

Introduction to the U.S. DOT Public Access Policy & Resources

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2021-04-06



U.S. Department of Transportation
Office of the Secretary of Transportation
Bureau of Transportation Statistics

Slide Title: Introduction to the U.S. DOT Public Access Policy & Resources
<https://doi.org/10.21949/1522406>

Speaker text:

Thank you to Mike and Anthony for inviting me to speak to you today.

Today, I will give a very high-level overview of the U.S. DOT Public Access Policy, its context, & some of the resources available to folks trying to comply with the plan.

But first, let's define "Public Access." Public Access is a very simple concept. By Public Access, we mean that the people of the country are able to discover and access government-funded research outputs, such as reports and datasets, while protecting privacy and security.

So Public Access is simply the practice of a more deliberate research transparency.

Please keep this definition in mind for the next few minutes as we dig a little deeper.
[Next slide]

[Slide text not presented orally:

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NOTE: There are "Links to resources" slides at the end of the deck for those of you who would like to explore after the workshop. Further, each slide's "speaker notes" section has the complete text of my prepared remarks for each slide.

Contents

- 1. How Public Access Came to Be**
- 2. What we Mean by Public Access**
- 3. Resources**

Slide Title: Contents

Speaker Notes:

The themes I will speak on are:

1. How Public Access Came to Be
2. What we Mean by Public Access
3. Resources

Let's get right to it.

[Next slide]

How Public Access Came to Be: Open Science



Image from UNESCO:
<https://unesdoc.unesco.org/ark:/48223/pf0000374837>

**U.S. federal public access plans
have their roots in the global
Open Science movement.**

Slide Title: How Public Access Came to Be: Open Science

Speaker notes:

U.S. federal public access plans have their roots in the global Open Science movement.

If you are not familiar with open science, the basic idea, which has been around since 1998, is the broadest possible availability and usability of research outputs, such as publications, data, and code. These levels of openness are enabled in part by global computing resources, as well as policies, agreements, and shared practices.

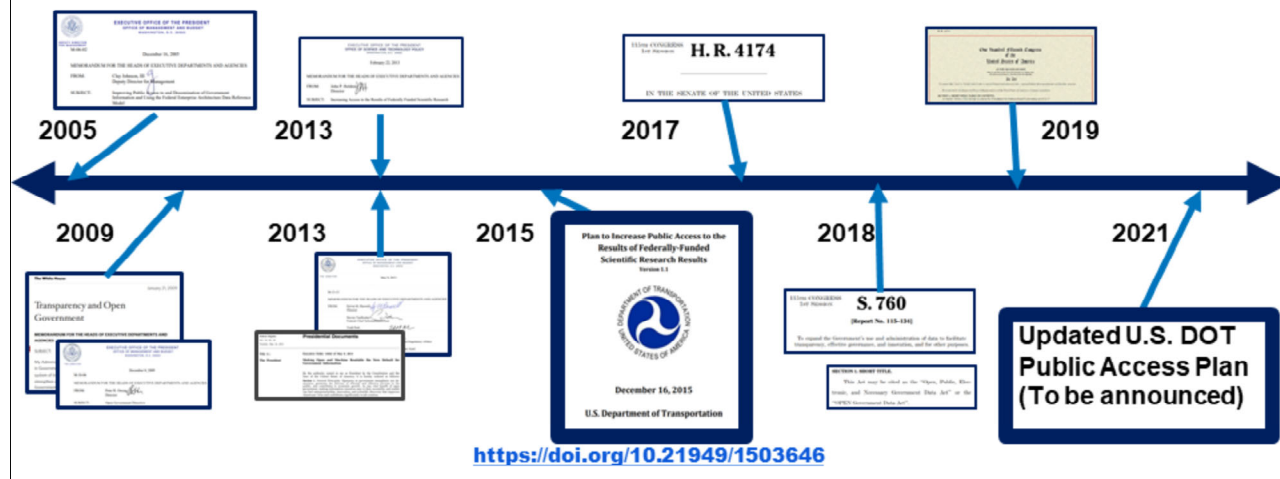
Open science is a world-wide activity. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) is working on a common definition for open science to be agreed on this year. You can read the short UNESCO draft recommendation on open science at <https://unesdoc.unesco.org/ark:/48223/pf0000374837>

The United States has been and is a part of the open science ecosystem. Next, let us take a quick look at that development.

[Next slide]

How Public Access Came to Be: Federal Policy & Law

Public Access to research is Federal law.



Slide Title: How Public Access Came to Be: Federal Policy & Law

Speaker notes:

Public Access to research is Federal law. In fact, public access to federally funded research is a decades-old practice, going back to 1861, with the development of the U.S. Government Printing Office (GPO). This was extended in 1950 with the development of the National Technical Information Service (NTIS).

Focusing our view on the present digital computing era, this very crowded timeline is only meant to help illustrate the fact that over the past 15 years we have seen many executive orders, policies, and laws, that seek to make our government research more transparent. These include directives for increased public access to federally funded publications and datasets. It is hoped that opening research outputs to broader public use will have social, economic, and research benefits, especially as data is re-used in novel ways.

In the center we have the 2015 U.S. DOT Plan to Increase Public Access to the Results of Federally-Funded Scientific Research; or what we call the U.S. DOT Public Access Plan, which we look at next.

