 Traffic Safety Toolbox
- 21-2 RFID
- 21-3 Rapid Setting Concrete
- 22-2 BMD Round Robin
- 22-3 Phosphorus Removal with DWTRs
- 22-4 SmartGrowth, VMT and GHG

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POTENTIAL 2023 EXTERNAL RESEARCH PROJECTS

- Using DCP in Preliminary Design – Geotech
- New UAS Technology Public Sector Impacts – Aviation
- Small Culvert Performance Monitoring – District Maintenance
- Travel Time Data from Work Zones – Proj Development/Traffic Design
- Pavement Performance Models – Asset Manaement
- RAS as an FDR Mechanical Stabilizer – Asphalt Materials
- Phosphorus Removal from Stone-Lined Ditches – Stormwater Mntce
- Laboratory Aging Procedures for Asphalt Mixtures – Asphalt Materials
- Rural GHG Reductions Toolbox – Planning

TECHNICAL ADVISORY COMMITTEE (TAC)

- All VTrans led projects have TACs
- Technical Champion
- Research Staff
- AOT staff from different Bureaus, Divisions
- Technical staff from other Agencies
- RPC Staff
- More participation, more project guidance, more implementation potential

TRANSPORTATION RESEARCH PROGRAM OVERVIEW
VERMONT AGENCY OF TRANSPORTATION

ADDITIONAL VTRANS RESEARCH ACTIVITIES

- Annual Research and Innovation Symposium (September)
- Quarterly Newsletter

2022 AOT Research and Innovation Symposium

- 26-30 Projects in Four Groupings:
  - Asset Management and Maintenance
  - Materials
  - Environmental, Resilience, Planning and Public Transportation
  - Structures and Construction
- Virtual 2020, 2021, Hybrid 2022
- Each project includes
  - Web page—permanently available!
  - Fact Sheet
  - Poster
  - 3-5 Minute Recording (support team failed in 2022)
  - Half of the projects in 2022 included table demos

NEW ENGLAND TRANSPORTATION CONSORTIUM (NETC)

Three research projects/year, webinars, Symposium

Example Projects

18-3 Integrating Unmanned Aerial Systems

19-1 Curved Integral Abutment Bridges

20-4 Connected and Automated Vehicle Legal and Regulatory Issues

VERMONT AGENCY OF TRANSPORTATION

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP)

- FFY21 Contribution $240,000
- All states vote on 120-150 potential projects a year
- 60 new projects are funded
- VTrans staff on the following project panels (examples):
  - Workforce 2030: Recruiting and Training the Next Gen Trans Construction Workforce
  - Quantifying the Impacts of Corridor Management
  - Practices for Ensuring Bridge Surface Smoothness
  - Incorporating Maintenance Costs into a Transportation Asset Management Plan
  - Design Guide for Rural Deviated Fixed Route Transit Systems
  - Innovations Deserving Exploratory Analysis (IDEA)

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TRANSPORTATION RESEARCH BOARD (TRB)

- 10 VTrans staff participated in TRB Annual Meeting (January 2023)
- February 16 TRB Highlights Lunch and Learn
- VTrans Technical Committee membership includes:
  - Research Implementation Innovation Management
  - Winter Maintenance
  - Transportation Earthworks
  - Environmental Analysis and Ecology

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REGIONAL UNIVERSITY TRANSPORTATION CENTER (U OF MAINE/not funded 2023)

TIDC Transportation Infrastructure Durability Center AT THE UNIVERSITY OF MAINE

- Transportation Infrastructure Durability Center (TIDC UTC)
- UVM is one of five partner universities
- VTrans Technical Advisors on all UVM-led projects
- Active in TIDC UTC Advisory Board (meets twice a year)
- New sand borrow project

ADVANCED STRUCTURES & composites center

A consortium of the following New England Universities:

THE UNIVERSITY OF MAINE | UCONN UNIVERSITY OF CONNECTICUT | UMASS University of Massachusetts Lowell | The UNIVERSITY of VERMONT | THE UNIVERSITY OF RHODE ISLAND | WNE WESTERN NEW ENGLAND UNIVERSITY

VERMONT AGENCY OF TRANSPORTATION

VTRANS RESEARCH ACCOMPLISHMENTS

- Project Champions from across the Agency
- Variety of projects: materials, structures, snow and ice, environmental, etc.—directly and indirectly research funded, other
- Annual Research and Innovation Symposium
- Virtual AASHTO RAC
- Thrived during the pandemic—lots of virtual learning opportunities

Leading Transportation Pooled Funds Presentations

U.S. Department of Transportation
Federal Highway Administration
TPF TRANSPORTATION POOLED FUND

Transportation Pooled Fund (TPF) Program

Tricia Sergeson
TPF Program Manager
Federal Highway Administration (FHWA)

February 28, 2023

© 2022 FHWA.

Source: FHWA.

Colorado Peer Exchange

U.S. Department of Transportation
Federal Highway Administration
TPF TRANSPORTATION POOLED FUND

COLORADO
Department of Transportation

Welcome!

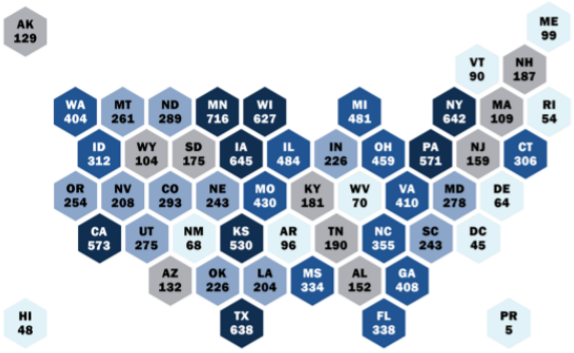
© 2022 *Tricia Sergeson.*

U.S. Department of Transportation
Federal Highway Administration

TPF TRANSPORTATION POOLED FUND

Research and Innovation Through Collaboration

- The TPF Program has existed for **more than 45 years**!
- The participants **develop innovative solutions at less cost while extending the reach and impact of their research** by pooling funds and expertise.



Represents number of studies each partner has participated in as of 2020.

Source: FHWA.

U.S. Department of Transportation
Federal Highway Administration

TPF TRANSPORTATION POOLED FUND

TPF Program Overview

- There are more than 160 active TPF study projects.
- More than $615 million in funds have been processed by the program since 2007.

TPF Program by the Numbers

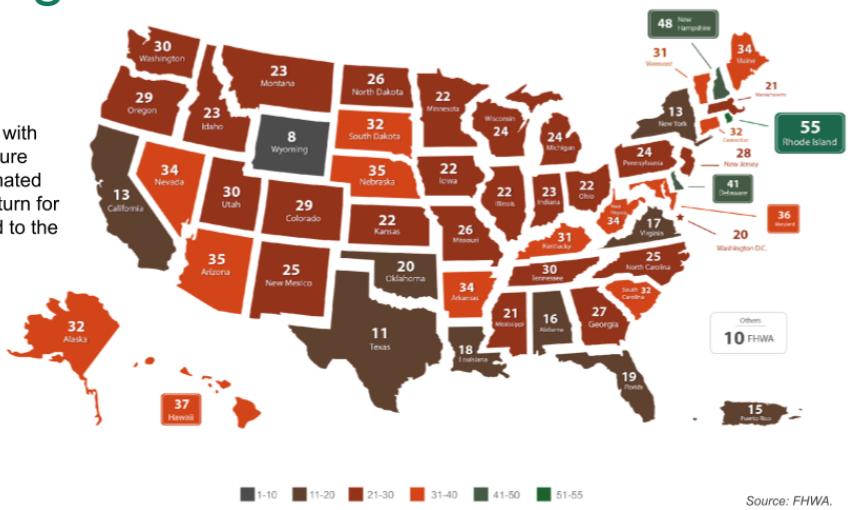
TPF Program Area	Total	FHWA	State DOT
Active projects	167	53	114
Total funding (active and closed projects)	$614,886,428	$236,479,186	$378,407,242
Total active project funding	$319,206,130	$133,310,351	$185,895,779
Open solicitations	10	0	10
Completed projects	446	177	269

An overview of the TPF Program funding and current projects.
Source: FHWA.[(1)]

DOT = department of transportation.

Leverage Funds!

By combining funds with other States, this figure represents the estimated funds received in return for every $1 contributed to the TPF Program.



Source: FHWA.

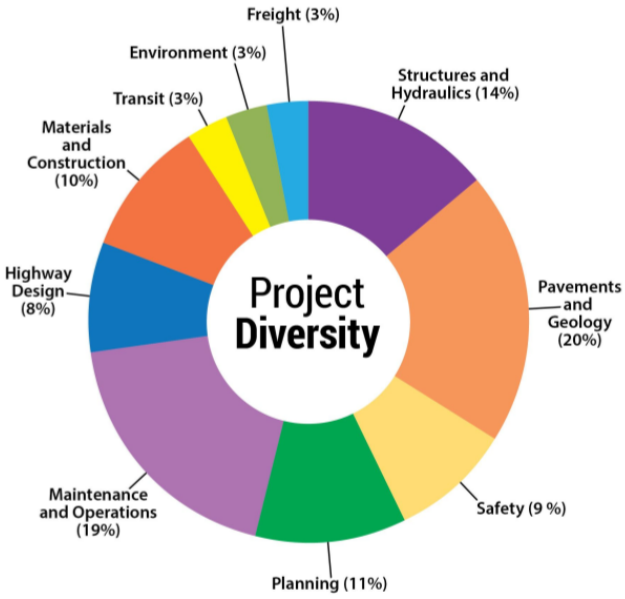
What Is a TPF Study?

A TPF study is intended to address a new area of planning, research, or technology transfer, or provide information that will complement or advance those areas. The study is a collaborative effort between different entities. The TPF Program study must:

- Be initiated and led by either **FHWA** or a **State DOT.**
- Have a total project duration not to exceed 5 yr.
- Have the proposed study documented in the State DOT's work program.

Types of TPF Study Topics

TPF study topic areas have a lot of variety!



Source: FHWA.[1]

Types of TPF Projects

What qualifies for the TPF Program?

Who Is Involved in a TPF Study?

Lead or partner agency:

- State DOT.
- FHWA program office.
- FHWA Resource Center.

Partner agency only:

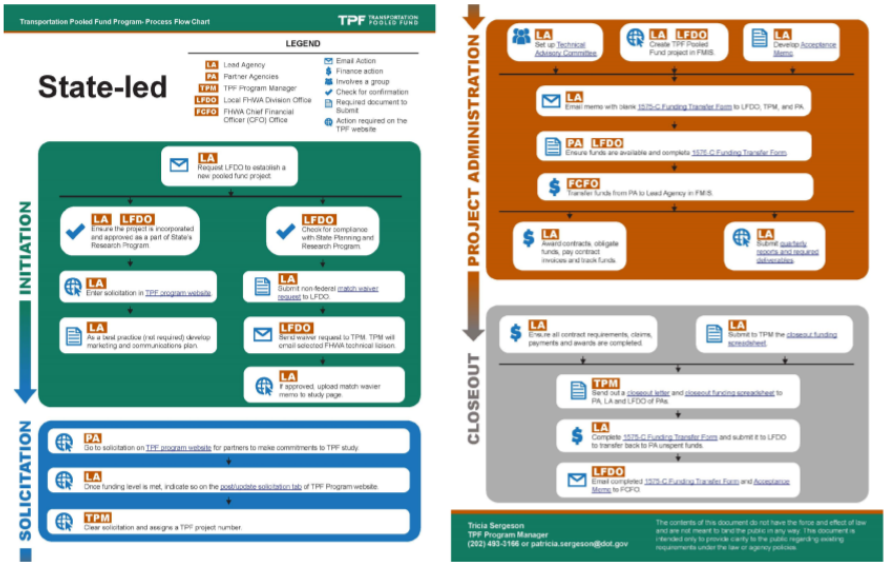
- Organizations.
- Private industry.
- Approved foreign governments.
- Local and regional agencies.
- Other Federal or State agencies.

TPF Program Partners

TPF Program International Partners

TPF Process Flow Charts

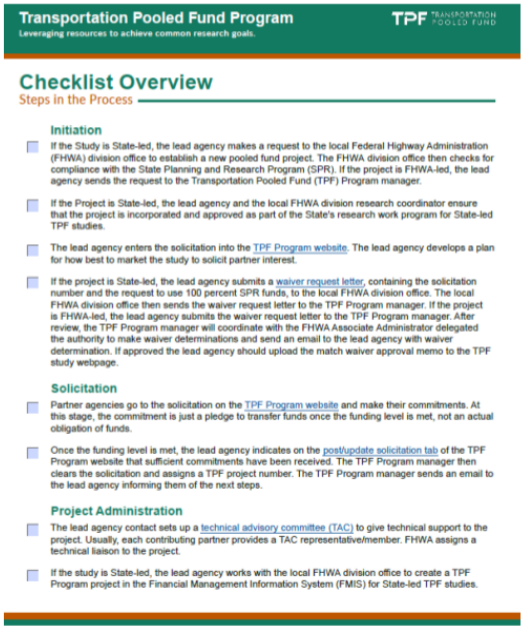
- Provide process overview.
- Link to TPF resources.
- Available on the TPF website.(2)



Source: FHWA.(2)

TPF Checklist

- Provides process overview.
- Links to TPF resources.
- Available on the TPF website.[2]



Transportation Pooled Fund Program
Leveraging resources to achieve common research goals.
TPF TRANSPORTATION POOLED FUND

Checklist Overview
Steps in the Process

Initiation

- If the Study is State-led, the lead agency makes a request to the local Federal Highway Administration (FHWA) division office to establish a new pooled fund project. The FHWA division office then checks for compliance with the State Planning and Research Program (SPR). If the project is FHWA-led, the lead agency sends the request to the Transportation Pooled Fund (TPF) Program manager.
- If the Project is State-led, the lead agency and the local FHWA division research coordinator ensure that the project is incorporated and approved as part of the State's research work program for State-led TPF studies.
- The lead agency enters the solicitation into the TPF Program website. The lead agency develops a plan for how best to market the study to solicit partner interest.
- If the project is State-led, the lead agency submits a waiver request letter, containing the solicitation number and the request to use 100 percent SPR funds, to the local FHWA division office. The local FHWA division office then sends the waiver request letter to the TPF Program manager. If the project is FHWA-led, the lead agency submits the waiver request letter to the TPF Program manager. After review, the TPF Program manager will coordinate with the FHWA Associate Administrator delegated the authority to make waiver determinations and send an email to the lead agency with waiver determination. If approved the lead agency should upload the match waiver approval memo to the TPF study webpage.

Solicitation

- Partner agencies go to the solicitation on the TPF Program website and make their commitments. At this stage, the commitment is just a pledge to transfer funds once the funding level is met, not an actual obligation of funds.
- Once the funding level is met, the lead agency indicates on the post/update solicitation tab of the TPF Program website that sufficient commitments have been received. The TPF Program manager then clears the solicitation and assigns a TPF project number. The TPF Program manager sends an email to the lead agency informing them of the next steps.

Project Administration

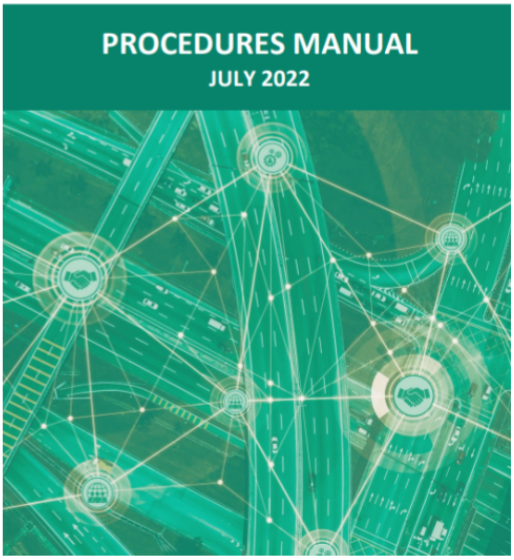
- The lead agency contact sets up a technical advisory committee (TAC) to give technical support to the project. Usually, each contributing partner provides a TAC representative/member. FHWA assigns a technical liaison to the project.
- If the study is State-led, the lead agency works with the local FHWA division office to create a TPF Program project in the Financial Management Information System (FMIS) for State-led TPF studies.

Source: FHWA.[2]

TPF Program Manuals

- TPF Procedures Manual.[3]
- TPF Web User Manual.[4]
- TPF Financial Procedures Manual.[5]

TPF TRANSPORTATION POOLED FUND



Source: FHWA.[5]

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Fund Transfer Automation Update

The fund transfer process is being automated through the Financial Management Information Systems (FMIS).

SPR-B Match Waiver Frequently Asked Questions

- Can the non-Federal match be waived for TPF studies?
- When do I submit a match waiver request for SPR-A, and when do I submit a match waiver request for SPR-B for a TPF Study?
- Do all TPF projects receive a funds-match waiver automatically?
- If a waiver is approved, does my funding source have to match the wavier?
- Who do I contact to submit an SPR-A or -B waiver?

TPF Website Overview

Source: FHWA.

U.S. Department of Transportation
Federal Highway Administration

TPF TRANSPORTATION POOLED FUND

Source: FHWA.[1]

TPF Best Practices

U.S. Department of Transportation
Federal Highway Administration

TPF TRANSPORTATION POOLED FUND

TPF Best Practices

- The document was compiled from various interviews with lead agency partners.
- It is a great resource for anyone new to leading a TPF study.
- It is available on the TPF website.[2]

TPF TRANSPORTATION POOLED FUND

MANAGEMENT BEST PRACTICES FOR TPF STUDY LEAD AGENCY

The following suggested best practices are not mandatory when leading a TPF study.

PROJECT INITIATION

Begin Outreach
Prior to posting a solicitation, begin outreach efforts to identify potential partner organizations.

Stakeholder Engagement
Engage stakeholders to garner support prior to posting a solicitation (such as emailing notifications, etc.).

Brainstorm How to Communicate the New Solicitation
Discuss how the team will conduct outreach for the TPF study, especially early in the process.

Funding Threshold
Identify the appropriate minimum funding commitment required for each partner organization (i.e., a minimum of $5,000 per year for a 5-year TPF study).

SOLICITATION

Provide Information
In the solicitation, it helps to include the following information:

- Study methodology.
- Planned outcomes.
- Project scope.
- Suggested contribution.

Promote Solicitation
Promote and advertise the new solicitation to potential partners.

Support Partner Organization(s)
Provide support to partner organization(s) throughout the solicitation process.

FUND TRANSFER PROCESS

Timeline Length
Be aware that the fund transfer process can take more time than one might expect.

Contact List
Maintain a list of partner organization contacts and individuals involved in the fund transfer process to provide any updates as needed.

Email Contacts
After receiving the pooled fund study number, send an email that includes the official pooled fund study number and fund transfer instructinos to funding contacts.

Verify Accuracy
Verify that the acceptance memo and fund transfer information are correct.

Source: FHWA.[2]

Project Initiation

- Begin outreach.
- Engage stakeholders.
- Brainstorm how to communicate new solicitation.
- Identify funding threshold.

Source: FHWA.

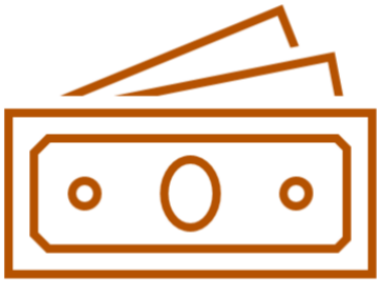
Solicitation

- Provide key information to users in solicitation.
- Promote solicitation.
- Support partner organization(s).

Source: FHWA.

Fund Transfer Process

- Timeline length.
- Email contacts.
- Contact list.
- Verify accuracy.



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Project Administration

- First year expectations.
- Kickoff meeting.
- Lead agency team.
- Project timeline.
- Project reporting.

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Technical Advisory Committee (TAC) Best Practices

- Hold a kickoff/orientation meeting for TAC members.

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- Include the following potential agenda items:
  - Introduce project team.
  - Discuss TPF procedures and resources.
  - Review logistics of fund transfer or pay.gov.
  - Discuss background/scope.
  - Establish project schedule and milestones.
  - Address questions.

Project Closeout

- Create spreadsheet.
- Conduct final meeting.

Closeout Funding Spreadsheet - Pooled Fund Project: TPF-5(XXX)

Project Manager:

As of 5/14/20XX

Example Only

State/Partner	Program Code (e.g., L560)	Funds Transferred to Project Per Partner	Funds Obligated	Contribution Percentage Per Partner	Amount Invoiced	Total Expenditures Per Partner	Actual Expense % Per Partner	Undelivered Orders Unexpended Funds	UDO Unexpended Funds to be Returned to Partners
FHWA	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Florida	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Georgia	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Hawaii	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Iowa	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Idaho	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Illinois	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Minnesota	L56E	15,000.00	15,000.00	7.1429	14,715.01	14,715.01	7.1429	284.99	284.99
Mississippi	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Montana	L550	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
New York	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Ohio	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Texas	L560	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Wisconsin	L550	15,000.00	15,000.00	7.1429	14,715.08	14,715.08	7.1429	284.92	284.92
Totals		**$210,000.00**	**210,000.00**	**100.00**	**$206,011.05**	**$206,011.05**	**100.00**	**$3,988.95**	**$3,988.95**

UDO = Undelivered orders.

Source: FHWA.

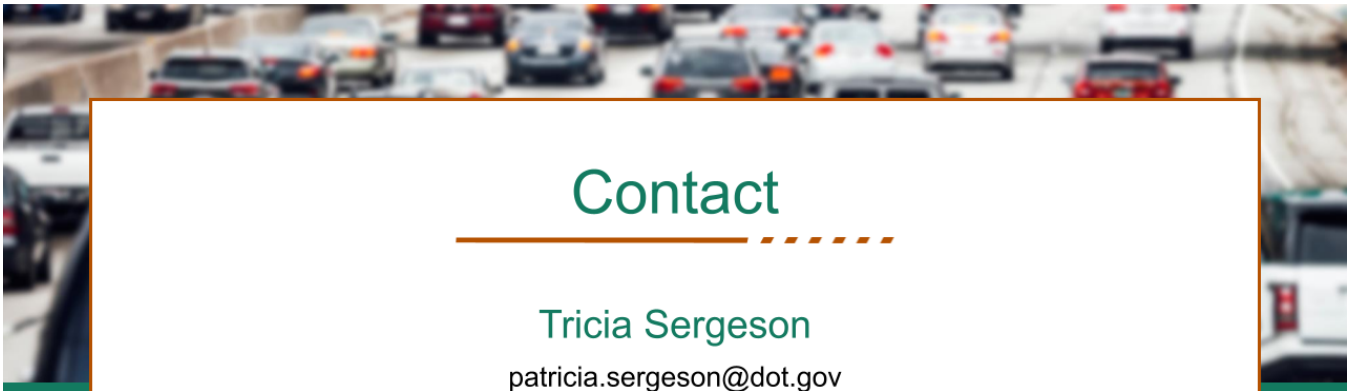
Open Discussion

- How do you think we can assist those who lead TPF studies?
- Are there TPF Program improvements you would like to see?
- How do you identify the impact of the TPF studies you have participated in after completion?

Questions?

U.S. Department of Transportation
Federal Highway Administration

TPF TRANSPORTATION POOLED FUND



Contact

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www.pooledfung.org

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Federal Highway Administration

TPF TRANSPORTATION POOLED FUND

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5. National Academies of Sciences, Engineering, and Medicine. 2022. *Transportation Pooled Fund Financial Procedures Manual*. Washington, DC: National Academies of Sciences, Engineering, and Medicine. Revision_TPF Financial Procedures Manual July 2022.pdf (pooledfund.org), last accessed February 6, 2023.

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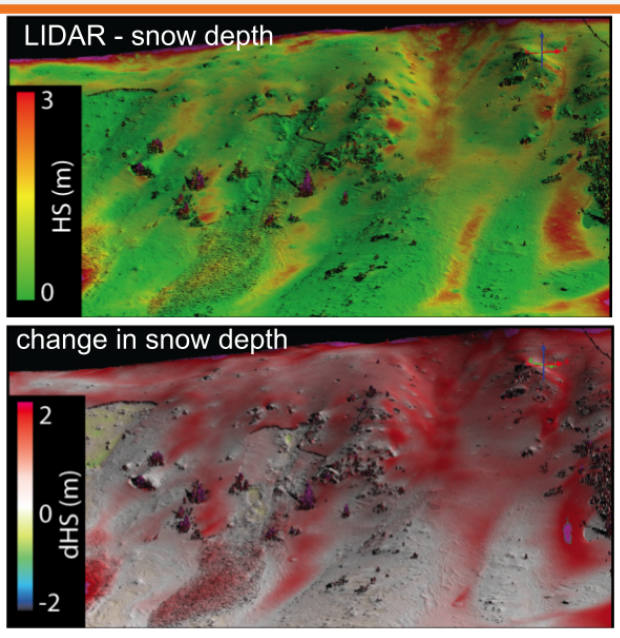
CDOT Pooled Funds Experience
David Reeves

- Manage Traffic Safety, Maintenance & Operations Projects
- Handle all the transfers to TPF's that CDOT participates in
- Lead several TPF's
- Been in the research branch since 2009 but at CDOT since 2003

Leading vs Participating

Participating:

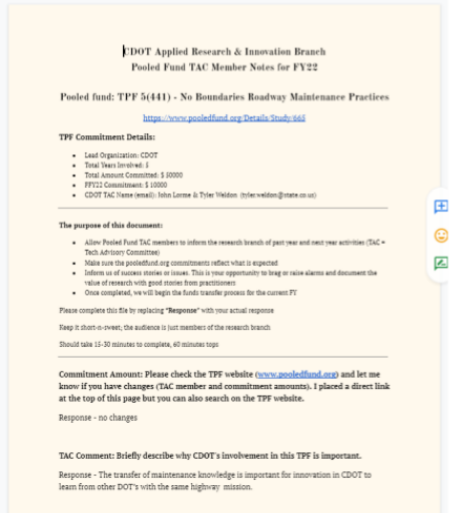
- Level of effort is low but not zero
- Tracking TPF's that we are involved in especially those using SPR funds
- Being the financial Point of Contact
- Transferring funds annually
- Coordinating with business office and FHWA/FMIS
- Return on Investment assuming active TAC member involvement is high
- **Checking in with Champions/TAC members to ensure CDOT benefit**



Sample TAC Report

- Before transferring funds, we ask TAC member to complete an annual report (try to at least)
- Reminder of the actual commitments
- Explain any past and future plans and benefits
- Reminds the TAC member of any out of state travel permissions
- Sample blank document

Microsoft Word Document



CDOT Applied Research & Innovation Branch
Pooled Fund TAC Member Notes for FY22

Pooled fund: TPF 5(441) - No Boundaries Roadway Maintenance Practices

https://www.pooledfund.org/Details/Study/665

TPF Commitment Details:

- Lead Organization: CDOT
- Total Years Involved: 5
- Total Amount Committed: $ 50000
- FY22 Commitment: $ 10000
- CDOT TAC Name (email): John Lorme & Tyler Weldon (tyler.weldon@state.co.us)

The purpose of this document:

- Allow Pooled Fund TAC members to inform the research branch of past year and next year activities (TAC = Tech Advisory Committee)
- Make sure the pooledfund.org commitments reflect what is expected
- Inform us of success stories or issues. This is your opportunity to brag or raise alarms and document the value of research with good stories from practitioners
- Once completed, we will begin the funds transfer process for the current FY

Please complete this file by replacing "Response" with your actual response

Keep it short-n-sweet, the audience is just members of the research branch

Should take 15-30 minutes to complete, 60 minutes tops

Commitment Amount: Please check the TPF website (www.pooledfund.org) and let me know if you have changes (TAC member and commitment amounts). I placed a direct link at the top of this page but you can also search on the TPF website.

Response - no changes

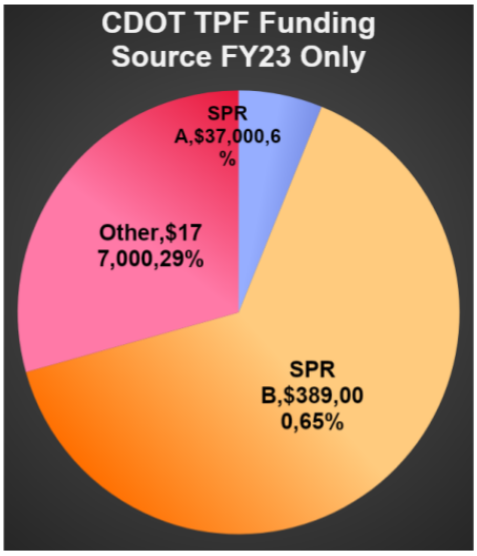
TAC Comment: Briefly describe why CDOT's involvement in this TPF is important.

Response - The transfer of maintenance knowledge is important for innovation in CDOT to learn from other DOT's with the same highway mission.

Participating – Some Stats

Too many to list but I have a spreadsheet

- 25 Active TPF's – Being the single Point of Contact helps
  - $2.1 Million - Total amount that have gone through my fingers since I joined the branch (FY's 10 – 23)
  - 92 years involved collectively – that's how old my dad is
  - $603,000 for FFY23
- 18 using SPR-B: $389,000 FFY23
- 2 using SPR-A: $37,000 FFY23
- 5 other funding source: $177,000 FFY23
- Transfers using SPR A or B is handled in FMIS – Easy to track (kind off)
- Non SPR – Require invoices that are sent to TAC member directly. I provide guidance and therapy.



That's it for Participating

CDOT Lead Pooled Funds

TPF-5(497) Transportation Avalanche Research Pool (TARP) 2.0

TPF-5(337) Transportation Avalanche Research Pool (TARP)

TPF-5(441) No Boundaries Transportation Maintenance Innovations

TPF-5(380) Autonomous Maintenance Technology (AMT)

TPF-5(260) Next-Generation Transportation Construction Management

PFS 1574 Post-Wildfire Debris Flow - Proposed - at $265k but need $700k minimum

Leading vs Participating

Leading:

1. Lead state controls the agenda
2. Easy to initiate but hard to get commitments
3. Communication (TAC & Financial)
4. Transfer funds early on – can't procure until funds arrive
5. Non-SPR (Research) is a headache for transferring funds via check/electronic transfer
6. Tracking member states transfers
7. Coordinating with member agencies takes a lot of effort. Delegate to Champion – don't be an enabler
8. Managing PI's and projects that satisfy all members

Twin snow shed, BC, Canada (photo: Jones)

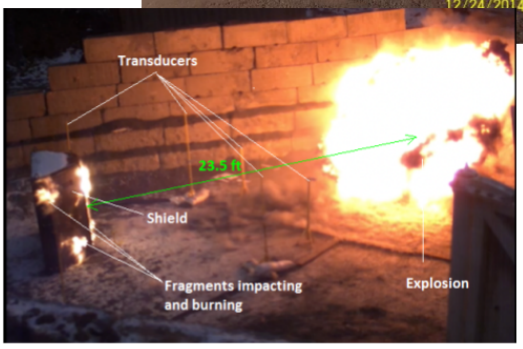
Synthesis report on the use and design of snow sheds to protect transportation corridors against avalanches

Time Check?

- Almost a watch but I liked the picture
- If time allows move forward, otherwise go to last slide

TARP - Initiating a TPF

- Pre-TARP – CDOT project to develop and test a blast shield for Avalauncher (see right)
- 2019 Project team went to International Snow Science Workshop/Conference (ISSW) - met a bunch of avalanche nerds and TARP was born
  - Met New Zealand by fluke (I was sitting next to Kevin)
- Importance of networking and getting commitments up front
- Took funds for some avalanche project that was funded and used the $75k as seed money for TARP
- Takes a long time to get folks to send $$$ - Push the finance guys and transfer your commitments early especially at the beginning
- Turned into over $1 million in research projects and growing



List of TARP projects Over $900k ($165k CDOT's part)

1. Assessing Gazex Avalanche Control Effectiveness with Terrestrial Laser Scanning (CU)
2. Infrasound Avalanche Detection (Boise State)
3. O'BellX Analysis (Colorado School of Mines)
4. Detecting Avalanches and Differentiating Type and Size of Avalanches Using Radar (Niivatech – but got canceled – they couldn't pull it off)
5. Developing Real-Time Data Processing and Analytics for Avalanche Forecasting Using Frequency Modulated Continuous Wave Lidar During Winter Precipitation Events (Montana State University - MSU)
6. LIDAR Phase 2 - Terrestrial Laser Scanning with Real-Time Data Analytics for Avalanche Forecasting (CU)
7. Measuring Explosive Airblast of Remote Avalanche Control Systems (RACS) (MSU)
8. Snowshed Synthesis (MSU)
9. DEID Snow Storm Instabilities (U. of Utah)
10. Avalanche Metric (Yeh & Associates plus BGC)
11. UAS Synthesis (In procurement but U of Wyoming)

Differential Emissivity Imaging Disdrometer

TARP Partners – Custom Logo

Caltrans
CDOT
CAIC
Colorado Avalanche Information Center
Transportation & Public Facilities – State of Alaska
UDOT
Keeping Utah Moving
NZ TRANSPORT AGENCY
WAKA KOTAHI
TARP
TRANSPORTATION AVALANCHE RESEARCH POOL
ALASKA RAILROAD
Wyoming Transportation Department
David Hamre & Associates, LLC
British Columbia Ministry of Transportation and Infrastructure
WSDOT

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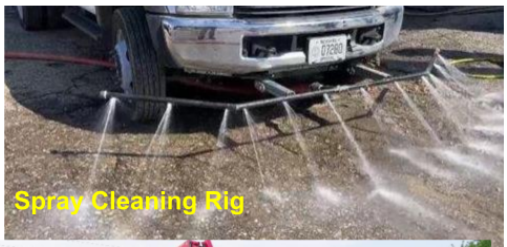
TPF 5(441) No Boundaries

- https://maintainroads.org/
- Facilitate the transfer of knowledge of non-snow and ice maintenance innovations and technologies
- Bi-Annual in-person & Monthly meetings
- Innovation Database
- Close group and facilitated by experts
- 21 Member state at $10k per year – Transfer is a challenge


Spray Cleaning Rig

Solar Gore Point Flasher - MoDOT

Gator Geter – MoDOT & CDOT

Knuckle Boom Crane – Ohio DOT

12

AMT
Autonomous Maintenance Technology

Caltrans Crashes

TPF 5(380) Autonomous Maintenance Technology (AMT)

TAC Members:
- Ashley Nylen, CDOT Office of Innovative Mobility – Left CDOT recently
- Tyler Weldon, CDOT Maintenance Engineer and now Deputy Director of the Bridge and Tunnel Enterprise

Objective:
- Get the driver out of a truck designed to be crashed into
- Focus on autonomous technologies in work zone applications
- Improving the safety, efficiency and quality of work efforts
- providing better solutions and valuable lessons learned for the integration of new technologies

CDOT's Autonomous Truck Mounted Attenuator Impact Protection Vehicle

Leading TPF's Challenges

1. TPF 5-year timeline – clock starts clicking when you meet your funding expectations
2. Benefit to 5 years (accounting, scope creep, retirements)
3. Losing project champions
4. Breaking in new IHE's
5. Contracting issues especially with IP ownership
6. Facilitating Meetings - Universities are not the best (curious what others experience is)
7. Procurement - too many projects all at once – and work with IHE that you already have a relationship with
8. Have a steering committee with the TAC leaders rather than relying on lead state
9. Member states keep sending money or to wrong TPF

OBellX for Avalanche Control

Idaho Transportation Department Leading Pooled Fund Projects

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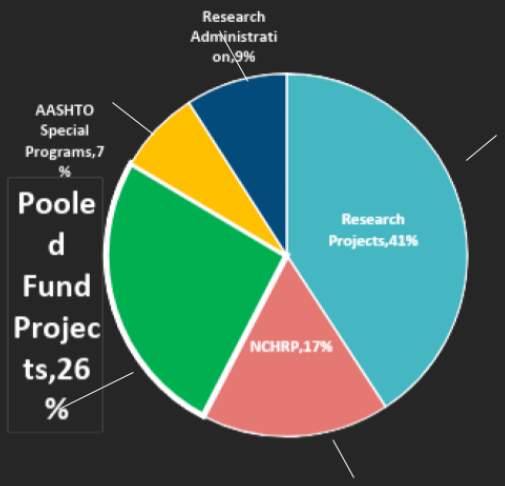
YOUR *Mobility*
YOUR *Economic Opportunity*

Amanda Laib
Senior Research Analyst
February 28, 2023

Pooled Fund Projects – ITD Participation

- Actively participating in **27** pooled fund studies
- Programmed another **5** that are in solicitation phase
- $643,000 budgeted in FY2023
  - $364,000 in current year funds
  - $279,000 in prior year funds



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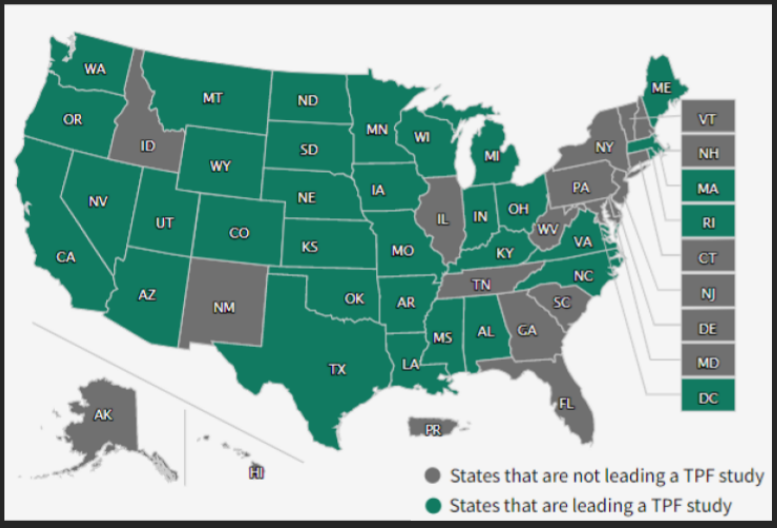
Pooled Fund Projects – ITD Participation

Why doesn't Idaho lead Pooled Funds?

- Practical barriers
  - Small Research Program (2 FTEs)
  - No financial specialist
  - Interest from SMEs?
- Bureaucratic barriers
  - Can't spend federal money without spending authority from legislature
  - Would need to include funds transferred from other states
  - Then build into budget request
  - Spending authority lapses after 1 year unless funds are encumbered



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Value of Pooled Fund Projects for ITD

Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs)

General Information

Study Number:	TPF-5(385)
Former Study Number:	
Lead Organization:	Virginia Department of Transportation
Solicitation Number:	1478
Partners:	Louisiana Transportation Research Center, AR, CA, CO GDOT, ID, IL, IN, KS, KY, LA, MI, MO, MS, MT, NC, NM, NV PADOT, SC, TN, TX, VA, VT, WI
Status:	Cleared by FHWA
Est. Completion Date:	
Contract/Other Number:	
Last Updated:	Jun 27, 2022
Contract End Date:	

Commitments by Organizations

Organization	Year	Commitments
Idaho Department of Transportation	2019	$660,000.00
South Carolina Department of Transportation	2021	$300,000.00
Idaho Department of Transportation	2020	$200,000.00
Idaho Department of Transportation	2022	$148,000.00
New Mexico Department of Transportation	2019	$141,000.00
New Mexico Department of Transportation	2020	$141,000.00
South Carolina Department of Transportation	2019	$141,000.00
Idaho Department of Transportation	2021	$130,000.00

- Leading contributor to TSDD project, ~$1.14 million from 2019-2022
- Collected ~5000 mi of data and determined remaining service life
  - Not realistic without Pooled Fund
- Presently integrated into ITD asset management strategy
- ITD Innovation Best of the Best award

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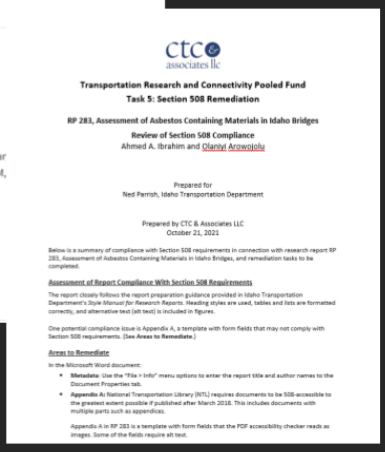
Value of Pooled Fund Projects for ITD

Transportation Research and Connectivity(librarian toolkit / knowledge networking / information condition / analysis of resources / digitization efforts / ADA support)

General Information

Study Number:	TPF-5(442)
Former Study Number:	
Lead Organization:	Oklahoma Transportation
Solicitation Number:	1503
Partners:	Northwestern University Transportation Librar Curcio, MLS, AZDOT, CA, ID, IL, MO, NC, NJ, NM, SD, TX, UT, WI, WY
Status:	Cleared by FHWA
Est. Completion Date:	Feb 28, 2020
Contract/Other Number:	
Last Updated:	Jan 27, 2023
Contract End Date:	



ctc associates llc

Transportation Research and Connectivity Pooled Fund
Task 5: Section 508 Remediation

RP 283, Assessment of Asbestos Containing Materials in Idaho Bridges
Review of Section 508 Compliance
Ahmed A. Ibrahim and Olaniyi Arowojolu

Prepared for
Ned Parrish, Idaho Transportation Department

Prepared by CTC & Associates LLC
October 21, 2021

Below is a summary of compliance with Section 508 requirements in connection with research report RP 283, Assessment of Asbestos Containing Materials in Idaho Bridges, and remediation tasks to be completed.