[Next slide]

[Text of slide not presented orally:

List of policies and memos picture on the screen:

- Office of Management and Budget (OMB) Memo M-06-02, “Improving Public Access to and Dissemination of Government Information and Using the Federal Enterprise Architecture Data Reference Model,” December 16, 2005, <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2006/m06-02.pdf>
- White House “Transparency and Open Government” memo, January 21, 2009, <https://obamawhitehouse.archives.gov/the-press-office/transparency-and-open-government>
- Office OMB memo M-10-06, “Open Government Directive”, December 8, 2009, <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2010/m10-06.pdf>
- White House Office of Science and Technology Policy (OSTP) memo “Increasing Access to the Results of Federally Funded Scientific Research,” also known as “The Holdren Memo,” February 22, 2013, https://web.archive.org/web/20130308142014/https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf
- OMB memo M-13-13, “Open Data Policy – Managing Information as an Asset,” May 9, 2013, <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2013/m-13-13.pdf>
- White House Executive Order 13642 “Making Open and Machine Readable the New Default for Government Information,” May 9, 2013, <https://www.govinfo.gov/content/pkg/FR-2013-05-14/pdf/2013-11533.pdf>
- House of Representatives bill H.R. 4174, “Foundations for Evidence-Based Policymaking Act of 2018,” introduced October 31, 2017, <https://www.congress.gov/bill/115th-congress/house-bill/4174>
- U.S. Senate bill “S.760 - Open, Public, Electronic, and Necessary Government Data Act,” introduced March 29, 2017, <https://www.congress.gov/bill/115th-congress/senate-bill/760/text> , and,
- Public Law No. 115-435 “Foundations for Evidence-Based Policymaking Act of 2018,” signed into law on January 14, 2019, <https://www.congress.gov/115/plaws/publ435/PLAW-115publ435.pdf>

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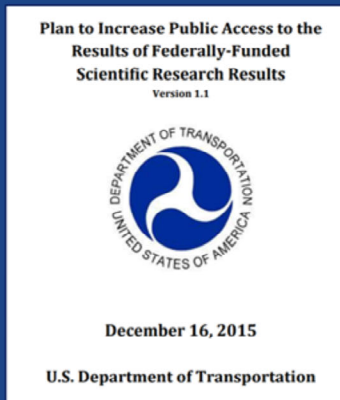
- Over at least the past 15 years we have seen a number of White House executive orders, policies, and laws, that seek to make the operations of the government more transparent. This included executive orders calling for increased public access to federally funded publications, research, and data, so that citizens have as much access

as possible to the products they fund through taxes. It is hoped that opening research outputs to broader public use may also have social, economic, and research benefits, especially as data is re-used in novel ways, perhaps not considered by the original researcher.

- A non-exhaustive list of these order, memos, and laws include: (see list above)

Let us focus for a second on Public Law 115-435, the **Foundations for Evidence-Based Policymaking Act of 2018 (HR 4174)**. Title II of the Act, includes the Open, Public, Electronic, and Necessary (OPEN) Government Data Act. The OPEN Government Data Act requires that non-restricted U.S. government data be available in machine-readable formats, and that each federal agency have a Chief Data Officer. This act is consistent with the spirit of the memos and policies that preceded it, including the U.S. DOT Public Access Plan.]

How Public Access Came to Be: 2015 Public Access Plan



U.S. DOT Public Access Plan:
<https://doi.org/10.21949/1503646>

In December 2015, the U.S. DOT published its plan to affirm and enhance DOT's commitment to Public Access to Scientific Research results.

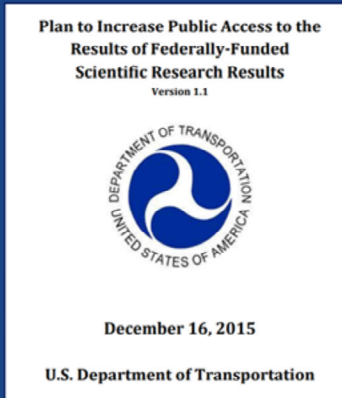
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Slide Title: How Public Access Came to Be: 2015 Public Access Plan

Speaker notes: Consistent with the federal laws and policies just discussed, in December 2015, the U.S. DOT published its public access plan to affirm and enhance DOT's commitment to Public Access to Scientific Research results, without charge to the maximum extent possible.

OK, we have taken a couple of minutes to contextualize the DOT Public Access Plan, now let's take a closer look at the plan.
[Next slide]

What we Mean by Public Access: Definition



U.S. DOT Public Access Plan:
<https://doi.org/10.21949/1503646>

Public Access to Research Outputs means the Public is aware of & can locate these outputs; and, is able to download & analyze these outputs.

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Slide Title: What we Mean by Public Access: **Definition**

Speaker notes:

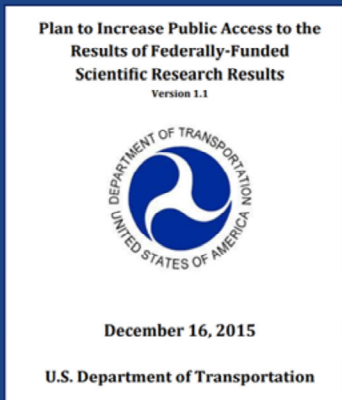
Let's remind ourselves of our definition. Paraphrasing the DOT plan, Public Access to Research Outputs means the Public is aware of & can locate these outputs; and, is able to download & analyze these outputs.

The Public Access plan also makes provision for restricting the amount of "openness" to protect individual privacy, as well as business, agency, and homeland security.

To put this another way, the U.S. government wants to conduct scientific research that "defaults" to openness, sharing and reuse, while still protecting people and organizations where needed. And, U.S. DOT research units are in the process of aligning their practices with Public Access.