Assessment of Report Compliance With Section 508 Requirements

The report closely follows the report preparation guidance provided in Idaho Transportation Department's *Style Manual for Research Reports*. Heading styles are used, tables and lists are formatted correctly, and alternative text (alt text) is included in figures.

One potential compliance issue is Appendix A, a template with form fields that may not comply with Section 508 requirements. [See **Areas to Remediate**.]

Areas to Remediate

In the Microsoft Word document:

- **Metadata**: Use the "File > Info" menu options to enter the report title and author names to the Document Properties tab.
- **Appendix A**: National Transportation Library (NTL) requires documents to be 508-accessible to the greatest extent possible if published after March 2016. This includes documents with multiple parts such as appendices.

  Appendix A in RP 283 is a template with form fields that the PDF accessibility checker reads as images. Some of the fields require alt text.

- Research Program staff active in Transportation Research Connectivity project
- Section 508 Compliance review and remediation of research reports
- Exploring possible use of digitization services offered through the pooled fund to digitize some ITD collections

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Value of Pooled Fund Projects for ITD

Roadside Safety Pooled Fund - Phase 3

General Information

Study Number:	TPF-5(501)
Former Study Number:	TPF-5(343)
Lead Organization:	Washington State Department of Transportation
Solicitation Number:	1567
Partners:	AK, AL, CA, CO, CT, DE, FL, IADOT, ID, IL, LA, MA, MDOT SHA, MI, MN, MO, NM, OH, Ontario MOT, OR, PADOT, TX, UT, WA, WI, WV
Status:	Cleared by FHWA
Est. Completion Date:	
Contract/Other Number:	
Last Updated:	Jan 03, 2023
Contract End Date:	

- Highways Design Engineer active in Roadside Safety project
- Design and testing of safety hardware
- Collaborative development of guidelines
- ITD able to use established and tested designs without having to reinvent the wheel

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Pooled Fund Projects – Challenges

- Time commitment – PMs take on projects in addition to primary job duties
  - Not a problem for all PMs/Pooled Fund projects
  - Meetings, travel, evaluating deliverables
- Buy-in from leadership
  - Pooled funds are a good way to use unspent prior year funds
  - But support for implementation may not always be there
- Workforce retention and PM turnover
- Communication can be an issue
  - Some leading agencies provide little communication on progress
- In large Pooled Fund projects, hard to have a voice
  - Individual state priorities may not match group priorities
  - Some states' priorities may not be addressed

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Leading Pooled Fund Projects – Questions

The Financial Planning Component

- Is Idaho uncommon in spending authority and legislative constraints?
- Do other states require spending authority from legislature?
- If so, can other states carry spending authority year to year?
- Is spending of transferred federal funds built into annual Department budget request?

The Practical Component

- Pooled Fund project initiation process?
- Where do you draw project ideas from
  - AASHTO and TRB committees?
  - Internal staff or other agency partners?
- The role of Research Program staff?
  - Who drafts the problem statement?
  - Contracting, financial management and tracking spending, reporting, monitoring progress?

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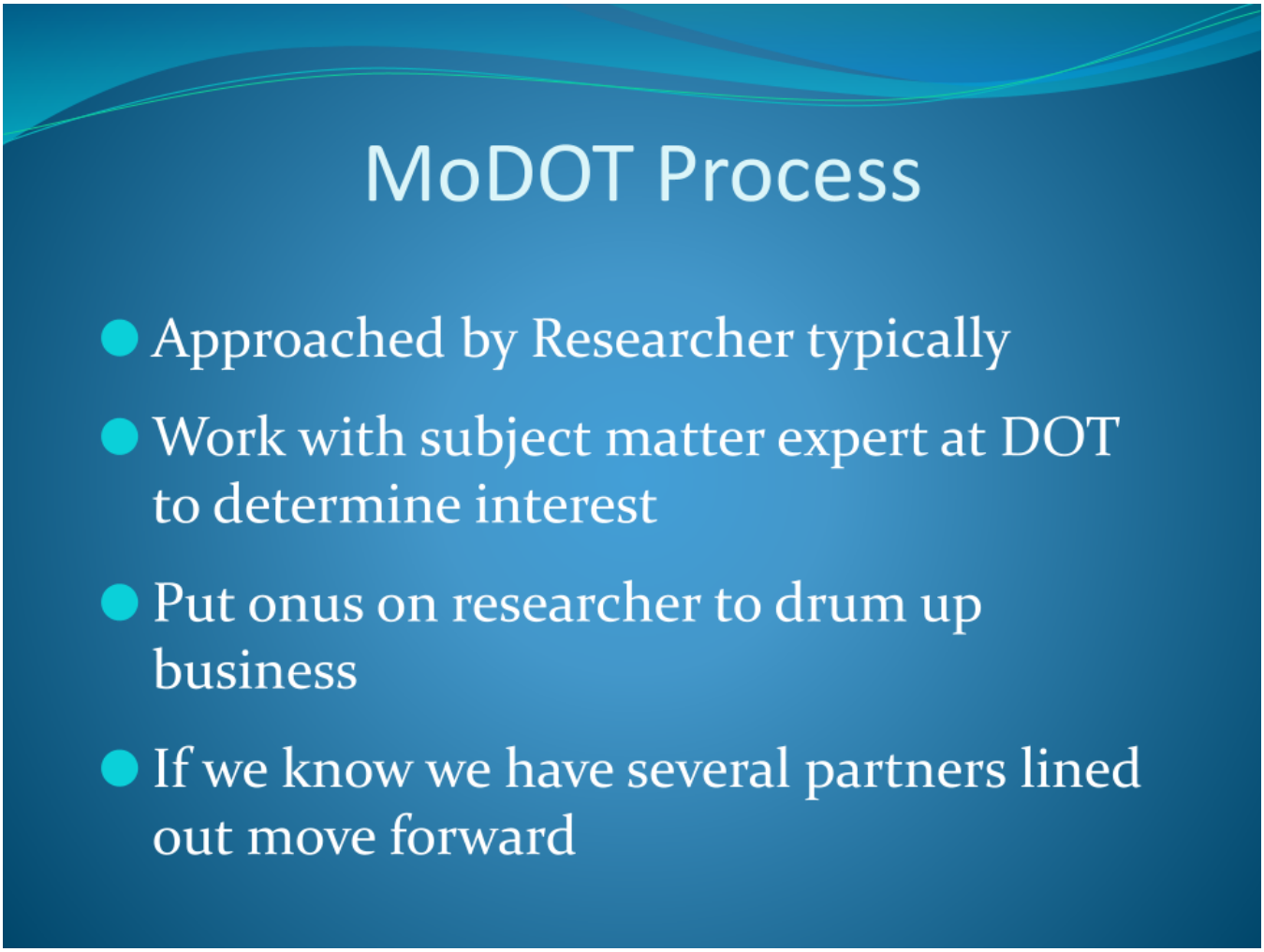
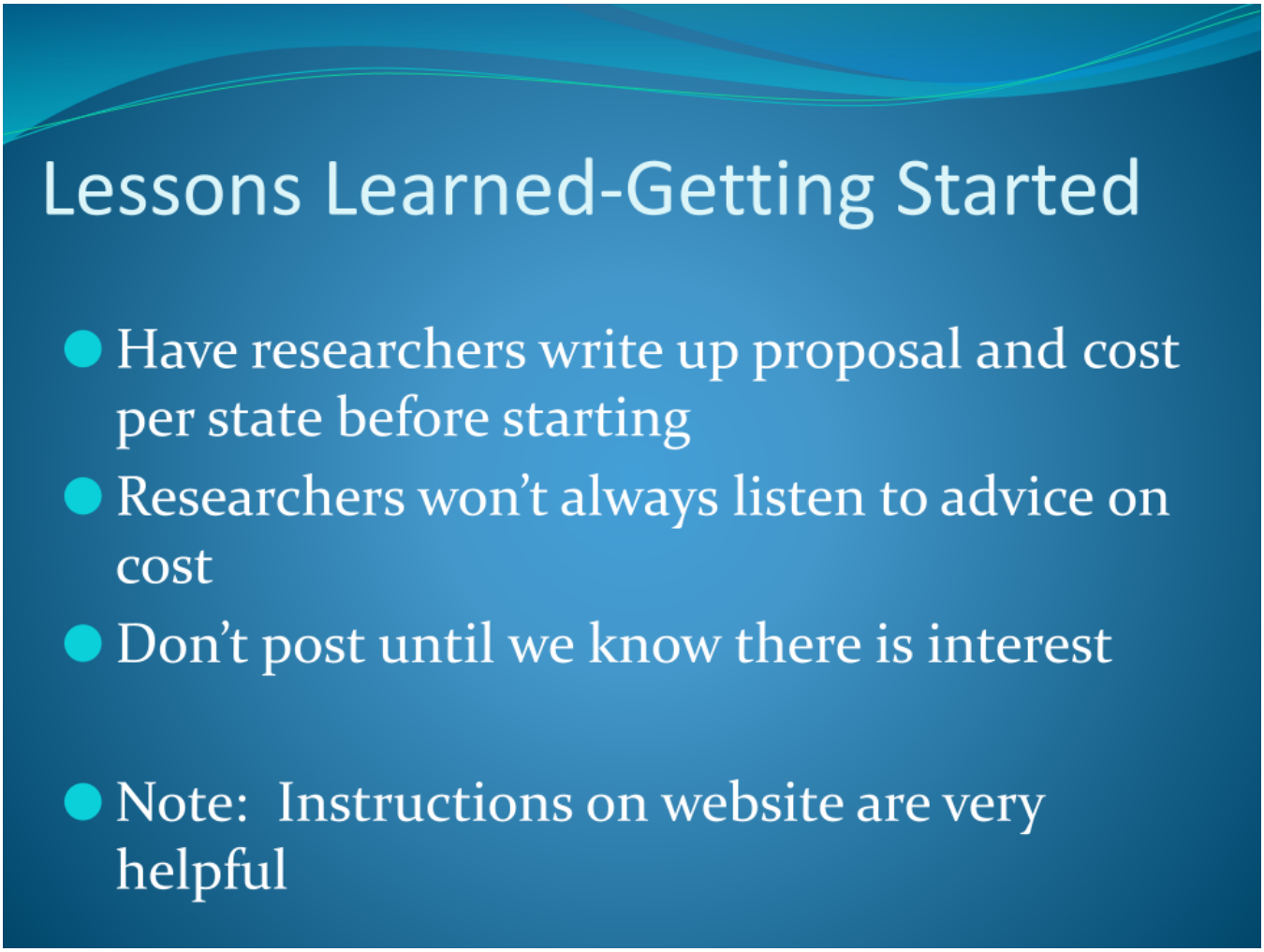
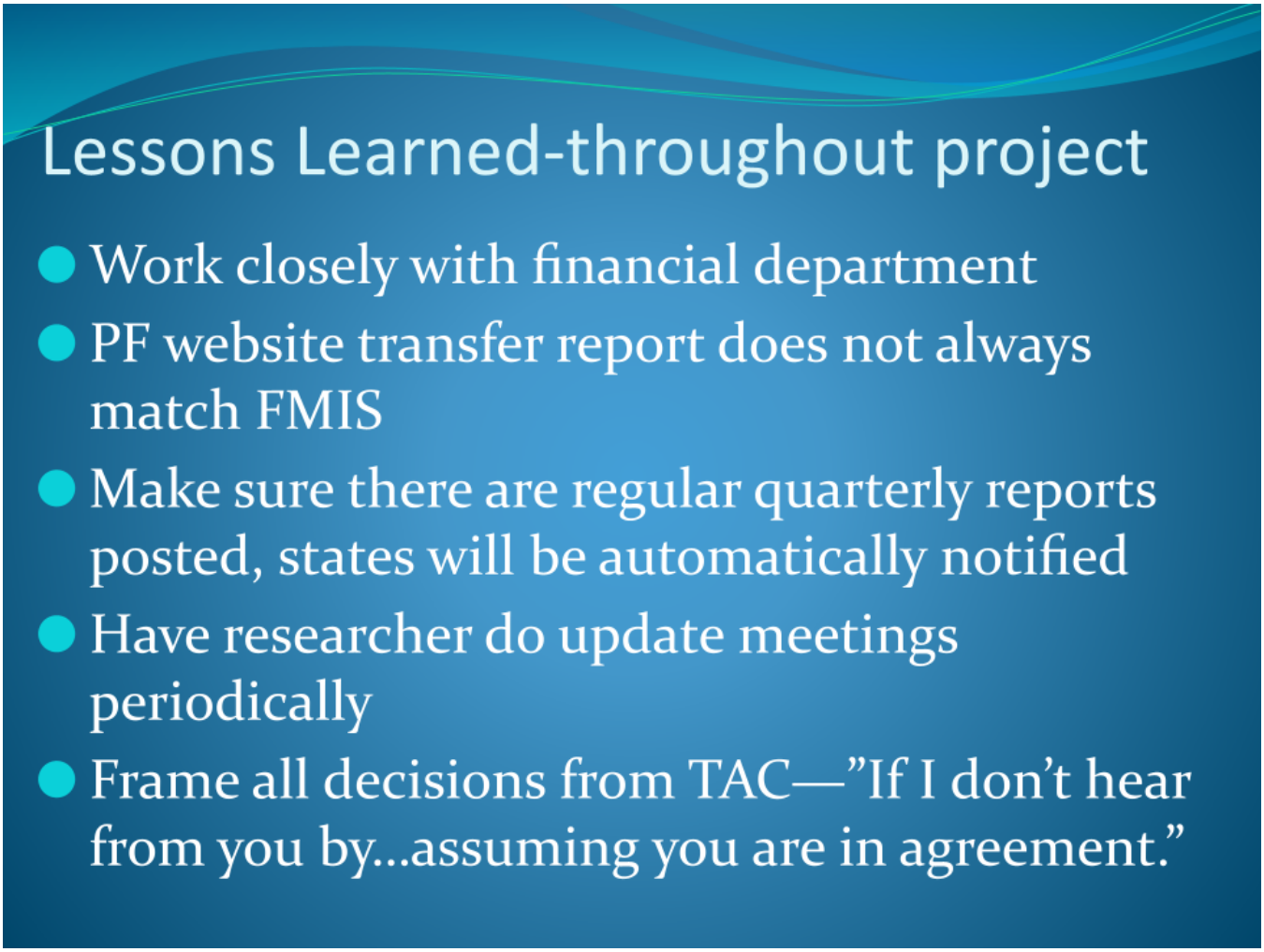
Colorado Peer Exchange
MoDOT leading pooled funds
Missouri DOT Presentation
Feb/March 2023
MoDOT

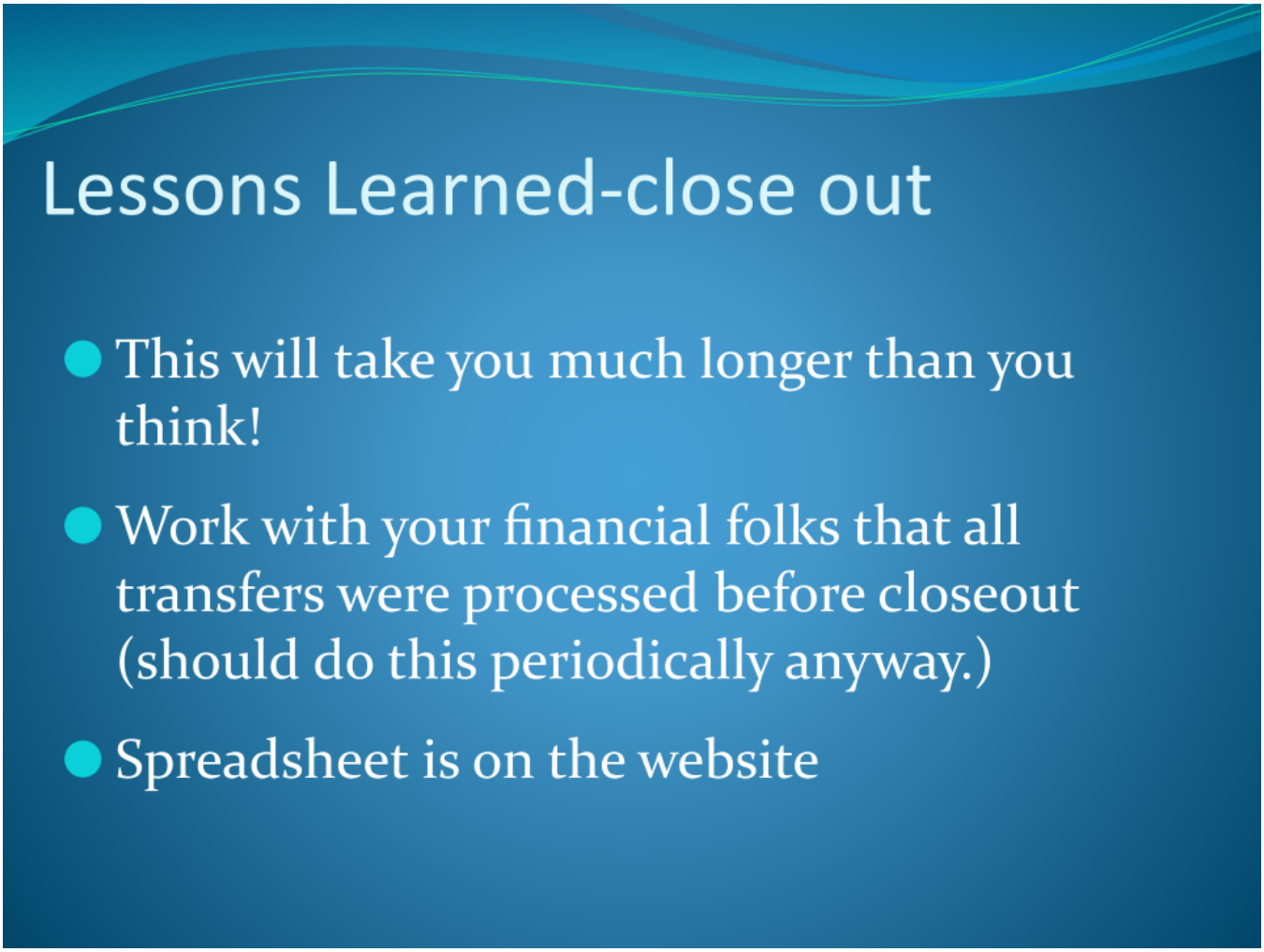
MoDOT led Pooled Funds

- Developing Implementation Strategies for Risk Based Inspection
- Traffic Disruption-Free Bridge Inspection Initiative with Robotic Systems
- Assessment and Repair of Prestressed Bridge Girders Subjected to Over-height Truck Impacts Pooled Fund Project


MoDOT Process
Approached by Researcher typically
Work with subject matter expert at DOT to determine interest
Put onus on researcher to drum up business
If we know we have several partners lined out move forward


Lessons Learned-Getting Started
Have researchers write up proposal and cost per state before starting
Researchers won't always listen to advice on cost
Don't post until we know there is interest
Note: Instructions on website are very helpful


Lessons Learned-throughout project
Work closely with financial department
PF website transfer report does not always match FMIS
Make sure there are regular quarterly reports posted, states will be automatically notified
Have researcher do update meetings periodically
Frame all decisions from TAC—"If I don't hear from you by...assuming you are in agreement."


Lessons Learned-close out
This will take you much longer than you think!
Work with your financial folks that all transfers were processed before closeout (should do this periodically anyway.)
Spreadsheet is on the website

VT AOT: Leading Pooled Funds/Pooled Funds

Emily Parkany, Research Manager
Vermont Agency of Transportation
Colorado Research Peer Exchange
February 28, 2023

PRESENTATION OVERVIEW

- VT AOT led previous version of New England Transportation Consortium
- Two research staff; not in a hurry to lead more Pooled Funds
- Participate in a few Pooled Funds
- Pooled Fund Qs

Led NETC 2014-2018 (2019)

- Set up before I joined in 2017
- Six New England States contributed $100,000/year
- Pays for Coordination and 3-4 new projects a year
- UVM had GIANT coordination contract--$185,000 for four years and additional contract fees at beginning and end of research contracts
- New Pooled Fund led by Maine DOT, but VT was still completing projects
- VT Division Office had a lot of paperwork to close the project and transfer money back to all six states

NETC's Slow Demise

- Started looking for new Lead State in 2021
- Conducted "Re-energizing NETC" project and it didn't finish/states could not agree on what to emphasize
- No state stepped up!
- Decided not to select new projects in 2022—no Pooled Fund transfers in 2022
- Spending remaining $200,000 or so through CTC Support Contract (June 2024); at least one project selected in 2021 will not finish until June 2024

VT Not Likely to Lead a Pooled Fund

- Only two of us
- Concentrating on other activities
- Easier when we had embedded "Business Support Services"

Current Pooled Fund Activity

- Not many when I started
- Now 5-6
- Funds with greater than $25K/year commitments, I generally quickly say "no"
- Not sure that we have a fair system of which ones to join
- Let's discuss "procurement-mechanism" Pooled Funds

Current VT Pooled Fund Participation

Number	Pooled Fund Name	Annual VT Commitment
TPF-5(479)	Clear Roads Phase III	$25,000
TPF-5(467)	Research Project Tracking	$46,000 (one time)
TPF-5(444)	Traffic Safety Culture Phase II	$10,000
TPF-5(464)	Hydrologic and Hydraulic Software Enhancements (SMS, WMS, Hydraulic Toolbox, and HY-8)	$5000
TPF-5(372)	Building Information Modeling (BIM) for Bridges and Structures	$20,000; now $25,000
TPF-5(385)	Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs)	$15,000 + data ($117,000 2023)

Pooled Fund as a (SPR-B) Procurement Mechanism

- Two funds led by Virginia
- One is TSDD (TPF-5(385) —participated since 2019; 26 states including MO and CO
- A similar one to get pavement friction data (TPF-5(463)); 13 states including MD SHA and MO. The commitments here ONLY reflect $20,000/year participation
- I am sympathetic that using the Pooled Fund transfers is a way to get desired data collection without RFPs and state/federal contracting processes
- Not sure that it's "fair"/equitable to use older SPR-B funds this way

Research Data Curation Presentations

Disclaimer & Accessibility Note

Opinions expressed by me during this presentation, the discussion period, or at other times during the session are mine alone, and do NOT necessarily represent the opinions, practices, polices, and/or laws of the National Transportation Library, the Bureau of Transportation Statistics, the U.S. Department of Transportation, or the United States government. Typographic errors are also mine.

This presentation has been made as accessible as possible for screen readers and adaptive technologies. Further, color choices and contrast have been checked. Also, the entire scripted text is included in the Slides Notes feature, so folks may read along at their own pace. However, ad libs will not be recorded. My apologies. Suggested improvements are welcome.

The Slide Notes section may also include text that I did not have time to read, and which contains more useful information. This text is easier to locate on the "Handout" version of these slides which have been shared with you.

Personal Introduction

1. Data Curator at the National Transportation Library at U.S. DOT, as well as Implementation Lead for the U.S. DOT Public Access Policy (2016 to present)
    1. Curate data for the Repository & Open Science Access Portal (ROSA P) https://rosap.ntl.bts.gov/
    2. Editor of U.S. DOT Public Access Guidance webpages, https://doi.org/10.21949/1503647
2. Librarian/Library Director at the Iowa DOT Library (2012 to 2016)
    1. Lead author for AASHTO Standing Committee on Research NCHRP Problem Statement "Best Practices for Increasing Access to the Results of Federally Funded Scientific Research" (2014-09-15), which became NCHRP 20-110 https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4062
    2. NCHRP 20-110 Panelist (2016 – 2020)
        1. Output: NCHRP Research Report 936: **Guide to Ensuring Access to the Publications and Data of Federally Funded Transportation Research**, (2020) https://dx.doi.org/10.17226/25704
3. Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign, Masters of Library and Information Science (MLIS), Certificate of Study in Data Curation (2009-2012)

Important Links

- ORCID https://orcid.org/0000-0002-0543-4268
- LinkedIn https://www.linkedin.com/in/leightonchristiansen

Topical Introduction & Order of Operations

Topic Question: How are we managing data from research projects and ensuring it is accessible as a product of federally funded research?

Order of Operations

1. State Experiences (50 minutes)
2. Break (10 minutes)
3. Presentation and Advice, including NCHRP Guide (45 minutes)
4. Discussion (50 minutes)

5

State Experiences

U.S. Department of Transportation

1. **Maryland**
2. **Vermont**
3. **Missouri**
4. **Idaho**
5. **Colorado**

6

Break

U.S. Department of Transportation

10 Minutes

7

Recap of State Experiences & Questions

U.S. Department of Transportation

Maryland

Action: Creating a Collaborative Project Management System for Data, which will include persistent identifiers!

Questions:

1. Public Access DMPs and Funding Types?
2. What is Data for DOT Public Access Plan?

Vermont

Action: Asking right questions about releasing sensitive information!

Questions:

1. Can we start small?
2. What are the middle-ground options?
3. What information is needed for TRID record?
4. Does the contract need to specify data link?
5. What else should a state do?

Missouri

Action: Requires DMPs in contract language!

Questions:

1. Compliance is hard, right?
2. How to store data? University repository? Other

Idaho

Action: Creating a Research Data Management Plan Template!

Questions:

1. Who should host data?
2. How to treat private sector data?
3. One place for all data?
4. Contract terms?
5. Metadata?
6. After retention period?

Colorado

Action: CDOT now has formal Office of Data Management!

Questions:

1. What data needs to be gathered, preserved, and made available?
2. What levels of data and detail? Example radar data.
3. How should data be formatted and what metadata?
4. Do we make it permanently available? How?

8

Credit Where it is Due

U.S. Department of Transportation

Data Curation at NTL is a team sport:

- Jesse Long, Data Curation & Data Management Fellow (2019 to present)
- Peyton Tvrdy, Practicum Student, UIUC, Fall 2022
- Zoe Mann, STIPDG Intern Summer 2021
- Francisco Juarez, STIPDG Intern Summer 2020, Practicum Fall 2020
- Jacky Hart, former Data Curation & Data Management Fellow
- Laura Farley, former Data Curation & Data Management Fellow
- and the NTL and DOT Public Access team

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Agenda

U.S. Department of Transportation

11

Points to Cover

U.S. Department of Transportation

1. What Do We Mean by "Data Curation"?
2. Why Should We Manage & Share Research Data?
3. The Larger Picture: Public Access & Open Science
4. Data Management & Data Curation Good Practices
    1. Data Management Planning & Writing DMPs
    2. Data Collection Practices: File Formats, File Naming, & Backing Up
    3. Citing & Persistently Identifying Research Data & Researchers
    4. Documenting & Packaging Data for Preservation & Sharing
    5. Deciding Where to Keep Your Data & for How Long
    6. Getting Data Curation Skills into your Research Programs
5. Other Questions & Pain Points from the States
6. Resources for Future Work

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Resources

U.S. Department of Transportation

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NCHRP 936

U.S. Department of Transportation

Table of Contents

Ch. 1: What are We Trying to Accomplish?
Ch. 2: Understanding Essential Requirements
Ch. 3: Going Beyond the Minimum in an Evolving Landscape
Ch. 4: Developing Strategies and Policies
Ch. 5: Roles & Responsibilities
Ch. 6: Managing Research Publications
Ch. 7: Managing Research Data
Ch. 8: Data Management Plans
Ch. 9: Building Blocks of the Solution
Ch. 10: Learning and Training
Ch. 11: Estimating and Managing Costs
Ch. 12: Assessing and Managing Progress
Ch. 13: Putting it all Together

See Table of Contents

Important Links

NCHRP 936: https://www.trb.org/Publications/Blurbs/180230.aspx

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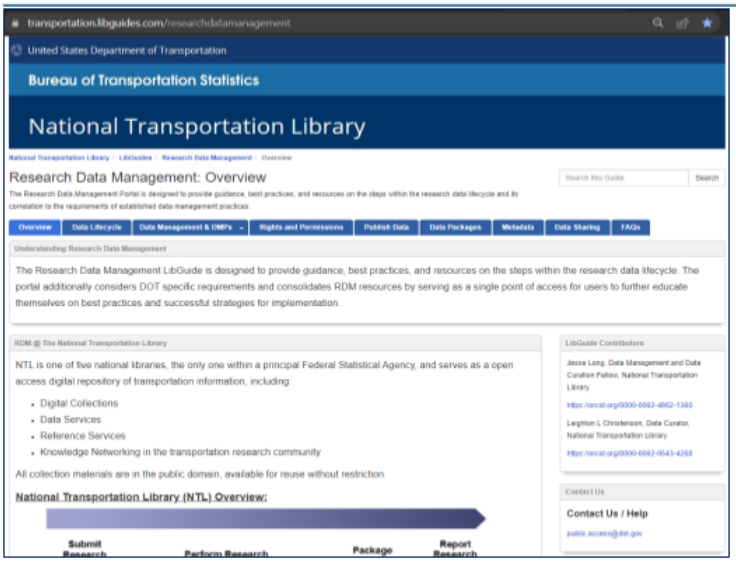
NTL LibGuide: Research Data Management



Topics Covered

- The Data Lifecycle
- Data Management
- Data Management Plans
- Rights and Permissions
- Public Data
- Data Packages
- Metadata
- Data Sharing

Important Links: NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/datamanagement

U.S. DOT Public Access Guidance Website

Topics Covered

- Plan to Increase Public Access to the Results of Federally-Funded Scientific Research
- How to Comply
- Creating a DMP
- Evaluating Repositories for Conformance
- Managing Rights
- Requesting an Embargo
- FAQs

Important Links: U.S. DOT Public Access: Home Page: https://doi.org/10.21949/1503647

What Do We Mean by "Data Curation"?

U.S. Department of Transportation

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Data Curation Definitions 1

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Data Management [or Research Data Management (RDM)]:
The deliberate planning, creation, storage, access and preservation of data produced from a given investigation.[1,2,3]

Data Curation:
Actions that enable data discovery and retrieval; maintain data quality; adds value; and, provides for re-use over time.[4]

Data Science:
Drawing useful conclusions from large and diverse data sets through exploration, prediction, and inference.[5]

See Chapter 7: Managing Research Data

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Data Curation Definitions 2

Data Stewards:

Those making connections between researchers, policy makers, software developers, and infrastructure providers to implement the necessary elements that enable researchers to successfully implement RDM [research data management].[6]

Data Governance:

The executive or managerial "exercise of authority, control, and shared decision-making over the management of data assets."[7,8]

See Chapter 7: Managing Research Data & Chapter 13: Putting It All Together

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Linked Processes 1

Data Management (DM) is a necessary element of Data Curation (DC)

$$DM \in DC$$

Data Curation (DC) enables Data Science (DS)

$$DC \Rightarrow DS$$

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Linked Processes 2

Data Management ∈ Data Curation ⇒ Data Science

$$DM \in DC \Rightarrow DS$$

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

Data Curation & the Data Lifecycle

Data Curation:

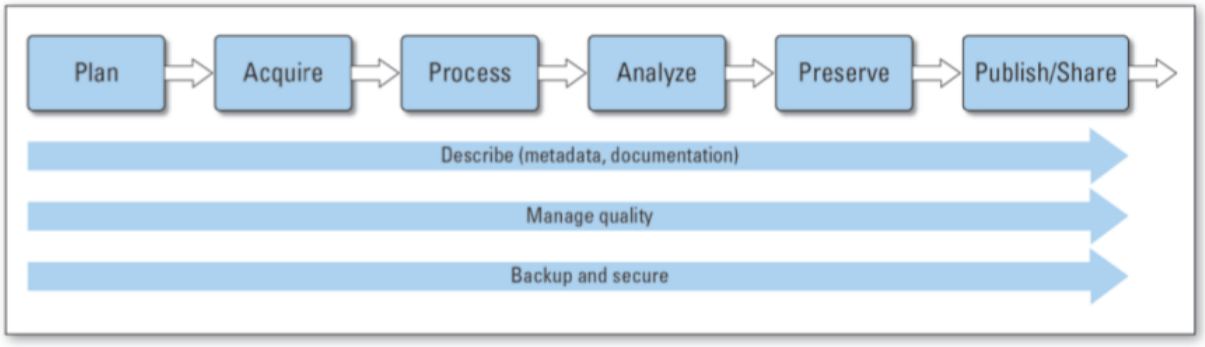
Actions that enable data discovery and retrieval; maintain data quality; adds value; and, provides for re-use over time. (GSLIS UIUC)

Data Lifecycle:

All the phases of data's existence from planning to collection, through preservation, to reuse and potential destruction.[9]

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datalifecycle

USGS Data Lifecycle Model[9]



- Plan FIRST!!
- Collect second
- Curation steps throughout

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datalifecycle

About Data Curation Actions

Reactive

- Curation & Preservation
- Repository Ingest
- **Access & Reuse**
- **Preservation/Mitigation**
- Format Migration
- Disposition

Proactive

- Creation & Collection
- Standard Workflows: File Naming
- **Data Management & Training: DMPs**
- **Robust Documentation: Readme & Codes**
- Controlled Vocabularies: Data Dictionaries
- Metadata Standards: Choose & Publicize
- **Persistent Identification: DOI, ORCID, ROR**
- **Preservation Planning: Repository & Backups**

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

Benefits of Data Curation

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- Protects Unique Data from Loss
- **Improves Data Search & Retrieval**
- **Enables Reuse**
- **Facilitates Longitudinal and/or Meta-analysis**
- Avoids Duplication of Effort & Spending
- Increases Verifiability
- **Opens New Lines of Scientific Discovery**
- Satisfies Public Access & Open Government & Legal Requirements

Data reuse example: Sanjay Tewari, **Combined Effect of Sea-Level Rise and Coastal Land Subsidence – Identification of Critical Transportation Infrastructure At-Risk in Coastal SPTC Region: Part I – Louisiana**. https://rosap.ntl.bts.gov/view/dot/62266 [10]

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Data Curation Review

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1. **Data Curation:** Actions that enable data discovery and retrieval; maintain data quality; adds value; and, provides for re-use over time.
2. **Linked Processes:** DM ∈ DC ➡ DS
3. **Planning** is the first step of the data lifecycle.
4. **Data Curators** take Reactive and Proactive actions over the data lifecycle
5. **Benefits** of DC are numerous.

See Chapter 7: Managing Research Data

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Why Should We Manage & Share Research Data?

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Considerations for Managing & Sharing Research Data

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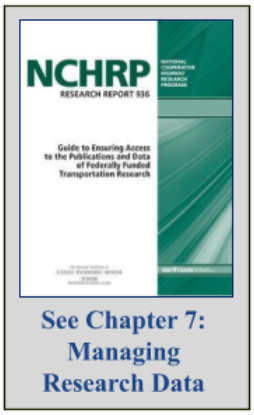
The most likely re-user of your data is your future self or your future department! Be good to your future self.

- Managing & Sharing Data is Good Science because it is Findable, and Enables for Re-use, Interoperability, Replication, Reproduction, Verification, and Challenge.
- Managing & Sharing Data Helps to Avoids Duplication of Effort, Save Future Time, & Wasted Research Spending.
- Managing & Sharing Data Satisfies Public Access & Open Government Legal Requirements.
- Managing & Sharing Data Opens New Lines of Scientific Discovery.



See Chapter 7: Managing Research Data

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Defining Research Data

U.S. Department of Transportation

Research Data Definition 2013 OSTP Public Access Memo:
…the digital recorded factual material commonly accepted in the scientific community as necessary to validate research findings including data sets used to support scholarly publications…

A Federal Research Data Definition 2022:
FAR 52.227-14 (https://www.acquisition.gov/far/52.227-14) defines data as: "…recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software."

Good Practices:
1. Read all funding awards from, U.S. DOT carefully.
2. Define research data in your funding and research documents and policies.

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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The Larger Picture: Public Access & Open Science

U.S. Department of Transportation

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Sharing U.S. Government Research Before Public Access

U.S. Government Publishing Office (GPO)

https://www.gpo.gov/

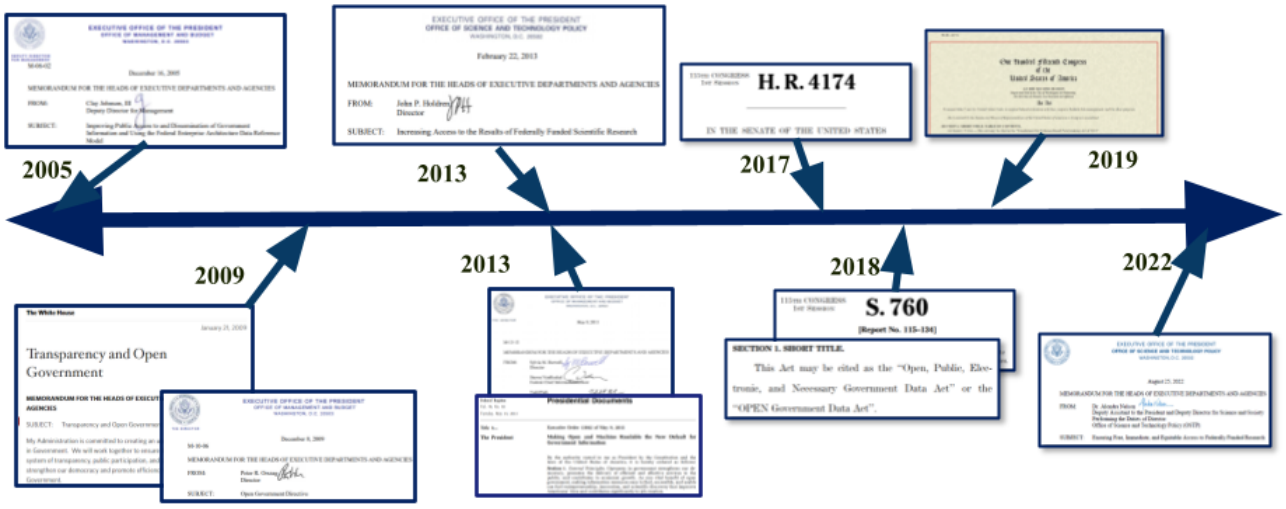
- Opens March 4, 1861 as Government *Printing* Office
- Printing and binding for the Senate and House of Representatives, the Executive Branch, and the federal Judiciary.
- Embraces digital future, and rebranded Government *Publishing* Office in 2014
- GPO Style Manual: https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf

National Technical Information Service (NTIS)

https://www.ntis.gov/

- Established by law on September 9, 1950, as "Publication Board"
- Clearinghouse for the collection and dissemination of scientific, technical, and engineering information (STEI)
- Federal agencies are required to send a copy of their STEI products to NTIS
- NTIS catalogs, organizes, preserves and disseminates to public online through National Technical Reports Library (NTRL) https://ntrl.ntis.gov/NTRL/

Opening U.S. Government-Funded Science: Polices 2005 to 2023



Making Data FAIR [11]

U.S. Department of Transportation

Findable
Accessible
Interoperable
Reusable

Sharing Data

- Last step of USGS Data Lifecycle: Publish/Share
- Sharing: Culture Change that affects decisions
- Encourages new discovery & efficiencies
- Consistent with developing U.S. policy and law

Important Links
FAIR Data Principles: https://force11.org/info/the-fair-data-principles/

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The Global Open Science Movement

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Science is humanity making an organized attempt at understanding the processes and phenomena occurring in nature and society, to paraphrase the United Nations Educational, Scientific, and Cultural Organization (UNESCO)[12].

- 1998 "Open Science" coined, focused on software sharing
- 2018 NASEM "Open Science by Design" ensuring the availability and usability of scholarly research outputs, such as publications, data, methodology, and code.[13]
- 2021 UNESCO "Recommendation on Open Science": "an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible, and reusable for everyone; to increase scientific collaborations and sharing of information for the benefits of science and society; and, to open the process of scientific knowledge creation, evaluation, and communication to societal actors beyond the traditional scientific community."[14]

See Chapter 1: What are We Trying to Accomplish & Chapter 13: Going Beyond the Minimum in an Evolving Landscape

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The White House announces
The 2023 Year of Open Science
NASA ✦ NSF ✦ NOAA ✦ DOA ✦ DOE ✦ GSA ✦ NEH ✦ NIH ✦ NIST ✦ USDA ✦ USGS ✦ DOT
Along with other organizations, including CENDI, voluntary collaboration among Federal managers, and HELIOS, a coalition of 80+ universities
A multi-agency initiative across the federal government to spark change and inspire open science engagement through events and activities that will advance adoption of open science.
Website: https://open.science.gov/
WH: https://www.whitehouse.gov/ostp/news-updates/
Nature: https://doi.org/10.1038/d41586-023-00019-y

The 2023 Year of Open Science
Definition:
Open science is the principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility and equity.
Website: https://open.science.gov/
WH: https://www.whitehouse.gov/ostp/news-updates/
Nature: https://doi.org/10.1038/d41586-023-00019-y

Considerations & Larger Picture Review

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1. The most likely re-user of your data is your future self.
2. Sharing federally-funded scientific outputs has a long history.
3. U.S. public access and open science is in active development.
4. Open Science is a global movement.
5. Open science is good science!

See Chapter 1: What are We Trying to Accomplish & Chapter 13: Going Beyond the Minimum in an Evolving Landscape

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Data Management & Data Curation Good Practices

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Data Management & Data Curation Good Practices Menu

1. Data Management Planning & Writing DMPs
2. Data Collection Practices: File Formats, File Naming, & Backing Up
3. Persistently Identifying Research Data & Researchers
4. Documenting & Packaging Data for Preservation & Sharing
5. Deciding Where to Keep Your Data & for How Long
6. Getting Data Curation Skills into Your Research Programs

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Good Practice 1: Data Management Planning & Writing DMPs

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Good Practice 1: Data Management Planning & Writing DMPs: 01

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What is a Data Management Plan (DMP)?