Next let's take a look at research outputs
[Next slide]

What we Mean by Public Access: Research Outputs



U.S. DOT Public Access Plan:
<https://doi.org/10.21949/1503646>

“Research Outputs” mean:

- **Research Project Records,**
- **Publications (broadly defined), and,**
- **Digital Datasets.**
- **(Software & Code included in 2021 plan update.)**

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Slide Title: What we Mean by Public Access: **Research Outputs**

Speaker notes:

The information coming your way next is vital, and is most often misunderstood, especially by folks who don't actually read through the plan. So we are going to spend a bit of time on it.

By “Research Outputs” we mean: research project records, publications, datasets, and soon, software.

Let's take a look at each of these:

Research Project Records,

This may be the project metadata, such as a Research Hub record, where the public can learn what research the DOT has performed, is performing, or is planning for the future.

Publications, Publications can include the very thick and detailed technical or research report that researchers supply to DOT, it can mean a technology transfer summary, it can include the manuscript of a much shorter peer-reviewed journal article, it can be a poster or presentation slide deck, etc. If the publication was produced as part of DOT-funded research, the public should

be able to find it, and within limits, read it.

Digital Datasets. This means the final, machine-readable, public release dataset, which was analyzed to generate the findings and conclusions asserted in the research publications. This is the data distilled from the raw data; NOT all of the raw data. And the dataset must NOT include any personally identifiable information or other sensitive information.

Software & Code: As the practice of scientific research has developed over the past 5 years, we realized that research-generated software and code was also vital for the analysis, replicability, and reproducibility of research. Therefore, the 2021 update to the Public Access plan adds Software and source code to the list of research outputs.

So to review, Public Access means the public can find, and where not restricted, access and re-use, federally-funded research outputs, including research records, publications, datasets, and soon, software.

Of course, this takes work and effort on our part, as DOT employees. You might be asking yourself “What does the U.S. government hope will happen as a result of Public Access?”

Good question. Let us look at that next.

[Next slide]

What we Mean by Public Access: Expected Outcomes



Image from UNESCO:
<https://unesdoc.unesco.org/ark:/48223/pf0000374837>

U.S. DOT Public Access Plan:
<https://doi.org/10.21949/1503646>

Expected Outcomes include:

- **Long-term access to, & preservation of, research;**
- **Enhanced scientific discovery and deployment; &**
- **Promotion of scientific & economic innovation.**

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Slide Title: What we Mean by Public Access: **Expected Outcomes**

Speaker notes:

Let's answer that last question: Why are we doing this?

By "Outcomes" we expect:

Long-term access to, & preservation of, research;

Enhanced scientific discovery and deployment; &

Promotion of scientific & economic innovation.

So your next question might be, "Does this work? Do we have examples we can point to?"

Well, yes, we have a recent and topical example, with the vaccines for COVID-19.

Vaccine discovery and production normally takes years. But the COVID-19 vaccines began coming on line in months, for a couple of reasons.

- 1: Scientists had already developed new vaccine technology, using messenger RNA; and,
- 2: That new tech was then paired with shared science.

I will name 2 sharing instances that made an impact:

- A. On January 11, 2020, Chinese health official released to the world, the genetic sequence of the novel coronavirus; and,
- B. In March 2020, the U.S. National Institutes of Health National Library of Medicine worked with publishers to open up instant, free access to coronavirus research through the NLM repository PubMed Central.

Together, these actions helped researchers produce a number of vaccines more quickly, saving some lives.

Now, will every publicly accessible research output help lead to such important advances? No.

What is important is that we develop the practices of public access and open science, and apply these to each research project, because we cannot predict today, what may be vital to solving an urgent need tomorrow.

OK. So you might be asking, "What resources are available to me to help me implement public access?"

Let's talk very quickly about a couple.
[Next slide]

Resources: PA Plan Guidance Website



U.S. DOT Public Access Plan Guidance Website:
<https://doi.org/10.21949/1503647>

**DOT Staff and researchers
have constant access to the
U.S. DOT Public Access Plan,
and to implementation
guidance.**

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Slide Title: Resources: PA Plan Guidance Website

Speaker notes:

I want to take a moment to remind folks that DOT Staff and researchers have constant access to the U.S. DOT Public Access Plan, and to implementation guidance at our guidance website: <https://doi.org/10.21949/1503647>

- The current pages include:
- -- The Plan
- -- Information for researchers, especially on how to write DMPs
- -- Info for DMP evaluators
- -- Information for and on repositories
- -- FAQs, especially with answers on publishing, public access, and copyright issues; and,
- -- Training Resources, which are always under development

It is very important to note that you should get in the habit of navigating to this website by the Digital Object Identifier or DOI link at the top of the slide.
<https://doi.org/10.21949/1503647>

With the 2021 plan update, this website will be getting a much needed

overhaul. Further, the website is relocating from the NTL web to OST-R webpages, where it belongs.

And if you remember back to the beginning , I mentioned an upcoming training.

[Next slide]

Resources: Training

Image from UNESCO:
<https://unesdoc.unesco.org/ark:/48223/pf0000374837>



**Save the date:
Public Access Deep Dive for
Researchers, Wednesday,
May 12, @ 1300 EST**

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Slide Title: Resources: Training

Speaker notes: Besides the training materials linked in the Guidance website, we also provide training on demand.

I am happy to announce that working with Mike and Anthony, we are planning a hour-long session tentatively called Public Access Deep Dive for Researchers, on Wednesday, May 12, at 1300 Eastern. Bring your lunch.

[Next slide]

Resources:
Contact Info

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202-366-2759

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Slide Title: Resources: Contact Info

In conclusion,

The themes I spoke on today were:

1. How Public Access Came to Be
2. What we Mean by Public Access
3. Resources

There are many more resources on the Supplemental Slides of this deck, which will be shared with you after the presentation.