- A DMP is a **narrative document** created during research proposal writing and planning to capture and record implicit team knowledge into an explicit document: **Knowledge Management!**

See Chapter 8: Data Management Plans

What does a DMP do?

A robust DMP describes:

- The researcher's **plan** for handling the raw and final dataset(s) generated during research; and,
- How the research proposal **conforms to applicable policy** on the dissemination and **sharing** of research results.

Note: Initial **DMPs** are NOT set in concrete and **SHOULD** change as the realities of the research evolve.

Important Links

NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/dmp and **Data Management Plans for Research Proposals:** https://doi.org/10.21949/1524567 and
US DOT Public Access Guidance **Creating Data Management Plans:** https://doi.org/10.21949/1520562

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Good Practice 1: Data Management Planning & Writing DMPs: 02

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How Should We Structure Our DMPs?

A robust DMP will include at least 6 sections which provide:

1. Name and contact information for the project;
2. A description of the expected final research data to be produced;
3. An explanation of standards used for data and metadata collection, format, and content;
4. A listing of policies for access and sharing the final research data, including provisions for appropriate protection of Personal privacy; Business confidentiality; National or State security; Intellectual property; and, Other rights or requirements;
5. Policies and provisions for re-use, re-distribution, and the production of derivatives; and,
6. Plans for archiving of, and long-term access to, final research data and publications.

See Chapter 8: Data Management Plans

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Good Practice 1: Data Management Planning & Writing DMPs: 03

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What Sections are in a DMP Created at NTL?

0. Dataset Name and Contact Information
1. Data Description
2. Standards Employed
3. Access Policies
4. Re-Use, Redistribution, and Derivative Products Policies
5. Archiving and Preservation Plans

Question to you: Do we want to take a closer look at what information could be recorded in each section?

See Chapter 8: Data Management Plans

Important Links
NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/dmp and **Data Management Plans for Research Proposals:** https://doi.org/10.21949/1524567 and
US DOT Public Access Guidance **Creating Data Management Plans:** https://doi.org/10.21949/1520562

DMP Section 0: Dataset Name and Contact Information

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0. Dataset and Contact Information
- Staff lead: Enter lead researcher, PI, or lead staff name.
- Staff lead ORCiD: Enter ORCID and/or other identifier.
- Contact information: Add address, email, phone number, and agency's name.
- Title of Dataset: Add title of dataset.
- URL: Add URL or Persistent Identifier to dataset. (if know)
- This is an ☒ initial DMP or a ☐ revised DMP.
- Date this version of DMP was written:

Important Links
NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/dmp and **Data Management Plans for Research Proposals:** https://doi.org/10.21949/1524567 and
US DOT Public Access Guidance **Creating Data Management Plans:** https://doi.org/10.21949/1520562

DMP Section 1: Data Description

Section Summary

- Provide a description of the data that you will be gathering in the course of your project.
- You should address the nature, scope, and scale of the data that will be collected.
- Describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply.
- Discuss value of the data over the long-term.

Prompts

1. Name the data, data collection project, or data producing program.
2. Describe the purpose of the research.
3. Describe the data that will be generated in terms of nature and scale (e.g., numerical data, image data, text sequences, video, audio, database, modeling data, source code, etc..).
4. Describe methods for creating the data (e.g., simulated; observed; experimental; software; physical collections; sensors; satellite; enforcement activities; researcher-generated databases, tables, and/or spreadsheets; instrument generated digital data output such as images and video; etc..).
5. Discuss the period of time data will be collected and frequency of update.
6. If using existing data, describe the relationship between the data you are collecting and existing data.
7. List potential users of the data.
8. Discuss the potential value of the data have over the long-term for not only your institution, but also for the public.
9. If you request permission not to make data publicly accessible, explain rationale for lack of public access.
10. Indicate the party responsible for managing the data.
11. Describe how you will check for adherence to this data management plan

DMP Section 2: Standards Employed

Section Summary

- Describe the anticipated formats that your data and related files will use.
- To the maximum extent practicable, and in accordance with generally accepted practices in your field, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future.
- If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.
- Identify the metadata standards you will use to describe the data.

Prompts

1. List in which format(s) the data will be collected. Indicate if they are open or proprietary.
2. If you are using proprietary data formats, discuss your rationale for using those standards and formats.
3. Describe how versions of data be signified and/or controlled.
4. If the file format(s) you are using is(are) not standard to your field, describe how you will document the alternative you are using.
5. List what documentation you will be creating in order to make the data understandable by other researchers.
6. Indicate what metadata schema you are using to describe the data. If the metadata schema is not one standard for your field, discuss your rationale for using that scheme.
7. Describe how will the metadata be managed and stored.
8. Indicate what tools or software is required to read or view the data.
9. Describe your quality control measures.

DMP Section 3: Access Policies

Section Summary

- Describe any access restrictions that may apply to your data. In general, data from research projects funded wholly or in part by U.S. DOT must be made publicly accessible. Exceptions to this policy are data that contain personally identifiable information, confidential business information, or classified information.
- Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take the protect privacy and confidentiality prior to archiving your data, and any additional concerns (e.g., embargo periods for your data). If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators or other project staff.
- If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality.

Prompts

1. Describe what data will be publicly shared, how data files will be shared, and how others will access them.
2. Indicate whether the data contain private or confidential information. If so:
    1. Discuss how will you guard against disclosure of identities and/or confidential business information.
    2. List what processes you will follow to provide informed consent to participants.
    3. State the party responsible for protecting the data.
3. Describe what, if any, privacy, ethical, or confidentiality concerns are raised due to data sharing.
4. If applicable, describe how you will deidentify your data before sharing. If not:
    1. Identify what restrictions on access and use you will place on the data.
    2. Discuss additional steps, if any you will use to protect privacy and confidentiality.

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DMP Section 4: Re-use, Redistribution, and Derivative Products Policies

Section Summary

- Describe who will hold the intellectual property rights for the data created by your project.
- Describe whether you will transfer those rights to a data archive, if appropriate.
- Identify whether any copyrights apply to the data, as might be the case when using data purchased from third parties.
- If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP.
- Describe any other legal requirements that might need to be addressed.

Prompts

1. Name who has the right to manage the data.
2. Indicate who holds the intellectual property rights to the data.
3. List any copyrights to the data. If so, indicate who owns them.
4. Discuss any rights be transferred to a data archive.
5. Describe how your data will be licensed for reuse, redistribution, and derivative products.

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DMP Section 5: Archiving and Preservation Plans

Section Summary

- Describe how you intend to archive your data and why you have chosen that particular option. You may select from a variety of options including, but not limited to:
  - Use of an institutional repository
  - Use of an archive or other community-accepted data storage facility
  - Self-dissemination
- You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability. Whatever archive option you choose, that archive must support the capture and provision of the US Federal Government Project Open Data Metadata Schema. In addition, the archive you choose must support the creation and maintenance of persistent identifiers (e.g., DOIs, handles, etc..) and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data. Your plan should address how your archiving and preservation choices meet these requirements.

Prompts

1. Discuss how you intend to archive your data and where (include URL).
2. Indicate the approximate time period between data collection and submission to the archive.
3. Identify where data will be stored prior to being sent to an archive. You should also:
4. Describe how back-up, disaster recovery, off-site data storage, and other redundant storage strategies will be used to ensure the data's security and integrity.
5. Describe how data will be protected from accidental or malicious modification or deletion prior to receipt by the archive.
6. Discuss your chosen data archive's policies and practices for back-up, disaster recovery, off-site data storage, and other redundant storage strategies to ensure the data's security and integrity for the long-term.
7. Indicate how long the chosen archive will retain the data.
8. Indicate if the chosen archive employs, or allows for the recording of, persistent identifiers linked to the data.
9. Discuss how your chosen data repository meets the criteria outlined on the Guidelines for Evaluating Repositories for Conformance with the DOT Public Access Plan page. NTL's National Transportation Data Archive may be an option for your research data. Contact us at public.access@dot.gov for more information.

Example DMPs

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Where can we see example DMPs?

1. Bureau of Transportation Statistics **Commodity Flow Survey 2017** dataset at: https://doi.org/10.21949/1522565
   1. Download the "Data and Documentation zip" and open the DMP
2. **US DOT Public Access Data Management Plans** collection in ROSA P: https://rosap.ntl.bts.gov/collection_pa_dmp

See Chapter 8: Data Management Plans

Important Links
NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/dmp and **Data Management Plans for Research Proposals:** https://doi.org/10.21949/1524567 and
US DOT Public Access Guidance **Creating Data Management Plans:** https://doi.org/10.21949/1520562

Types of DMPs

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Are there Different Types of DMPs?

Yes! DMPs should be written with the audience in mind and depending on the knowledge you are trying to manage.

- **Initial/Planning DMP:** (Research Team) The data we think we will be capturing as we envision the research. Include team members, their roles, data file paths, and data access restrictions, etc. Fundamental KM document.
- **Funding Proposal DMP:** (Funder) Edited down to basic information. Convince funder you will be good caretakers of funded data.
- **In-process/Updated DMP:** (Research Team) Reflect research realities not that research underway: more data types, larger file size, decided on a different repository, etc. In-process KM: research conditions & teams change.
- **Final DMP:** (Funder/Public/Repository manager) End of project; reflects size and scope of final dataset; how will shared dataset be managed for long-term. Future user/re-user KM document.
- **Project-level DMP or Organizational Master DMP:** A research organization can author a master DMP that all its researchers must follow. Then project DMPs can reference the master and include project specific information. Saves rewriting boilerplate language.

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DMP Review

U.S. Department of Transportation

- A DMP is a **narrative document** created during research proposal writing and planning to capture and record implicit team knowledge into an explicit document: **Knowledge Management!**
- **A** robust DMP describes the researcher's **plan** for handling the raw and final dataset(s) generated during research; and, how the research proposal **conforms to applicable policy** on the dissemination and **sharing** of research results.
- Initial **DMPs** are NOT set in concrete and **SHOULD** change as the realities of the research evolve.
- There are different types of DMPs, depending on the knowledge to save and the audience
- NTL provides plenty of examples and online guidance.

See Chapter 8: Data Management Plans

Important Links

NTL Research Data Management LibGuide: https://transportation.libguides.com/researchdatamanagement/dmp and **Data Management Plans for Research Proposals:** https://doi.org/10.21949/1524567 and US DOT Public Access Guidance **Creating Data Management Plans:** https://doi.org/10.21949/1520562

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Good Practice 2: Data Collection Practices

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Good Practice 2: Data Collection Practices: 01

U.S. Department of Transportation

1. File Formats Good Practices

1. Open, Non-Proprietary File Format
2. Backward and Forward Compatible
3. Long-Term Preservable
4. Document Software version if using a proprietary application
5. Good Practice Tip: In order for tabular data to be machine readable and interoperable, it should have only two types of rows: a single header row, and all others rows are data.

2. Files Naming Good Practice

1. The Research Team should agree on a file naming structure and document it.
2. human-readable files names, such as: **bts_osp_national_census_ferry_operators_2016_README_2017_10_26.txt**

3. Backup Strategy Good Practice

3-2-1 Backup Strategy

- 3 Copies of the Data
- 2 Different Geographical Regions
- 1 Other Type Storage Media

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datapackages

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Good Practice 3: Persistently Identifying Research Data & Researchers

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Good Practice 3: Citing & Persistently Identifying Research Data & Researchers: 01

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Publishing Data

- Data is a **first-class research output** in its own right and is on par with reports, publications, etc.
- Therefore, Datasets deserve:
  - Their own repository page
  - Robust Metadata
  - A Recommended Citation
  - A Persistent Identifier
- Datasets can be accompanied by a data paper, but it is not necessary.
  - About Data Papers: https://guides.library.oregonstate.edu/research-data-services/data-management-data-papers-journals

Example

Recommended Citation:
U.S. Department of Transportation, Bureau of Transportation Statistics. (2020). Commodity Flow Survey (CFS) 2017 [datasets]. https://doi.org/10.21949/1522565

Persistent Identifier, in this case a DOI or Digital Object Identifier.

Important Links
NTL Persistent Identifier LibGuide: https://transportation.libguides.com/persistent_identifiers

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Good Practice 3: Citing & Persistently Identifying Research Data & Researchers: 02

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The Dream of Persistent, Unique, Unambiguous Identification is NOT New
Remember 555 95472?

To see this classic Peanuts comic strip and lean about 555 95472, go to:
http://peanuts.wikia.com/wiki/555_95472

But you can call him "5"

(Or is it "V")

To see Snoopy's confused expression, go to:
https://static.wikia.nocookie.net/peanuts/images/2/2f/19501209.gif/

Important Links
NTL Persistent Identifier LibGuide: https://transportation.libguides.com/persistent_identifiers

Good Practice 3: Citing & Persistently Identifying Research Data & Researchers: 03

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https://www.doi.org/
Digital Object Identifier
(digital identifier of an object)

- ISO 26324
- Identify any entity — physical, digital or abstract
- Registered
- DOI name: Directory indicator; Registrant code; Unique numerical suffix
  https://doi.org/10.21949/1398953

https://orcid.org/
Open Researcher & Contributor ID

- ISO 27729
- Distinguishes any person from every other person
- Registered
- https URI: 16-digit numerical identifier preceded by "https://orcid.org/"
  http://orcid.org/0000-0002-0543-4268

Important Links
NTL Persistent Identifier LibGuide: https://transportation.libguides.com/persistent_identifiers

Good Practice 4: Documenting & Packaging Data for Preservation & Sharing

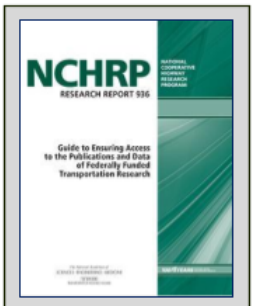
U.S. Department of Transportation

Good Practice 4: Documenting & Packaging Data for Preservation & Sharing: 01

U.S. Department of Transportation

Essential Requirements for Sharing Research Data

1. Data used to draw research conclusions
2. Data stored in an open format, or explanation of chosen format
3. Include a **Package of Data Documentation**
4. Preserve data in conformant repository
5. Create descriptive metadata to support search and retrieval



See Chapter 7: Managing Research Data

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datapackages

Good Practice 4: Documenting & Packaging Data for Preservation & Sharing: 02

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What do you Mean by a Data Package?

A "Data Package" is the dataset, the data management plan (DMP), and all other documentation needed to contextualize the dataset for any and all users and re-users.

Data Package Elements:

1. Research Output(s): Dataset, Software, Code, Model, etc..
2. README.txt which includes a data dictionary
3. Metadata file
4. Data Management Plan (DMP)
5. Other supporting codes, scripts, or tables

For more info: https://doi.org/10.21949/1500456

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datapackages

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Good Practice 5: Deciding Where to Keep Your Data & for How Long

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 01

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1. **Data Retention**: "Policies of persistent data and records management for meeting legal and business data archival requirements." https://en.wikipedia.org/wiki/Data_retention [17]
2. **Data Preservation**: "Actions taken to conserve and maintain the safety and integrity of data." https://en.wikipedia.org/wiki/Data_preservation [18]

Management functions vs. Implemented actions

Similar to differences between **Data Governance** and **Data Curation.**

Your organizations should have **Data Retentions Policies** that guide and inform **Data Preservation Practices.**

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 02

U.S. Department of Transportation

- **Data Storage** is NOT the same at **Data Preservation**
- **Data Storage** is a passive activity that may be done once, while **Data Preservation** is a series of actions over time.

Data Preservation and Curation is **Active** over Data Lifecycle

- 3-2-1 Backup strategy
- Robust documentation
- Bit fixity checking
- Format migration as needed
- Data Disposition Decision-making

Good Practice: Use a repository that actively preserves and curates data.

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 03

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Choosing a Data Repository

- Look for:
  - Easy access
  - Explicit retention policies
  - Long-term organizational sustainability
  - The use of persistent identifiers
  - Robust metadata
  - Data security

- Reference the **Desirable Characteristics of Data Repositories for Federally Funded Research** at https://doi.org/10.5479/10088/113528
- Reference the NTL list of criteria at https://doi.org/10.21949/1520563 or the list of DOT conformant repositories at https://doi.org/10.21949/1520566

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 04

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Benefits & Shortcomings of Repository Types

1. **General Research Data Repository**:
   1. Benefits: Breadth and Low Cost
   2. Shortcomings: May be hard to find a dataset among the many; little to no curation; outside institutional control
2. **Institutional Data Repository**:
   1. Benefits: Breadth, Local, Institutional cost sharing
   2. Shortcomings: Curation may be limited by budget and staff skills
3. **Domain-Specific Data Repository**:
   1. Benefits: Depth and Curation
   2. Shortcomings: Extra cost of curation services; outside institutional control

Good Practices: Any repository is better than none. Check with your home institution first. Then look to research partners. Your best option may be to contract for repository services.

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 05

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How Long Should We Keep Data? It Depends!

- Not all data can or should be preserved
- Essential: preserve all data needed to replicate research findings.

Significance Factors

1. Substantive value and influence on scientific knowledge;
2. Likely value to science, society, funder, and/or stakeholders over time;
3. Uniqueness
4. Impact on transportation policy and safety

Good practice: Discuss scope of data for preservation with funder prior to research. May require additional funding.

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

Important Links

NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Good Practice 5: Deciding Where to Keep Your Data & for How Long: 06

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Further Considerations on How Long Should We Keep Data?

NCHRP 936, Chapter 7:

1. "As long as data is of value to the community of users."
2. How much re-use over time?
3. Who depends upon having access to the data?
4. Are the data connected to other outputs?

U.S. DOT Public Access Plan:

1. DOT Public Access Plan Section 7.4.2: "long-term access"
2. When offering guidance since 2016, we have been saying at least 5 years.
3. Plan and budget for preservation in proposal, we will pay.

Good Practices: Clarify with funder. Plan for decades-long preservation, depending on the research and its utility.

See Chapter 7: Managing Research Data & Chapter 9: Building Blocks of the Solution

Important Links

NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

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Good Practice 6: Getting Data Curation Skills into Your Research Program

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Good Practice 6: Getting Data Curation Skills into Your Research Program: 01

U.S. Department of Transportation

1. Hire a degreed Data Curator and embed them in each data collection project.
   1. You wouldn't build a bridge with out a certified Civil Engineer on the project.
   2. An expert Data Curator uses their skills to care for the data, freeing other project staff to use their expert skills at greatest efficiency.
2. Contract Curation actions through nearby university library or digital repository.
3. Create or join a "curation network."
   1. Example: Data Curation Network: https://datacurationnetwork.org

Important Links
NTL Research Data Management LibGuide:
https://transportation.libguides.com/researchdatamanagement/datamanagement

Other Questions & Pain Points from the States

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Discussion

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Resources for Future Work

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Resources Related to NCHRP 936

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Best Practices for Increasing Access to the Results of Federally Funded Scientific Research. NCHRP Problem Statement. Christiansen, Leighton L, et al. 2019-09-15.