You can always reach out to me with other question.

You may see and email from Mike and Anthony ahead of the May 12 presentation, asking for your questions ahead of time, so that we can target that presentation.

[Next slide]

Thank you!

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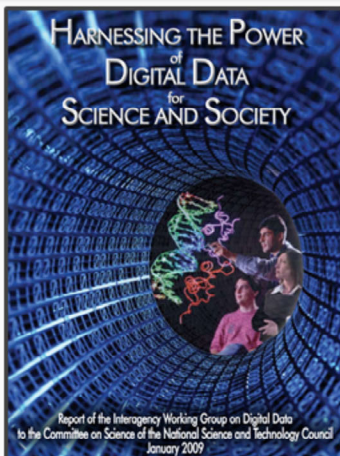
Supplemental Slides

The following Supplemental Slides include further resources for those interested.

Slide Title: Supplemental Slides

Slide text: The following Supplemental Slides include further resources for those interested.

Opening U.S. Government-Funded Science: Practices



Guiding Principles

- Science is global and thrives in the digital dimensions;
- Digital scientific data are national and global assets;
- Not all digital scientific data need to be preserved and not all preserved data need to be preserved indefinitely;
- Communities of practice are an essential feature of the digital landscape;
- Preservation of digital scientific data is both a government and private sector responsibility and benefits society as a whole;
- Long-term preservation, access, and interoperability require management of the full data life cycle; and
- Dynamic strategies are required

<https://www.nitrd.gov/Publications/PublicationDetail.aspx?pubid=25>



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Slide Title: Opening U.S. Government-Funded Science: Practices

Speaker notes: The impacts of digital technology on science are fundamental, and were summarized by the Interagency Working Group on Digital Data with their 2009 report “Harnessing the Power of Digital Data for Science and Society.”

The authors note that science will now be conducted in a “fully digital world” and that data is “an endless fuel for creativity.”

The authors list seven guiding principles for the new research reality. Among these are:

- Digital scientific data are national and global assets;
- Communities of practice are an essential feature of the digital landscape;
- Preservation of digital scientific data is both a government and private sector responsibility and benefits society as a whole.

The evolution in research and digital data made the new U.S. policies necessary in order for U.S.-funded researchers to keep pace.

However, new Open Science policies and practices are only fully realized if they are implemented. Let us look at two groups engaged in implementation.

[Next slide]

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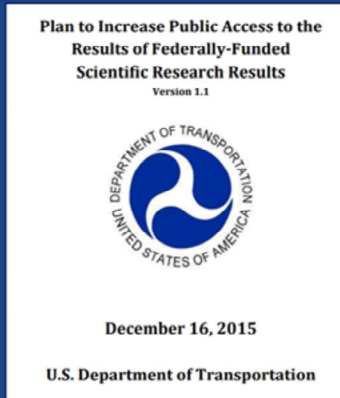
Full list of Guiding Principles:

- Science is global and thrives in the digital dimensions;
- Digital scientific data are national and global assets;
- Not all digital scientific data need to be preserved and not all preserved data need to be preserved indefinitely;
- Communities of practice are an essential feature of the digital landscape;
- Preservation of digital scientific data is both a government and private sector responsibility and benefits society as a whole;
- Long-term preservation, access, and interoperability require management of the full data life cycle; and
- Dynamic strategies are required

URL to “Harnessing the Power of Digital Data” report:

<https://www.nitrd.gov/Publications/PublicationDetail.aspx?pubid=25>]

Public Access Implementation Working Group (PAIWG)



- Mission: Enable cross-modal collaboration to ensure the best possible public access to USDOT scientific research through implementation of the DOT Public Access Plan, common best practices, and shared resources.
- Scope:
 - USDOT Public Access Plan development, implementation, and compliance monitoring
 - Charters time-limited implementation task forces with modal and OST experts;
 - Reports Public Access Plan progress and obstacles to the RD&T Planning Team, including compliance monitoring; and
 - Coordinates U.S. DOT participation in U.S. Federal, domestic and international Public Access, Open Science, and Data Strategy efforts and activities.

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Slide Title: Public Access Implementation Working Group (PAIWG)

Speaker notes:

The US DOT's Public Access Implementation Working Group harnesses the energy and talents of about 60 people to ensure the best possible public access to USDOT scientific research through implementation of the DOT Public Access Plan, common best practices, and shared resources.

Let us leave the policy and practice realm, and take a look at technologies.

[Next slide]

[Slide text not presented orally:

- Mission: Enable cross-modal collaboration to ensure the best possible public access to USDOT scientific research through implementation of the DOT Public Access Plan, common best practices, and shared resources.
- Scope The Public Access Implementation Working Group (PAIWG):
 - Owns USDOT Public Access Plan development, implementation, and

compliance monitoring across all categories of public access outputs, including consistent-facing communications and inputs to implementation support resources;

- Charters time-limited implementation task forces with modal and OST experts;
- Reports Public Access Plan progress and obstacles to the RD&T Planning Team, including Operating Administration compliance monitoring once the revised plan is implemented; and
- Coordinates U.S. DOT participation in U.S. Federal, domestic and international Public Access, Open Science, and Data Strategy efforts and activities, and enables knowledge sharing of these activities with the Department.]