A Guide to Ensure Access to the Publications and Data of Federally Funded Transportation-Related Research. NCHRP 20-110 [Completed]. Flannagan, Carol; et al. 2016-08-05. https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4062

Guide to Ensuring Access to the Publications and Data of Federally Funded Transportation Research. NCHRP Research Report 936. Flannagan, Carol; et al. 2020-06. https://dx.doi.org/10.17226/25704

TRB Webinar: Managing and Sharing Research Data for Public Access. Leighton L Christiansen and Bill McLeod. 2022. https://www.nationalacademies.org/event/04-20-2022/trb-webinar-managing-and-sharing-research-data-for-public-access

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NTL Resources for Research Data Curation

Research Data Management LibGuide. National Transportation Library. https://transportation.libguides.com/researchdatamanagement

Persistent Identifiers LibGuide. National Transportation Library. https://transportation.libguides.com/persistent_identifiers/

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DOT & NTL Resources for Public Access

Plan to Increase Public Access to the Results of Federally-Funded Scientific Research. (2015-12-16). United States Department of Transportation. https://doi.org/10.21949/1503646

U.S. DOT Public Access [Home page]. (2016 to 2022). United States. Department of Transportation. (2022) https://doi.org/10.21949/1503647

Repository & Open Science Access Portal (ROSA P). [Repository]. (2017 to present). United States. Department of Transportation. Bureau of Transportation Statistics. National Transportation Library. https://doi.org/10.21949/1398953

Repository and Open Science Access Portal. Collection: "Public Access Resources." National Transportation Library. https://rosap.ntl.bts.gov/collection_par

Repository and Open Science Access Portal. Collection: "US DOT Public Access Data Management Plans." National Transportation Library. https://rosap.ntl.bts.gov/collection_pa_dmp

Research Hub. [Database]. United States. Department of Transportation. Office of the Assistant Secretary for Research and Technology. https://researchhub.bts.gov/

A Deep Dive into Public Access for Research Data [Presentation to FAA]. Leighton Christiansen. 2021. https://doi.org/10.21949/1522407

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DOT & NTL Resources for DMPs

"Data Management Plans for Research Proposals" from U.S. DOT Public Access Guidance website. (2016 to 2022). United States. Department of Transportation. (2022) https://doi.org/10.21949/1524567

"Creating Data Management Plans" from U.S. DOT Public Access Guidance website. (2016 to 2022). United States. Department of Transportation. (2022) https://doi.org/10.21949/1520562

Data Management Plans (DMPs) for Research Proposals: Researchers' Development of a Data Management Plan: Session 1 for Federal Aviation Administration. Jesse Long, Zoe Mann, and Leighton Christiansen. 2021. https://doi.org/10.21949/1524567

Repository and Open Science Access Portal. Collection: "US DOT Public Access Data Management Plans." National Transportation Library. https://rosap.ntl.bts.gov/collection_pa_dmp

Commodity Flow Survey 2017 [dataset] Bureau of Transportation Statistics. https://doi.org/10.21949/1522565

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Resources on Persistent Identifiers & Data Papers

Persistent Identifiers LibGuide. National Transportation Library. https://transportation.libguides.com/persistent_identifiers/

Digital Object Identifiers. The DOI Foundation. https://www.doi.org/

ORCID. ORCID. https://orcid.org/

Data Papers & Data Journals. Oregon State University Libraries. https://guides.library.oregonstate.edu/research-data-services/data-management-data-papers-journals

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NTL Resources on Data Packages

Research Data Management LibGuide, "Data Packages." National Transportation Library
https://transportation.libguides.com/researchdatamanagement/datapackages

Delivering Data Packages for Discovery, Analysis, and Preservation. Leighton Christiansen. Transportation Research Board Annual Meeting Poster P18-20648. 2018.
https://doi.org/10.21949/1500456

Resources on Data Repositories & Data Retention

Desirable Characteristics of Data Repositories for Federally Funded Research. National Science and Technology Council (NSTC) Subcommittee on Open Science (SOS), 2022.
https://rosap.ntl.bts.gov/view/dot/62310

"Guidelines for Evaluating Repositories for Conformance with the DOT Public Access Plan" from U.S. DOT Public Access Guidance website. (2016 to 2022). United States. Department of Transportation. (2022) https://doi.org/10.21949/1520563

"Data Repositories Conformant with the DOT Public Access Plan" from U.S. DOT Public Access Guidance website. (2016 to 2022). United States. Department of Transportation. (2022)
https://doi.org/10.21949/1520566

Considerations on Data Retention: Presentation to the Open Mobility Foundation's Privacy, Security, and Transparency Committee. Leighton Christiansen. 2022.
https://doi.org/10.21949/1526875

Federal & NTL Public Access & Open Science Resources

Increasing Access to the Results of Federally Funded Scientific Research. [Memorandum]. (2013-02-22) John P. Holdren, White House Office of Science and Technology Policy (OSTP). https://rosap.ntl.bts.gov/view/dot/34953

Ensuring Free, Immediate, and Equitable Access to Federally Funded Research. [Memorandum]. (2022-08-25) Dr. Alondra Nelson, White House Office of Science and Technology Policy (OSTP). https://www.whitehouse.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Memo.pdf

Desirable Characteristics of Data Repositories for Federally Funded Research. National Science and Technology Council (NSTC) Subcommittee on Open Science (SOS), 2022. https://rosap.ntl.bts.gov/view/dot/62310

Open.Science.gov. Office of Science and Technology Policy. https://open.science.gov/

U.S. Open Science Policy Perspectives & Transportation: Open Science in Transportation: Challenges and Opportunities in a COVID-19 Era. Presented at Transportation Research Board 2021 Annual Meeting Workshop 1467. Leighton L Christiansen. 2021. https://doi.org/10.21949/1520725

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2. Briney, Kristin. 2015. Data management for researchers: organize, maintain and share your data for research success. http://www.pelagicpublishing.com/data-management-for-researchers.html
3. Harvard Medical School, Longwood Research Data Management. What is Research Data Management. https://datamanagement.hms.harvard.edu/about/what-research-data-management
4. Graduate School of Library and Information Science at the University of Illinois at Urbana-Champaign. "Specialization in Data Curation," 2013. http://www.lis.illinois.edu/academics/programs/specializations/data_curation
5. Definition based on Ani Adhikari and John DeNero, "The Foundations of Data Science" http://www.inferentialthinking.com/index.html "What is Data Science" http://www.inferentialthinking.com/chapter1/what-is-data-science.html
6. Hasani-Mavriqi, I., Reichmann, S., Gruber, A., Jean-Quartier, C., Schranzhofer, H., & Rey Mazón, M. (2022). Data Stewardship in the Making (1.0). https://doi.org/10.3217/p9fvw-rke48
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Other Useful Resources & Works Cited

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11. FORCE11. "The FAIR Data Principles." 2016. https://force11.org/info/the-fair-data-principles/
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Thank You

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Contact

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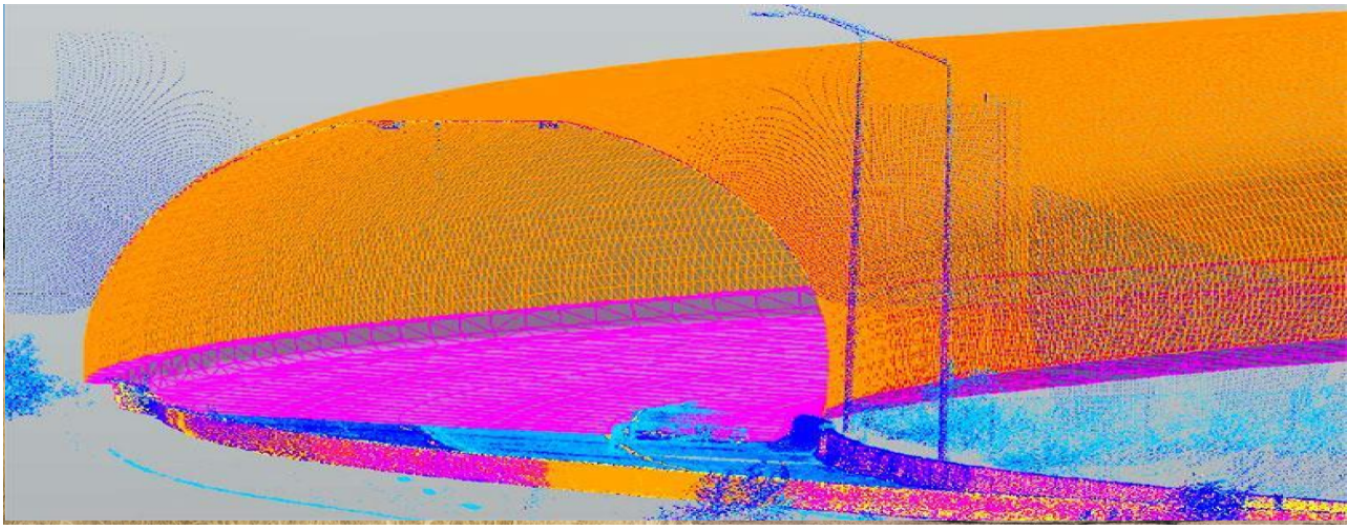

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Research Data Curation at CDOT/Applied Research and Innovation Branch

Agenda

- Current State
  - Research Branch
  - CDOT Ofc of Data Management
- Examples and Questions

Data Curation / Research Branch

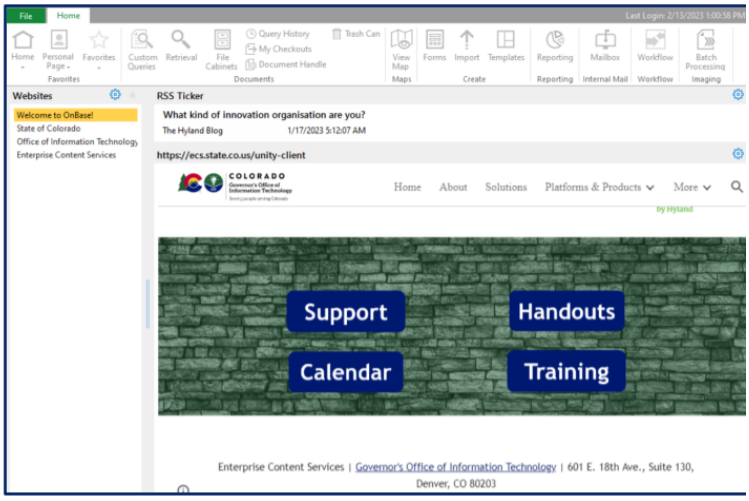
- ARIB does not currently have a research data policy
- In most cases, we do not hold data, except for certain projects where the situation dictates.
- For some projects, initial data comes from within CDOT or other databases (e.g., AADT, Crash datasets,)
- ARIB Research Reports are preserved on OnBase (CDOT),TRID (TRB), and other platforms. Detailed Data are not typically included.

Data Curation / Research Branch

OnBase

"A web-based tool that provides a centralized, digital repository, enabling easy & transparent access to the documents employees need, when they need them, wherever they're located (in the office, in the field or remotely)."

- **Commercial product.**
- **Widely used throughout State of Colorado Government.**
- ***Used for, e.g., Library digital materials (incl ARIB Reports), invoice tracking, much more***

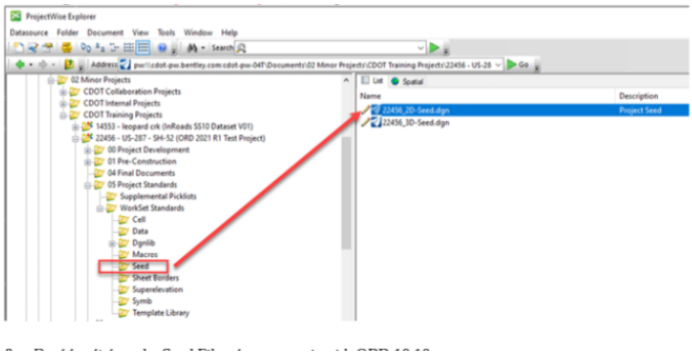


Data Curation / Research Branch

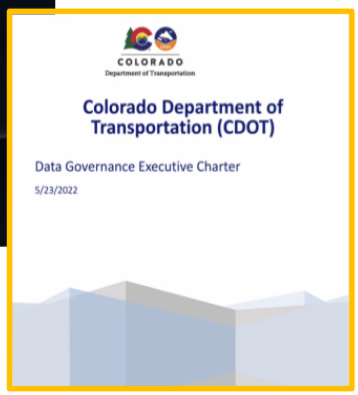
ProjectWise - used by Engineering Groups (not used by ARIB)

"a software package that serves as a document management system to manage engineering project documents."

- *"Single source for all project data*
- *Improved project communication and coordination*
- *Automatic backup*
- *Data integrity - audit trail*
- *Automates usage of the correct workspace*
- *Virtually eliminates lost reference files"*



Data Curation / CDOT Office of Data Management



CDOT is getting serious and formal about data management

- In 2017 CDOT established the CDOT Data Office (CDO) and hired a Chief Data Officer
- In 2022 CDO became the CDOT Office of Data Management (ODM)

Data Curation / CDOT ODM

The Data Governance Program

The Program Structure

The Data Management ESG
- Supports the program agency-wide
- Aligns the program priorities to CDOT goals
- Approves policies in support of our data strategies

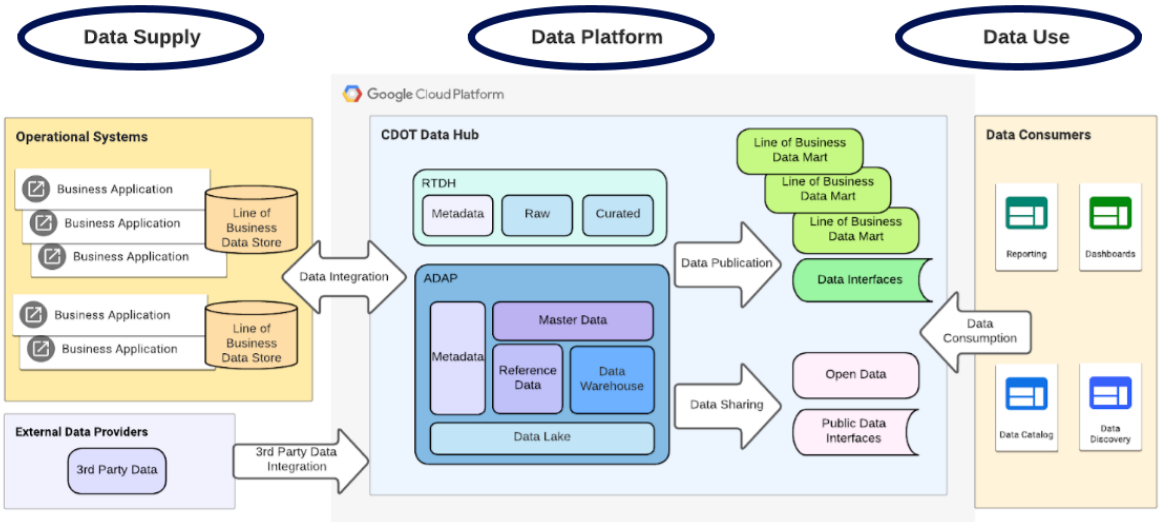
Enterprise Data Management Advisory Council
- Develops the data strategies
- Designs the data strategies roadmap
- Provides guidance to Data Stewardship Council

Data Stewardship Council
- Illuminates the impact current data policies are having at CDOT
- Develops project in alignment with the data strategies
- Facilitates discussions between data stakeholders across CDOT

Office of Data Management (ODM)
- Manages the Data Governance Program
- Facilitates communication between the data governance bodies
- Oversees implementation of data governance projects and tasks

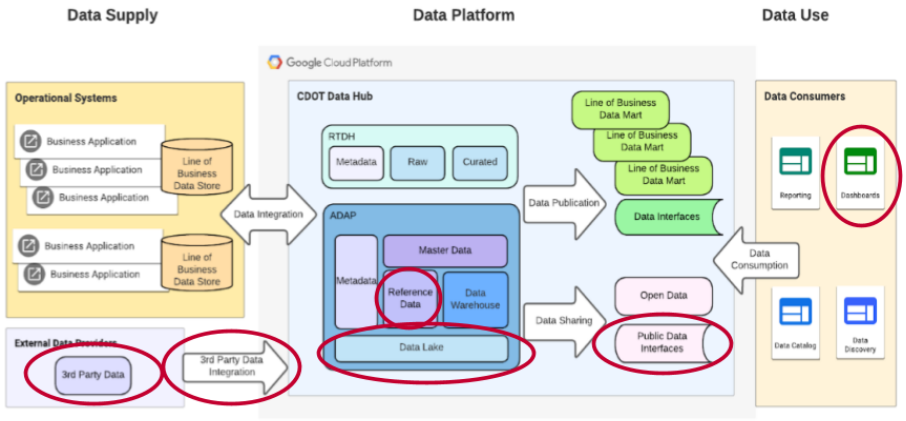
Data Curation / CDOT Office of Data Management

Conceptual Information Architecture



Data Curation / CDOT ODM

Air Quality Research - Experience



New Vocabulary

- **Data Lake**
- **Business Glossary**
- **Business Rules**
- **Data Dictionary**
- **…**

Many situations where we could use guidance

What data needs to be gathered, preserved, and made available?

- Example: A research project consultant draws and uses traffic and crash data from VZS. It is analyzed as part of a project and results are part of a published research report. Do we preserve a separate copy of the VZS data subset?

Many situations where we could use guidance

What level(s) of data and detail should be preserved?

- Example: Radar data: (a) raw signals are recorded as voltages with thousands of measurements each second (large data set!). (b) processed data may be images (much smaller). (c) Further processing gets to a list "Animal detected in roadway at [day/time]". Which do we save?

Many situations where we could use guidance

How should the data be formatted and what context (metadata) should be given?

- CDOT ODM formal process is a big effort
- CDOT OIT formal process is a big effort
  - Techniques such as AI/ML/DL increasingly have research applications hosted in the cloud
  - Data from these applications needs OIT guidance and consideration of cybersecurity

Many situations where we could use guidance

Do we make it permanently available? How?

- External or internal site for hosting site? DOI number?
- Are there Norms for "publishing" a dataset so it can appear in reference list and CVs?
- Best practices for Data sharing agreements?

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Idaho Transportation Department Research Data Curation

YOUR *Safety*
YOUR *Mobility*
YOUR *Economic Opportunity*

Amanda Laib
Senior Research Analyst
March 1, 2023

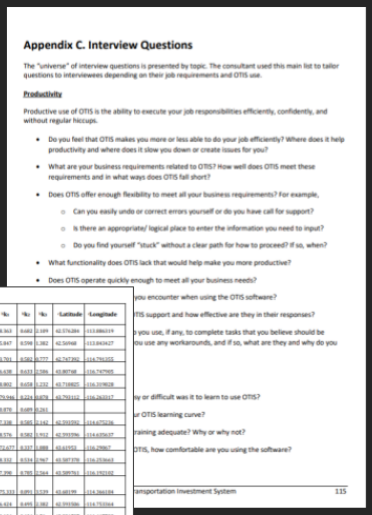
How are we managing data from research projects and ensuring it is accessible as a product of federally funded research?

- ITD does not presently have a data management plan
- Have started asking for research project DMPs as part of general project management tasks

Research data is typically included in appendices to reports
Sometimes integrated into systems and processes

Common data types
- Survey/interview responses
- Numerical/tabular
- Geospatial
- Models

Others
- Programming scripts/code
- Imagery, photos, and video


Appendix C. Interview Questions

The "universe" of interview questions is presented by topic. The consultant used this main list to tailor questions to interviewees depending on their job requirements and OTIS use.

Productivity

Productive use of OTIS is the ability to execute your job responsibilities efficiently, confidently, and without regular hiccup.

- Do you feel that OTIS makes you more or less able to do your job efficiently? Where does it help productivity and where does it slow you down or create issues for you?
- What are your business requirements related to OTIS? How well does OTIS meet these requirements and in what ways does OTIS fall short?
- Does OTIS offer enough flexibility to meet all your business requirements? For example,
  - Can you easily undo or correct errors yourself or do you have call for support?
  - Is there an appropriate/ logical place to enter the information you need to input?
  - Do you find yourself "stuck" without a clear path for how to proceed? If so, when?
- What functionality does OTIS lack that would help make you more productive?
- Does OTIS operate quickly enough to meet all your business needs?

you encounter when using the OTIS software?

TIS support and how effective are they in their responses?

t you use, if any, to complete tasks that you believe should be

ou use any workarounds, and if so, what are they and why do you

ly or difficult was it to learn to use OTIS?

r OTIS learning curve?

raining adequate? Why or why not?