[Expanded background text:

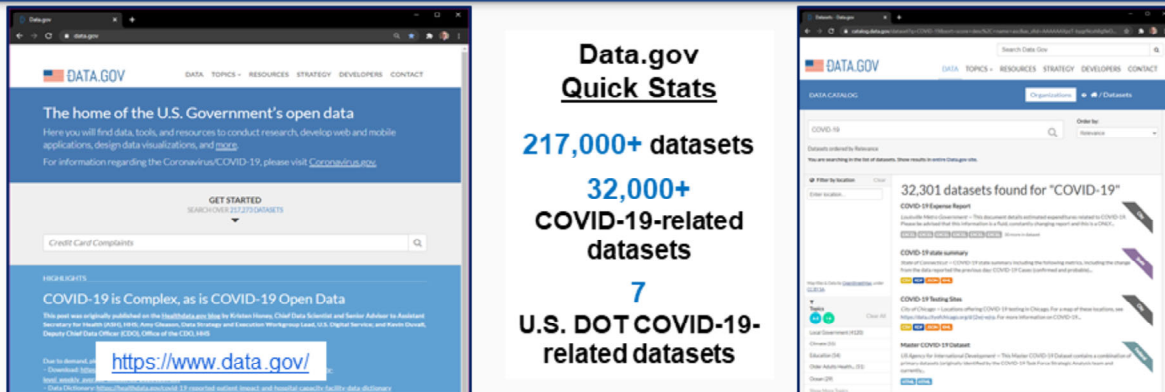
In mid-December 2015, the U.S. DOT published its “Plan to Increase Public Access to the Results of Federally-Funded Scientific Research,” or “Public Access Plan.”

Plan language states that “Public Access” to Publications and Digital Data Sets, will mean:

- The Public is aware of the Digital Data Set holdings and/or the Digital Data Sets generated, fully or partially, through federally funded Scientific Research;
- The Public is able to download and analyze unclassified Publications and/or Digital Data Sets unless specifically precluded by privacy, confidentiality or National/Homeland security concerns;

For the next couple of years implementation of the plan was lead by an ad hoc group chaired by the DOT Office of the Assistant Secretary of Transportation for Research & Technology and the National Transportation Library. In 2018, the Public Access Implementation Working Group (PAIWG) was formally organized to harmonize public access and open science activities across DOT. Then in 2020, PAWIG became a working group of the DOT Research, Development & Technology Planning Team. There are now about 60 DOT employee engaged in the effort to fulfill the PAIWG mission of: enabling cross-modal collaboration to ensure the best possible public access to USDOT scientific research through implementation of the DOT Public Access Plan, common best practices, and shared resources.]

Opening U.S. Government-Funded Science: Technology: Data.gov



Want just the DOT data in data.gov?
<https://catalog.data.gov/organization/dot-gov>

U.S. Department of Transportation
Office of the Secretary of Transportation
Bureau of Transportation Statistics

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Slide Title: Opening U.S. Government-Funded Science: Technology: Data.gov

Speakers notes;

As U.S. agencies open their data, we have seen a number of new technologies deployed, including data portals such as DATA.gov, in May 2009. Data.gov harvests its information from agency data inventories, giving the public a “one-stop federal-shop.”

As of January 2021, it indexed more than 217,000 datasets.

As of January 6, data.gov is linking to more than 32,000 COVID-19-related datasets.

- Of these, more than 23,000 were federal government data.

A couple of notes about Data.gov’s holdings:

- Not all 217,000 records link to machine-readable datasets.
 - Some of the “datasets” are PDFs of data tables
- Not all data indexed by Data.gov is publicly accessible.
 - Data’s metadata is discoverable, but access may be limited for privacy or security concerns.

And if you want to search just the U.S. DOT datasets in data.gov, you can use this specific link <https://catalog.data.gov/organization/dot-gov>

Speaking of DOT data, let’s now take a quick look at DOT’s data inventory

[Next slide]

[Expanded background text:

- As U.S. agencies, following policy leads we just reviewed, have been moving forward towards data openness, and we have seen a number of new technologies deployed, including data portals such as DATA.gov. Data.gov was launched in May 2009 in order to increase public access to data across all federal agencies. Data.gov harvests its information from all governmental agency enterprise data inventories, giving the public a “one-stop shop” for government data. As of January 2021, Data.gov lists more than 217,000 datasets.
- As of January 6, 2021, data.gov is linking to more than 32,000 COVID-19-related datasets.
 - Of these, more than 23,000 were federal government data, nearly 5,000 from U.S. states, and more than 2300 from city governments .
 - 7 of the U.S. DOT datasets have data related to COVID-19, coronavirus, or pandemic, by search term. There are likely many more, but they may not have metadata that indicates data during the COVID-19 period.
- A couple of notes about Data.gov’s holdings:
 - Not all 217,000 records link to machine-readable datasets.
 - Some of the “datasets” are PDFs of data tables
 - Not all data indexed by Data.gov is publicly accessible.
 - U.S. law requires that citizens are able to discover the metadata about federal data. However, access may be limited for personal and business privacy or national security concerns.
 - And if you want to search just the U.S. DOT datasets in data.gov, you can use this specific link <https://catalog.data.gov/organization/dot-gov>

As I mentioned, Data.gov harvests metadata and indexes federal data inventories. So let’s now take a quick look at DOT’s data.transportation.gov.]