OTIS, how comfortable are you using the software?

nsportation Investment System 115

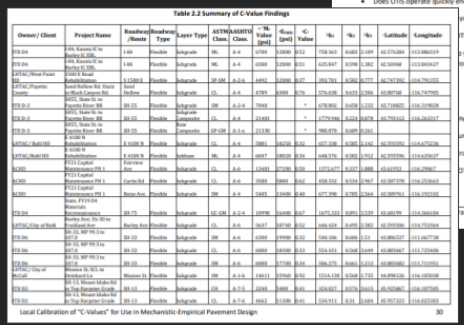


Table 2.2 Summary of C-Value Findings

Owner / Client	Project Name	Roadway /Route	Roadway Type	Layer Type	ASTM Class.	AASHTO Class.	N_{design} Value (psi)	ε_{design} (psi)	-C- Value	ε_{tr}	ε_{lg}	ε_{lat}	Latitude	Longitude
ITD D4	I-84, Kanaka IC to Burley IC, EBL	I-84	Flexible	Subgrade	ML	A-4	6789	32890	0.52	758.363	0.682	2.199	42.576284	-113.886319
ITD D4	I-84, Kanaka IC to Burley IC, EBL	I-84	Flexible	Subgrade	ML	A-4	6589	32890	0.51	635.847	0.598	1.382	42.569648	-113.843427
LHTAC/West Point MS	1500 E Road Rehabilitation	S 1500 E	Flexible	Subgrade	SP-SM	A-2-4	6452	32890	0.37	393.781	0.582	0.777	42.7472	-114.79155
LHTAC/Payette County	Sand Hollow Rd. Grade to Black Canyon Rd.	Sand Hollow	Flexible	Subgrade	CL	A-4	6789	6389	0.76	276.638	0.633	0.594	43.907748	-116.747995
ITD D-3	SH55, State St. to Payette River, BR	SH-55	Flexible	Subgrade	SM	A-2-4	7848		*	678.802	0.658	1.232	43.718925	-116.337828
ITD D-3	SH55, State St. to Payette River, BR	SH-55	Flexible	Subgrade	CL	A-4	21481		*	1779.946	0.224	0.878	43.793132	-116.262017
ITD D-3	SH55, State St. to Payette River, BR	SH-55	Flexible	Joint Composite	GP-GM	A-1-a	21330		*	980.878	0.689	0.261		
LHTAC / Bell ISD	E 4100 N Rehabilitation	E 4100 N	Flexible	Subgrade	CL	A-4	3981	18250	0.32	657.108	0.585	0.142	42.593292	-114.675236
LHTAC/Bell ISD	E 4100 N Rehabilitation	E 4100 N	Flexible	Subbase	ML	A-4	6947	18920	0.34	648.576	0.582	0.702	42.593596	-114.675237
ACHD	FY23 Capital Maintenance PH 1	Fairview Ave.	Flexible	Subgrade	CL	A-6	13481	27290	0.50	1372.677	0.237	0.888	43.61922	-116.29967
ACHD	FY23 Capital Maintenance PH 1	Curtis Rd.	Flexible	Subgrade	CL	A-6	3588	9893	0.62	658.332	0.534	0.967	43.587378	-116.255663
ACHD	FY23 Capital Maintenance PH 1	Boise Ave.	Flexible	Subgrade	SM	A-4	7445	15490	0.48	477.298	0.785	2.564	43.589761	-116.192102
ITD D4	State, FY19 D4 Materials Reconnaissance	SH-75	Flexible	Subgrade	GC-GM	A-2-4	10990	16490	0.67	1675.151	0.891	0.529	43.685199	-114.366184
LHTAC/City of Rigby	Burley Ave. Str 30 to Fronland Ave.	Burley Ave	Flexible	Subgrade	CL	A-6	7617	15745	0.52	686.324	0.695	0.382	43.719356	-111.917054
ITD D6	SH-33, MP 99.3 to MP 107.8	SH-33	Flexible	Subgrade	SM	A-4	6389	19900	0.32	560.186	0.606	1.51	43.886727	-111.667738
ITD D6	SH-33, MP 99.3 to MP 107.8	SH-33	Flexible	Subgrade	CL	A-6	6888	18530	0.37	554.431	0.568	0.649	43.8855467	-111.720496
ITD D6	SH-33, MP 99.3 to MP 107.8	SH-33	Flexible	Subgrade	SM	A-6	6888	17780	0.39	586.275	0.661	1.213	43.8855482	-111.721921
LHTAC / City of McCall	Mission St. SCL to Overland Ave.	Mission St.	Flexible	Subgrade	SM	A-1-b	14611	33940	0.43	1514.138	0.568	1.725	44.9981126	-116.105038
ITD D2	SH-13, Mount Idaho Rd to Top Keuterer Grade	SH-13	Flexible	Subgrade	CH	A-7-5	2268	5489	0.41	324.827	0.678	0.613	45.925867	-116.187585
ITD D2	SH-13, Mount Idaho Rd to Top Keuterer Grade	SH-13	Flexible	Subgrade	CL	A-7-6	4662	11390	0.41	534.911	0.31	0.684	45.957222	-116.025383

Local Calibration of "C-Values" for Use in Mechanistic-Empirical Pavement Design 30

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What's Our Plan for the Future?

First Step – Research Program Data Management Policy that will address:

- Roles and responsibilities
- Development of data management plan (DMP) at initiation of each project
- Adherence or modification of DMP throughout projects
- Proper storage and security of data during project
- Quality assurance and control standards
- Access, sharing, privacy and confidentiality
- Accompanying metadata
- Suitable repositories, public accessibility and retention period
- Intellectual property and embargo

Other considerations??

Guidance language and ***Research Project DMP template*** will be included in Project Management section of Research Program Manual

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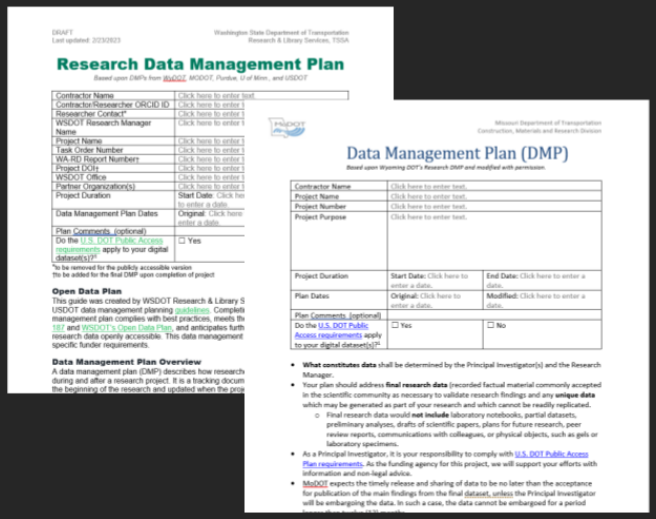
What's Our Plan for the Future?

Next Step - Research Project Data Management Plan Template that will define specifics for each project:

- Description of the data - types, formats, etc.
- What data should be linked to the final report
- Where the data will be archived
- The retention period
- Labels and naming
- Cataloging and organization
- Metadata with schema
- Privacy and intellectual property
- Embargo period
- Access procedure at the end of the project


Research Data Management Plan

Data Management Plan (DMP)

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Questions

Who should host the data?
- State DOT?
- University?
- Library?
- Repository?
- Any of the above?

Private Sector data?
- Same treatment?

One place for all?
- Is there value in redundancy?
- Centralized?

Terms expressly stated in contracts?
- Intellectual property and sharing?

Handling metadata
- How to ensure data is usable for others?
- What are requirements?

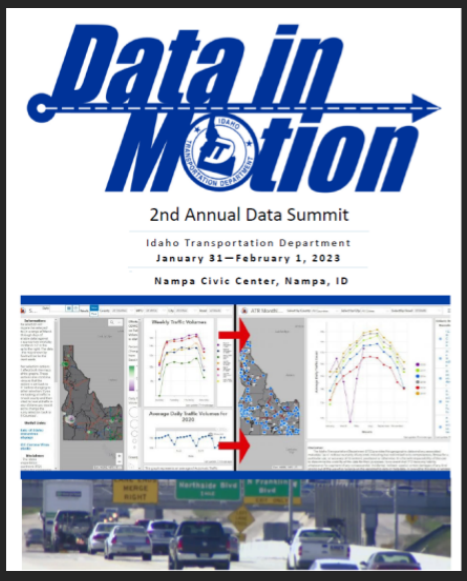
Actions after end of retention period?
- If it's possible to keep in perpetuity, why not?

Data Management at ITD in General

Data Governance Team leading agency-wide effort
- Roadway Data Manager
- Data Analytics Manager
- ETS Data Architect
- GIS Analyst

Annual Data Summit – an open dialogue among data users/owners within the agency
- Challenges of data collection and management
- Data as an important asset in the organization
- Understanding the strategic uses and value
- Successes and failures
- Innovation

Goal is to have an agency-wide data governance plan and system
- Data Governance Team involved in discussion with Research Program about managing research data



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Topic 1: Leading Pooled Fund Projects
Topic 2: Research Data Curation
Topic 3: Promoting a Culture of Research

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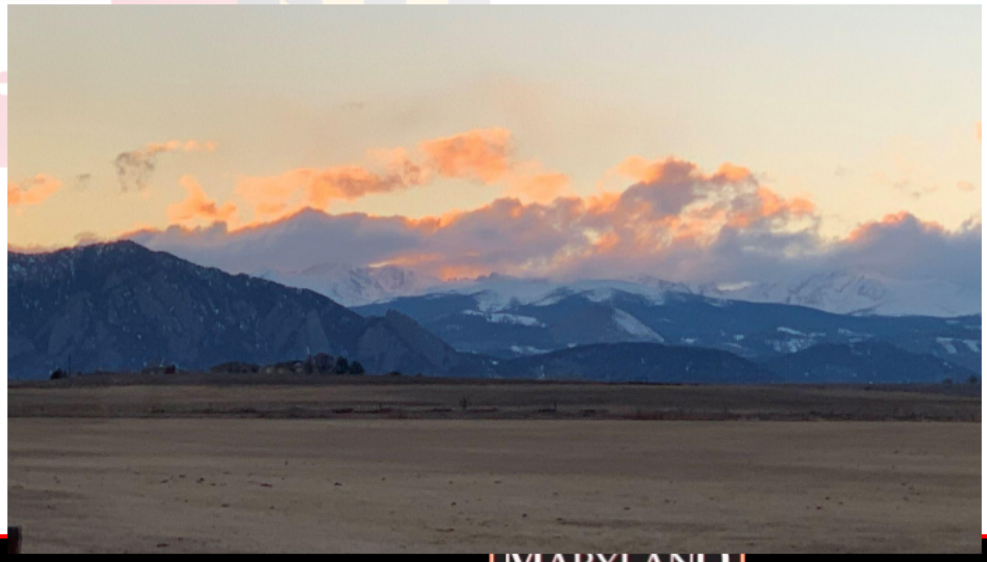
The Mountain



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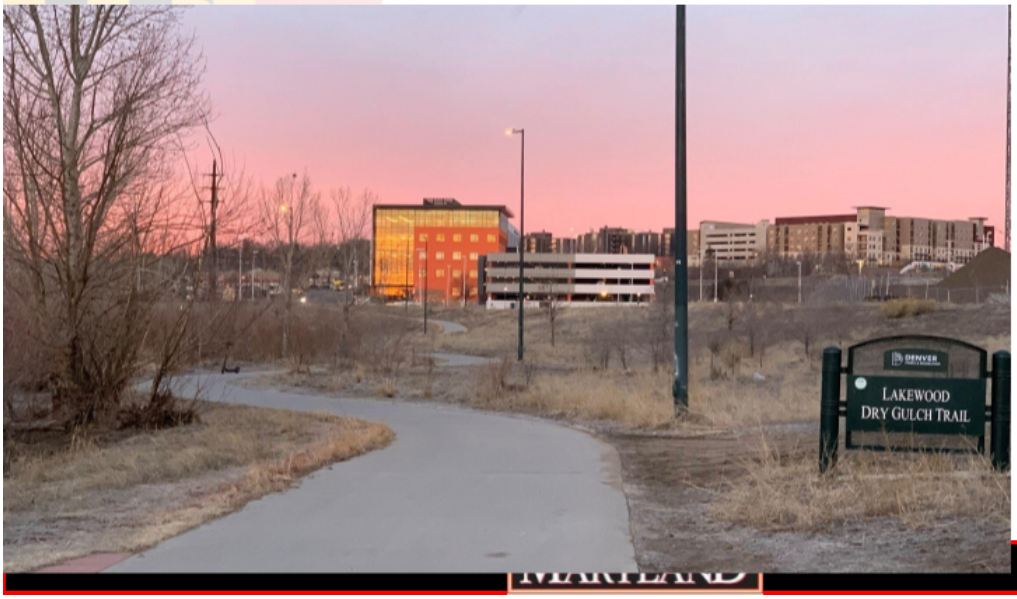
How close I got to CDOT



Data

From BTS National Transportation Library FAQ

https://ntl.bts.gov/ntl/public-access/faqs

Q. What, if any, funding programs are exempt from DOT's Public Access Plan?
A. Federal Aid programs flowing funding to states, such as State Planning & Research (SP&R) and National Cooperative Highway Research Program (NCHRP), as well as Small Business Innovation Research (SBIR) programs are

** but if you use SPR funding to match a federal grant, such as the UTC program, it will be included!!**

Q. SP&R funds are considered "federal funds" for purposes such as the required 80/20 match, auditing, and other federal standards, but not for the Public Access plan. How can they be considered federal funds for some purposes and considered state funds for other purposes?
A. The requirements of the DOT Public Access plan apply to recipients of funds obtained directly from USDOT through grants, contracts, cooperative agreements, or other funding agreements. SP&R funds are a set-aside of Federal-aid funds apportioned to the States. They are not provided to the States through any of the funding mechanisms specified in the DOT Public Access plan. Therefore, for purposes of the plan, they are considered state funds.

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From BTS National Transportation Library FAQ

If not exempted, on Data Management Plan:

Q. What constitutes "data" covered by a DMP?
A. What constitutes such data will be determined by the community of interest through the process of peer review and program management. This may include, but is not limited to: data, samples, physical collections, software and models. In general, your plan should address final research data. This includes recorded factual material commonly accepted in the scientific community as necessary to validate research findings. Final research data do not include laboratory notebooks, partial datasets, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as gels or laboratory specimens. As part of your research, you may also generate unique data, which are data that cannot be readily replicated. Examples of studies producing unique data include: large surveys that are too expensive to replicate; studies of unique populations, such as centenarians; studies conducted at unique times, such as a natural disaster; studies of rare phenomena, such as rare metabolic diseases. Your DMP should also address [illegible] y arise from your research.

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Vision for highway project data curation

Develop a collaborative project management approach to deliver effective and efficient transportation projects to the public.

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- Standardized Project Name - Official Project Description - Project Type - Office (asset/project owner office)	Lack of a **standard, recognized project unique identifier** across the organization.
Develop a **project information data warehouse** to support the day-to-day operations of project managers and stakeholders by providing access to a comprehensive set of **current, centralized data**. The data warehouse will be an extension of the comprehensive Project List (Recommendation #O1) and will use an **established "global unique identifier"** across many disparate systems to consolidate key data elements from each defined system of record to create a reliable, accessible data source. After implementation of Recommendation #O3, the users can view the data warehouse in a dashboard view. The data warehouse will be designed to retrieve and compile a standardized set of information covering key aspects of a project development lifecycle, such as project **base** information, **location** information, **contract** information, **phase / status** information, **ad** information, **financial** information, **construction** information as well as associated **permitting** and **environmental** information. The information will be linked together and synchronized to provide a comprehensive understanding of the project by pulling the appropriate data fields from each confirmed source system.	**Disparate systems** owned by various stakeholders across the organization tracking different elements of data for a project. **Duplicated information** across various disparate systems causing inconsistency and accuracy issues. **Inability to go to one source** and obtain a clear, transparent picture of a project status.
Implement a **central, standardized project tracking system** to help manage the process to initiate and track a project, assign a global identifier, establish a standard name, and support the tracking of the project portfolio. The system will be structured to capture the **project location on a map**, and will allow for basic information to be captured for project type, origin, owner and other classification. The intent is to implement a **Standard Operating Procedure (SOP)** to support consistent use of the project tracking system. The system will enable users to manage and maintain the comprehensive Project List (Recommendation #O1) and will provide access and query capabilities to the Data Warehouse information, recommended in Recommendation #O2. The system will provide a **dashboard** with a **project stoplight** to assist with communication of project status (Green, Yellow, Red) based on defined criteria and related to roles within the organization.	**Lack of a master repository** to name, number and track all projects for the organization. **Lack of a standardized project dashboard** or tool to review the project information and explore status information. Lack of a centralized location to get access to **project status comment**

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VT AOT: Data Curation

Emily Parkany, Research Manager
Vermont Agency of Transportation
Colorado Research Peer Exchange
March 1, 2023

PRESENTATION OVERVIEW

- Not a lot of data curation
- No formal data management plans
- Enough of a struggle to label things on our website
- Now a giant "IT part" of affected grants/contracts, but little on hosting the data/getting it to a Dataverse equivalent

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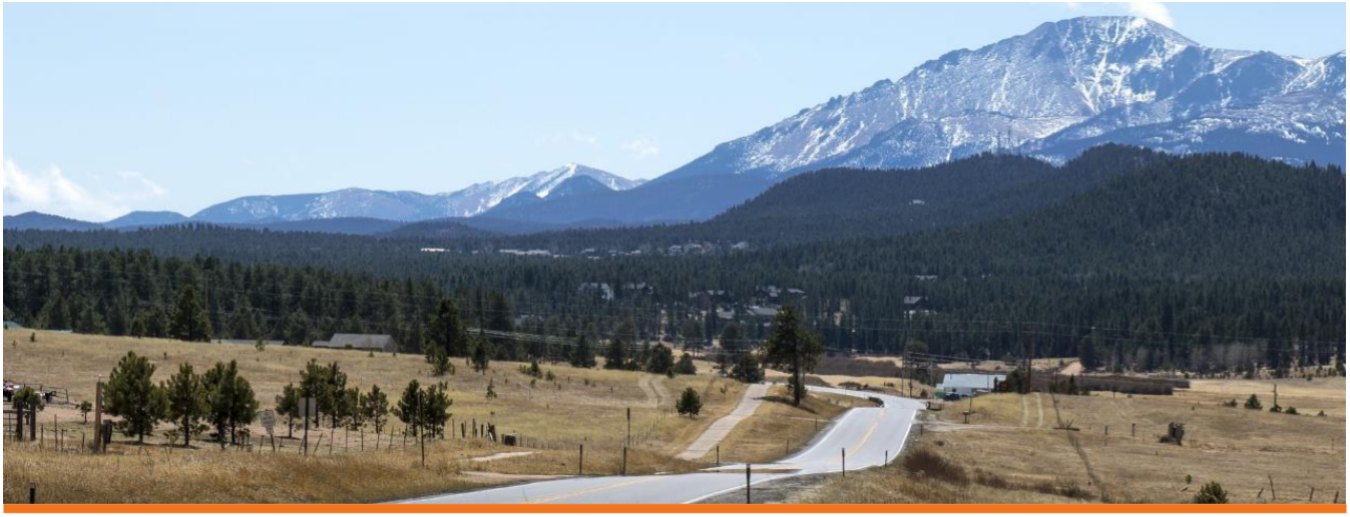
Recent example/project-related camera images

- Project finishing Jan/Feb 2023
- Researchers provided 1.38 GB of camera images of ped/vehicle interactions
- Aggregated into 200 KB Excel file (690 rows, 58 columns)
- Should the images be made available?
  - Researcher concerned about 1 of 5 towns and their anxiety about how video would be used. Should the research team get confirmation that the research-related images (not video) can be shared? Is this the State DOT responsibility?
- Should the Excel file be shared?
- Who makes the Dataverse entry?
  - I don't think that Harvard Dataverse is set up for State DOTs to upload data

Questions

- Can we start small?
- What are the middle-ground options between nothing and full Data Management Plan?
- Sounds like sharing a Dataverse link of data is enough to get it into TRID
- Does the contract need language about providing a permanent link to the data?
- Have states succeeded with getting these permanent links without contract language?
- In addition to the permanent link, what should a state do?

Promoting a Culture of Research Presentations



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Promoting a Culture of Research

Bryan Roeder
Planning & Environmental Research Manager
Colorado Dept of Transportation

Research Peer Exchange March 1, 2023

How to define a good Culture of Research

- *Some* DOT staff know that a Research Branch exists?
- DOT staff, leadership, stakeholders are engaged in research?
  - How to define "engaged?" Supportive?
- Executive Leadership defines priority topics?
  - Or would that be a poor culture?
- Implementation rate high? Value of Research high?

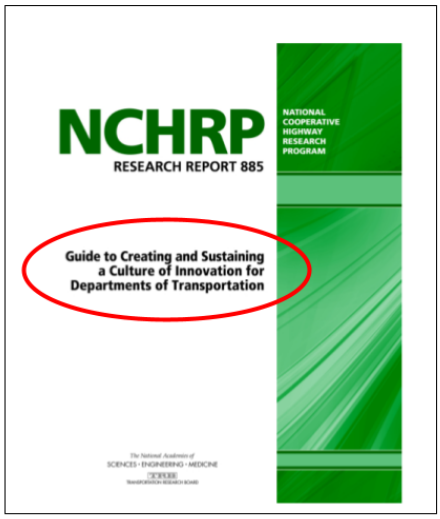
- Research reports - cited by other researchers, used by other states?
- Universities want to collaborate with us?

March 1, 2023 2

Do we need a guide like this for Culture of *Research?*

From this 2018 report, a thriving culture of *innovation includes*:

- An environment that fosters new ideas or methods and affords **opportunities to test them.**
- A place where good **ideas and new ways to solve challenges**… are encouraged
- **Resources are allocated to support new initiatives**…
- **Failure is tolerated**, rather than punished.
- Five necessary themes:
  - Leadership
  - Empowerment
  - Communication
  - Recognition
  - Measurement



https://nap.nationalacademies.org/catalog/25307

CDOT's efforts/opportunities to promote a culture of research

- Consensus for project selection
- Keep/Develop Champions
- Interdisciplinarity Study Panels
- University Researcher relationships
- Research Staff, Skill sets
- Outreach
- Implementation
- Challenges

Overlap with AASHTO-suggested peer exchange topics

Peer Exchange Reports Topics

To assist with the categorization of the Peer Exchange Reports, we have developed the following list of possible topics for these reports. The intent of creating these topic categories was to improve the findability of relevant reports within the Peer Exchange Reports database. This list may not be all-inclusive, but its purpose is to provide a standardized way to group existing and future reports to facilitate information sharing among agencies involved in transportation research management.

1. **Research Project and Program Management** (Scope Note: Use this topic category if a peer exchange was general and covered the entire research program or where program and/or project management was specifically listed as an objective).

2. **Alignment of the Research Function with Departmental Missions and Goals** (Scope Note: Includes the concepts of policy research and strategic planning).

3. **Research Staffing Needs, Capacity Building, and Skill Sets.**

4. **Research Collaboration and Partnerships** (Scope Note: Includes research with UTCs, pooled fund projects, participation in national programs, and research funding strategies).

5. **Optimizing the Value and Quality of Research** (Scope Note: Includes development, solicitation, review, and prioritization of research ideas, forming advisory panels, project and contract management, dealing with principal investigators, quality of reporting).

6. **Implementation/Deployment of Results/Technology Transfer.**

7. **Information and Knowledge Management** (Scope Note: Includes libraries, information databases, Transportation Knowledge Networks).

8. **Research Performance Measures and Communicating the Value of Research Projects and Programs** (Scope Note: Includes both internal and external outreach and marketing).

https://research.transportation.org/peer-exchange-reports-topics/

5

Multi-stage project selection process: **Gain consensus for funding of research**

1. Oversight Teams

- Subject-specific Teams review and provide advice on problem statements submitted for research.
  - Can suggest PS improvements, changes.
- Made up of CDOT SMEs, range of disciplines and experience.
- We want people with an interest in making a change through research.

2. Research Staff Review

- Research staff use professional judgement & OT advice to select best research ideas to pursue

3. Research & Implementation Council (RIC)

- CDOT management with broad knowledge of CO & CDOT transportation research needs
- Research projects endorsed by previous steps are reviewed, prioritized by the RIC. Not all are funded.
  - Intended to align research with overall Department Mission, Goals, Strategies
  - Upper management can encourage action and make sure that change can result from research process
- RIC & Research Branch meet 2-4/year

4. Leadership sign-off

- CDOT Chief Engineer and DTD (Division) Director sign-off on work plan before submitting to FHWA

6

Champions

- Required to fund a study
  - The most important role in each research project?
- May be the idea originator, PS author, or just invested in outcome
- Our main "customer" for any individual study
- Able to be a "change champion": promote implementation of research findings
- How do we find more?

Encouraging new champions

- Outreach
  - We attend various Committee/Branch/Unit meetings to discuss research branch, announce problem statement solicitation, etc.
    - New ideas from past champions
    - Or from new champions
- Prob Statements are open to anyone
  - Anyone with an idea can submit a Problem Statement. *Does this help or hurt with finding champions?*
- Study Panels
  - Former panel members make good champions or OT members
- Suggested/Delegated by Leadership
  - RIC and Management recommend champions

Encouraging new champions

Research Engineering Idea Summit

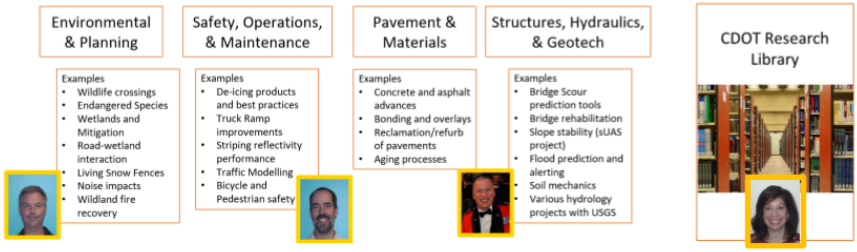
- May 11, 2022
- Chief Engineer sponsored
- ~ 16 invitees each pitched their own research idea
- Participants and Research staff provided feedback/discussion
- Participants identified the top choices they heard that day
- Research staff reached out to potential champions to develop Problem Statements

Study Panels

- Interdisciplinary study panel engages more staff, improves research, improves implementation
  - Members are typically SMEs and/or stakeholders in the research outcome.
- Participate in entire study duration
  - Can be good engagement with ARIB, expand our reach to new people
- Great way for more people to learn about research process/people
  - Future champions?
  - Future Research Staff?

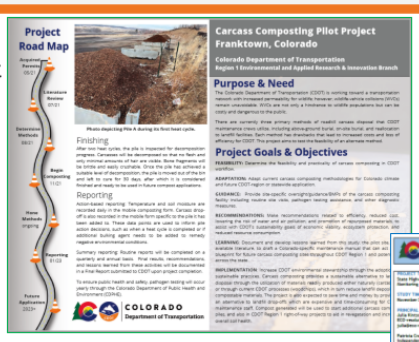
Engaged Research Branch Staff

- Take advantage of existing skill sets / interests
  - Projects managed by staff with background/interest in topic (when practical)
  - We've introduced "Emphasis Areas" based partly on Department need overlapping with staff interest, CO researchers
- Build skills
  - Professional meetings, national research, training, out of state conferences, etc.



Technology Transfer, Marketing

- Library, Website, Shared Drive - Knowledge Management
  - Make research easy to find (ours and others)
  - Spread the word
  - Shared project folders
- Outreach / Marketing
  - Present research results directly to relevant CDOT staff, stakeholders, leadership.
    - Final Presentations
    - Single page Research Brief
    - Put results in their terms
  - Get the word out about submitting PS ideas
  - Work with CDOTs other "Innovation" leaders
  - Participate in non-research meetings/committees
    - Describe completed, in progress, and upcoming research.
    - Find new panel members, new PS idea submitters, etc.
  - Encourage Champions to present results to professional, industry, and national meetings



Example 1-page Research Briefs

Researcher Relationships and Research Quality

- Maintain relationships with good research collaborators
  - Encourage submissions
  - Can build on previous studies, progress
  - Understand their strengths, interests
  - Past researchers understand CDOT culture, research needs
- Quality and conduct of research will impact DOT research culture
  - Quality over Quantity
  - Implementable findings

Challenges

- Good champions can be hard to find
  - Especially when PS author is external to CDOT
- Good champions & research advocates lost to retirement, turnover, etc.
- Who to engage?
  - Who is left out? Are new voices needed?
- Committee Fatigue
  - Waning Participation/Enthusiasm?
  - Stale membership?
- Out of State travel funding
- Delays
  - Some studies take over 1 year to procure
  - Frustrates champions, panels, research staff & researchers

Opportunities / Wrap up

- Engage SMEs, Leadership & other Innovation-focused groups to align with Department goals
- Develop new champions, panel, committee members
- Build Champion & Researcher relationships
  - Identify who to engage with as staff turns over, priorities change, etc.
  - Who has been left out?
  - Should we do more with industry, university or other groups?
  - Sustain or build momentum (what activities help?)
- Use and build research staff skills
- Do lots of outreach and solicit feedback
- Quality research, quality implementation

Idaho Transportation Department Research Program

Promoting Research Culture

YOUR *Safety*
YOUR *Mobility*
YOUR *Economic Opportunity*

Amanda Laib
Senior Research Analyst
March 1, 2023

Research Program Context

- Staffing: 2 FTEs
- Annual Budget: $2.35 Million
- Projects per Year: 8-10
- Organizational Home: Planning Services Section
- Research Performers:
  - Public Universities
  - Consulting Firms

- Research Interest Areas
  - Wide range of topics:
    - Highway safety and traffic
    - Materials and Bridge
    - Environmental
    - Financial Planning and Analysis
    - DMV
    - UAS
- Unique Aspects of Program
  - Responsible for overseeing all SPR funds
    - SPR Work Program
    - SPR Annual Performance and Expenditures Report
    - Obligating funds
    - Monitoring expenditures

YOUR *Safety* YOUR *Mobility* YOUR *Economic Opportunity*

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Research Program and ITD Mission

We support research, development, and technology transfer activities addressing the Department's strategic goals and initiatives

ITD Mission and Vision

- Mission: Your Safety, Your Mobility, Your Economic Opportunity
- Vision: Enhancing Quality of Life in Idaho through Transportation

Strategic Commitments

- Provide the safest possible transportation system and work environment
- A mobility-focused transportation system that drives economic opportunity
- Continually improve the employee experience
- Continually innovate business practices

} Four Strategic Teams that guide these goals

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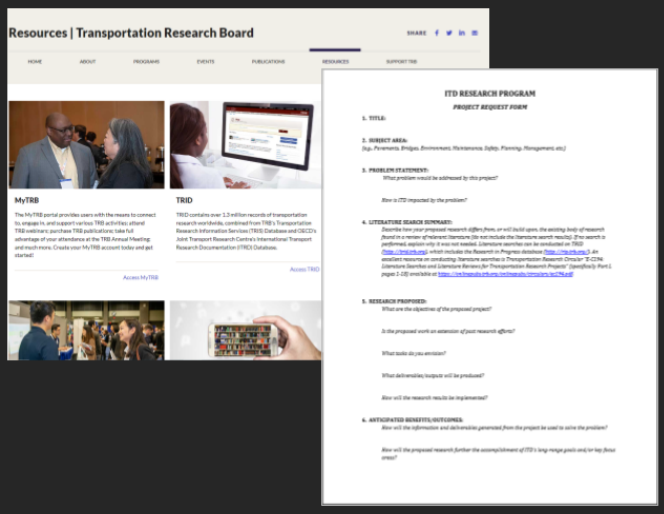
Communicating Research

Annual Activities

- Annual Cycle for Research Project Requests and Selection
- Research Program staff meets with people throughout department to highlight the resources we provide and solicit ideas
  - Strategic Teams
  - Highways Program Managers
  - Innovation Stewards and Office of Continuous Improvement
  - Try to include District Office Staff when appropriate
  - Encourage TRB involvement



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Communicating Research

Annual Activities

- Annual Research Program update to Idaho Transportation Board – Typically end of calendar year
- NCHRP Ballots in early Spring
  - SMEs asked to review problem statements
  - Local highway district, MPOs, LHTAC
  - Panel nominations
  - This year 14 were selected to serve!
- ITD conferences
  - Planning Summit
  - Data Summit
  - Leadership Summit
  - EIT Conference

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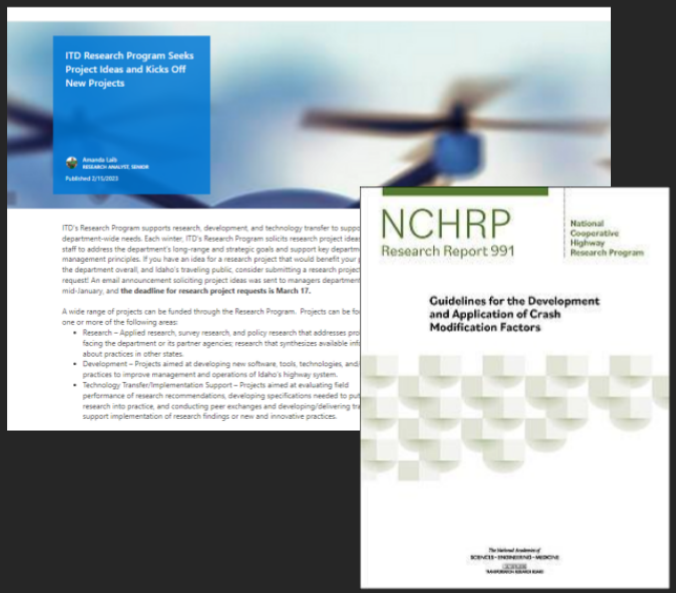
Communicating Research

Ways that we communicate throughout the year

- ITD Internal Newsletter – *The Transporter*
  - Articles to highlight new projects
  - Articles about completed projects - outcomes, implementation, recognition to researchers and ITD project team
- Workshops and trainings to share research project results
- Pooled Funds
  - Forward new solicitations to appropriate staff with Project Request Form
  - ITD RAC review of Pooled Fund requests
  - No Boundaries Innovations
- Publications and Webinars
  - TRB cooperatives, AASHTO, State DOTs, etc.
- AASHTO Innovation Initiatives



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Communicating Research to Leadership

ITD Research Advisory Council

- Broad-based group of agency leaders and FHWA division advisor
- Establishes research priorities
- Meets annually in the spring to review and rank research request
- Also reviews off-cycle requests throughout the year for Pooled Fund Requests

Meet with new section managers

Meet with executives

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Innovation Stewards

- Research Program aims to meet with Innovation Stewards quarterly
- Recently expanded participation
- Sr. Research Analyst now serves as steward

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Innovation Strategic Team

- Collection of ITD staff members from cross-functional business areas whose mission is to set the strategies used to advance innovation throughout ITD
- Research Program Manager serves on team

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Research Culture Project Highlight

- Bridge Section Research Roadmap
- Selected by ITD RAC for funding in FY2023
- Prioritize bridge related research but also to serve as guide for new bridge engineers

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1

Topic 1: Leading Pooled Fund Projects
Topic 2: Research Data Curation
Topic 3: Promoting a Culture of Research

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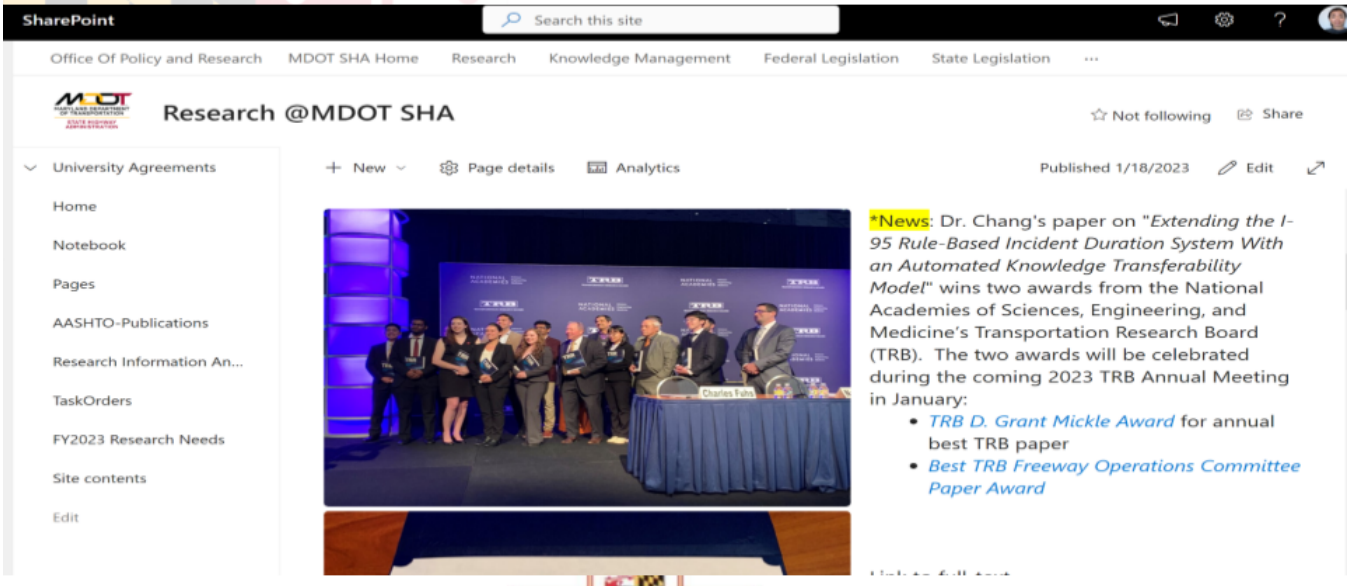

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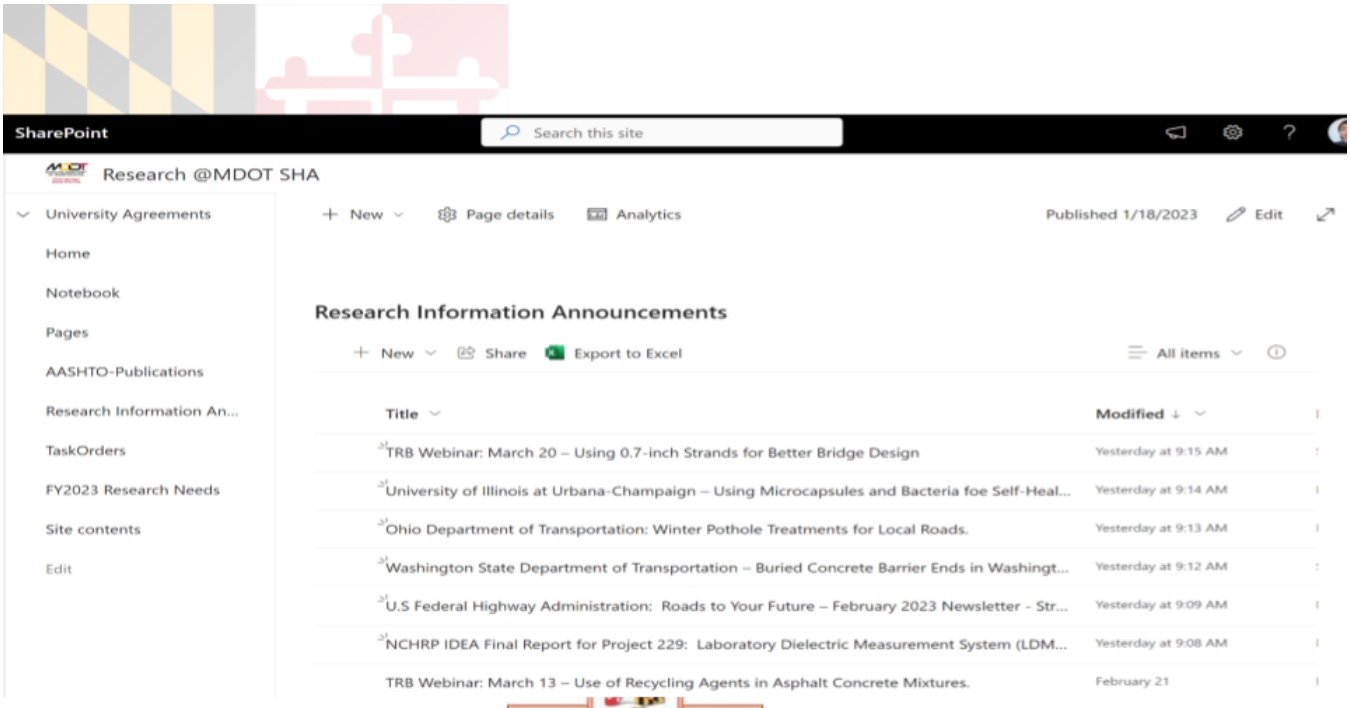

2019 Overview of MDOT SHA's Research Program

- Strengths – The three of us are **an effective team**
  - "Excellent customer service" is the most frequent feedback we received from other technical offices (our customers)
  - We support new ways of managing research program
    - SharePoint lists for tracking task orders, invoices
    - Customized workflows for information sharing
    - Research Engagement survey was conducted in September
      - Next slide has highlights

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2017 Survey

- Research Engagement survey in September, 2017
  - 132 responses were received from employees.
  - Achieved the goal of informing employees about ways to obtain TRB reports, attend TRB Annual Meetings, and explore MyTRB account.
  - 42% of the respondents are currently receiving RD's email announcements. 92% (49 of the 53) find the email announcements helpful.
  - 58% of the respondents (77 of the 132 responding employees) are NOT currently receiving RD's email announcements.

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2017 Survey (2)

- In the 91 subscriptions, the most popular subject areas are:
  - General Transportation (45)
  - Highway Design (41)
  - Connected/Autonomous Vehicles (36)
  - Pedestrians/Bicyclists (36)
  - Safety and Human Factors (36)
  - Environment (36)
  - Construction (34)
- The least popular subject areas are:
  - Freight (7)
  - Winter Maintenance (15)

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VT AOT: Fostering Research Culture

Emily Parkany, Research Manager
Vermont Agency of Transportation
Colorado Research Peer Exchange
March 1, 2023

PRESENTATION OVERVIEW

- What VT does to engage folks with research (outside of External Research Project management)
- Champions and TAC members (External Research Project management)

Research Engagement (Project Independent)

- Annual September Research and Innovation Symposium
- Quarterly Research and Innovation e-Newsletter
- NCHRP project voting; NCHRP panel member recruitment
- TRB (Annual Meeting, Webinars, NCHRP Report Distribution)
- Feb 16 TRB Takeaways Lunch and Learn—Hybrid
  - Identify “Research Friendly” staff

CHAMPIONS—Before Project is Funded

Large Champion lift to get project funded

- Ideas from anyone but have to be matched with enthusiastic Champion
- Champion develops Research Problem Statement distributed to Qualified Researcher List
- Champion selects research team based on two-page Letters of Interest
- Champion works with research team to get 10 page project proposal they want to advocate for
- Champion presents project description and benefits in four minutes at decision-making meeting
- Funding for “half” of the projects

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Technical Advisory Committee

- Champion suggests TAC members
- Research prefers larger TACs—more people to guide the project; more people to use the project
- Benefits/implementation Survey and Discussion since July 2022

Benefits/Implementation Survey and Discussion

- Before kickoff, mid-project, end of project
- Sent to TAC and researchers before the meeting
- Results aggregated into four slides to facilitate a during-meeting discussion
- Get people thinking about why they're in the meeting (to support the project) and how they will use the project results
- Get people on the same page

Champions Leave

- Leave Agency; get new position at Agency
- One case, someone stepped up fairly quickly to assume the Champion role
- Another case, Champion still attends but the field support guy has had to step up
- New boss asked in the past month about what we do if Champion leaves
- Several unfunded Champions have retired or left