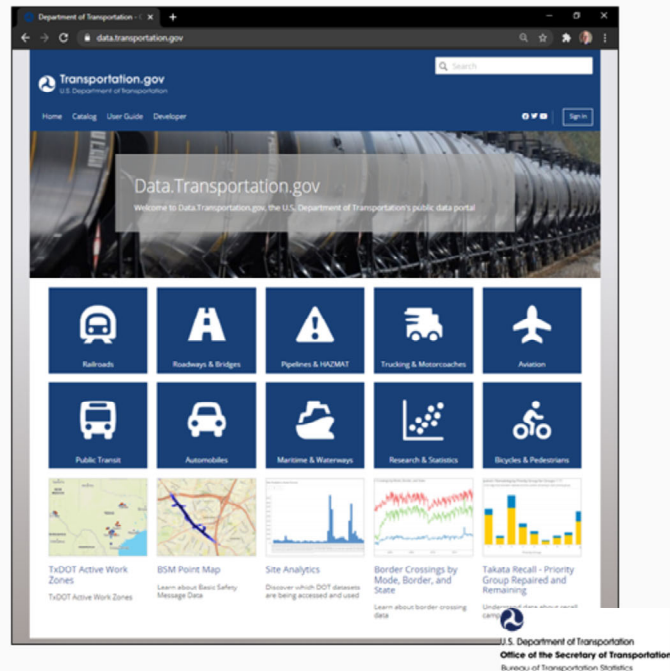
U.S. DOT's Open Data

Data.transportation.gov

Highlights:

- 4000+ datasets
- All transport modes
- Visualization tools
- Data management best practices:
 - Machine-readable datasets and subsets
 - Open formats
 - API access

<https://data.transportation.gov/>



Slide Title: U.S. DOT's Open Data: Data.transportation.gov

Speaker notes:

Data.gov harvests metadata from DOT's DATA.TRANSPORTATION.gov, a data catalog, warehouse, and visualization suite.

Most of the 4000-plus datasets are available for public download.

Some of the highlights include:

- All transportation modes are represented
- Data visualization tools are built in

We should now visit DOT's open scientific research report portal.

[Next slide]

[Slide text presented orally:

Be sure to visit <https://data.transportation.gov>

List of data.transportation.gov highlights

Highlights:

- 4000+ datasets
- All transport modes

- Visualization tools
- Data management best practices:
 - Machine-readable datasets and subsets
 - Open formats
 - API access]

[Expanded background text:

The U.S. DOT data catalog from which data.gov pulls is called DATA.TRANSPORTATION.gov, a data catalog, data warehouse, and data visualization suite. U.S. DOT launched its first data inventory in September 2010. Data.transportation.gov now utilizes the data visualization platform Socrata. As of January 2021, Data.transportation.gov contains records of more than 4000 datasets. Most of these are available to the public for download.

Some of the highlights of data.transportation.gov include:

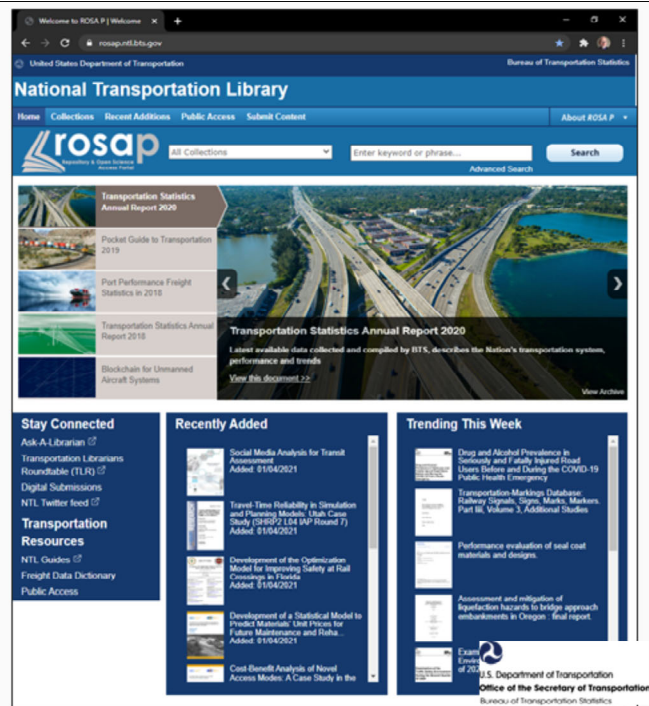
- There are currently over 4000 datasets
- All transportation modes are represented
- Data visualization tools are built into the user interface
- The new system meets several data management best practices including:
 - Allowing users to download Machine-readable datasets and subsets
 - Downloaded data is in open formats
 - The interface also allows for API access

Be sure to visit <https://data.transportation.gov>]

Repository & Open Science Access Portal (ROSA P)

ROSA P is the National Transportation Library's *Repository and Open Science Access Portal*. The name ROSA P was chosen to honor the role public transportation played in the civil rights movement, along with one of the important figures, Rosa Parks.

Visit ROSA P at:
<https://rosap.ntl.bts.gov/welcome>



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Slide Title: Repository & Open Science Access Portal (ROSA P)

Speaker notes:

The Repository & Open Science Access Portal, or ROSA P is operated by the National Transportation Library (NTL), and serves as the central repository for DOT research outputs, now numbering in the tens of thousands.

And there are already 6 research outputs that deal specifically with COVID-19.

But what if you up-to-date info on how COVID is impacting transportation?

[Next slide]

[Slide text not presented orally:

ROSA P is the National Transportation Library's Repository and Open Science Access Portal. The name ROSA P was chosen to honor the role public transportation played in the civil rights movement, along with one of the important figures, Rosa Parks.

Visit ROSA P at: <https://rosap.ntl.bts.gov/welcome>]

[Expanded background text:

The Repository & Open Science Access Portal, or *ROSA P*. is managed and maintained by my coworkers and I at the National Transportation Library (NTL). The 2012 law, “Moving Ahead for Progress in the 21st Century Act (MAP-21),” requires that NTL’s repository “Serve as the central repository for DOT research results and technical publications; and, Serve as the central clearinghouse for transportation data and information of the Federal Government.”

Further, U.S.’s DOT 2015 Public Access Policy requires that a copy of all DOT-funded research reports, and a metadata record for all DOT-funded research datasets, be available to the public through the NTL repository.

ROSA P is the repository and archive for tens of thousands of DOT-produced or DOT-funded research reports, going back, as we have seen, decades. And there are already about 6 reports, statistical publications, or other research outputs that deal specifically with COVID-19.]

COVID-19 Transportation Statistics from BTS



<https://www.bts.dot.gov/covid-19>



COVID-19 Related Statistics

- Daily Travel During the COVID-19 Public Health Emergency
- Mobility Over Time by State and By Trip Distance
- The Week in Transportation: Selected Measures During COVID-19
- Monthly Transportation Statistics
- County Transportation Profiles
- Daily Vehicle Travel
- Effects of COVID-19 On Travel Behavior
- Effects of COVID-19 On Travel Behavior by Income Groups
- Effects of COVID-19 On Bikeshare and E-Scooter Operations
- Docked Bikeshare Ridership: COVID-19 Effects
- Ferry Operators Status
- Ferry Routes for Top Ten Operators



Slide Title: COVID-19 Transportation Statistics from BTS

Speaker notes: The Bureau of Transportation Statistics (BTS) publishes stats on aviation, freight activity, and transportation economics, as well the effects of COVID-19 on travel and shipping, including:

- Travel Behavior by Income Groups
- Bikeshare and E-Scooter Operations

Let us next turn our attention to federal Open Science resources.

[Next slide]

[Slide text not presented orally:

COVID-19 Related Statistics:

- Daily Travel During the COVID-19 Public Health Emergency
- Mobility Over Time by State and By Trip Distance
- The Week in Transportation: Selected Measures During COVID-19
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<https://www.bts.dot.gov/covid-19>]

[Expanded background text:

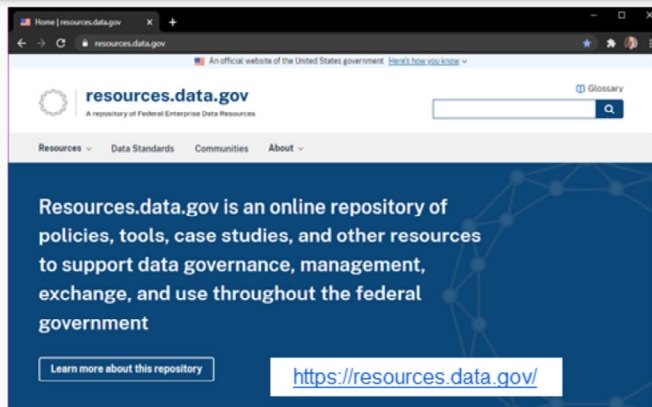
The Bureau of Transportation Statistics (BTS) is one of the 13 principle federal statistical agencies. BTS is the preeminent source of statistics on commercial aviation, multimodal freight activity, and transportation economics, and provides context to decision makers and the public for understanding statistics on transportation.

Responding to interest in the most recent coronavirus-related data, BTS has created web pages of transportation statistics allowing comparison of pre-COVID-19 and current numbers for passenger travel and freight shipments.

These pages present a wide range of data on all transportation modes from various sources. Some of these pages are update daily, weekly, or as data becomes available from the numerous providers BTS works with. To visit the COVID-19 related pages, go to <https://www.bts.dot.gov/covid-19>

Among the list of regularly updated pages of COVID-19 Related Statistics, are:
(see list above)]

Opening U.S. Government-Funded Science: Resources.data.gov



Some Available Resources:

- DCAT-US Schema v1.1 (Project Open Data Metadata Schema)
- Principles of Open Government Data
- Data Ethics Framework
- Geoportal Server
- JSON Validator
- Digital Analytics Program (DAP)
- Improving Agency Data Skills Playbook
- Case studies & examples

Slide Title: Opening U.S. Government-Funded Science: Resources.data.gov

Speaker notes: Resources.data.gov is a repository of policies, tools, case studies, and resources to support data governance, management, and use throughout the U.S. government.

Some of the available resources include:

- The DCAT-US Schema v1.1
- The Data Ethics Framework
- And Case studies & examples

As we near the end of this trip, let's turn to the challenges we face around open science.

[Next slide]

[Slide text not presented orally:

Some of the available resources include:

- The DCAT-US Schema v1.1 (Project Open Data Metadata Schema)
- The Principles of Open Government Data
- The Data Ethics Framework
- A Geoportal Server
- A JSON Validator

- Digital Analytics Program (DAP) for measuring use metrics
- An Improving Agency Data Skills Playbook
- And Case studies & examples

<https://resources.data.gov/>]

Science.gov

- Interagency federated search
- Focused COVID-19 search
- Results include:
 - Journal articles
 - Technical reports
 - Datasets
 - Conference papers
 - Videos
 - Audio files
 - Images

<https://www.science.gov/>



Science.gov Alliance Members

- Department of Agriculture (USDA, Forest Service)
- Department of Commerce (NTIS, NIST)
- Department of Defense
- Department of Education
- Department of Energy
- Department of Health and Human Services (NIH)
- Department of Homeland Security
- Department of Transportation
- Environmental Protection Agency
- Government Publishing Office
- National Aeronautics and Space Administration
- National Science Foundation

[Click here for the Science.gov COVID-19 search results.](#)



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Bureau of Transportation Statistics

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Slide Title: Science.gov

Speaker notes:

Science.gov is an interagency initiative providing a gateway to U.S. government science information. As a federated search interface, Science.gov offers free access to R&D results, as well as scientific and technical information (STI) from a long list of federal agencies. This includes journal articles, technical reports, conference papers, videos, audio files, images, and other multimedia, scientific and technical data sets and collections.

Science.gov has also added a directed search for federally-funded COVID-19 research.

All U.S. research outputs – report, dataset, software code, etc. – are tied to research projects. Let us take a quick look at the U.S. DOT research project database.

[Next slide]

[Slide text not presented orally:

Science.gov URL: <https://www.science.gov/>

List of all agencies that are part of Science.gov alliance:

- Department of Agriculture (USDA, Forest Service)
- Department of Commerce (NTIS, NIST)
- Department of Defense
- Department of Education
- Department of Energy
- Department of Health and Human Services (NIH)
- Department of Homeland Security
- Department of Transportation
- Environmental Protection Agency
- Government Publishing Office
- National Aeronautics and Space Administration
- National Science Foundation

Click here for the Science.gov COVID-19 search results:

[https://www.science.gov/scigov/desktop/en/service/link/runSearch/fullRecord:
%22Coronavirus%22%20OR%20%222019-
nCoV%22%20OR%20%222019nCoV%22%20OR%20%22COVID-
19%22%20OR%20%22SARS-CoV-2%22](https://www.science.gov/scigov/desktop/en/service/link/runSearch/fullRecord:%22Coronavirus%22%20OR%20%222019-nCoV%22%20OR%20%222019nCoV%22%20OR%20%22COVID-19%22%20OR%20%22SARS-CoV-2%22)

Detailed background:

Science.gov is an interagency initiative providing a gateway to U.S. government science information. As a federated search interface, Science.gov offers free access to R&D results, as well as scientific and technical information from a long list of federal agencies. This includes journal articles, technical reports, conference papers, videos, audio files, images, and other multimedia, scientific and technical data sets and collections.

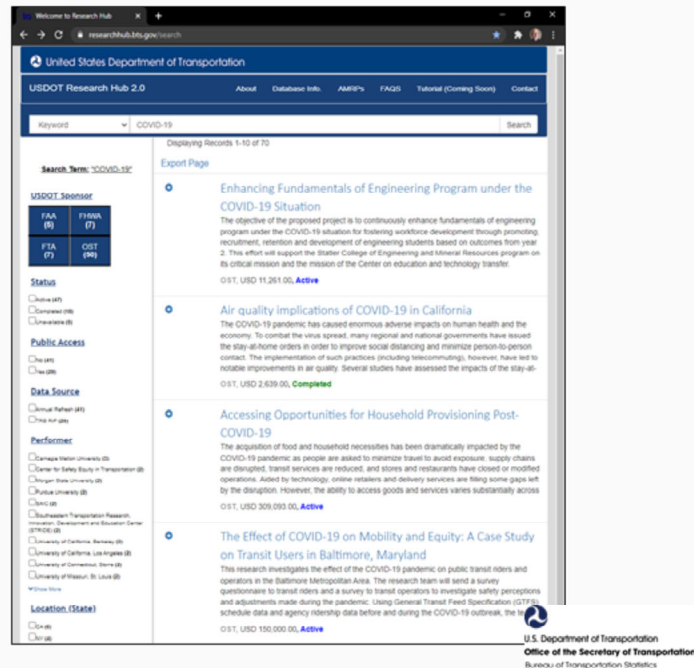
Science.gov has also added a directed search for federally-funded COVID-19 research.

Most U.S. research outputs – reports, datasets, software code, etc. – are tied to research projects. Let us take a quick look at the U.S. DOT research project database.

U.S. DOT Research Hub

Research Hub is a publicly accessible database of USDOT-sponsored research, development, and technology project records.

<https://researchhub.bts.gov/search>



Slide Title: Research Hub

Speaker notes:

Another tool in the US DOT Open Science toolbox is Research Hub.

The USDOT Research Hub is a publicly accessible database of USDOT-sponsored research, development, and technology project records. The database acts as a central repository for information on active and recently completed projects from USDOT's Operating Administrations, providing a comprehensive account of the Department's research portfolio at the project level.

A quick search of Research Hub shows a number of active COVID-19 related projects, and at least 1 that is already completed.

For the very latest on COVID-19 impacts on transportation, however, we should turn to the Bureau of Transportation Statistics.

[Next slide]

[Slide Text of slide not presented orally:

Research Hub is a publicly accessible database of USDOT-sponsored research, development, and technology project records.

<https://researchhub.bts.gov/search>]

ITS JPO CodeHub

ITS CodeHub promotes a reuse-first mentality and aims to support the discovery of open source code by putting it directly into the hands of developers to customize, transform, expand, and improve, as trends evolve and needs change

<https://its.dot.gov/code/>



Purpose
Empower innovation through code reuse, collaboration, and continuous improvement in the open

Capabilities

- Discover projects and modules
- Evaluate code health for reuse
- Connect to developers and other re-users
- Analyze development trends

Community
Grassroots, collaborative development of open-source ITS software



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Slide Title: ITS JPO CodeHub

Speaker notes:

Of course, an important aspect of Open Science is also the sharing and opening of computer and software code. To that end the U.S. Department of Transportation (U.S. DOT) Intelligent Transportation Systems (ITS) Joint Program Office's (JPO) launched CodeHub for its intelligent transportation systems projects.

ITS CodeHub is the source code management system. It is a resource for the ITS community to discover open source code, software, and more.

ITS CodeHub promotes a reuse-first mentality and aims to support the discovery of open source code by putting it directly into the hands of developers to customize, transform, expand, and improve, as trends evolve and needs change.

This approach has the benefits of lowering costs, increasing interoperability and transparency, and accelerating the path to high-quality software deployment—collectively advancing our nation's transportation system.

The Purpose

Empower innovation through code reuse, collaboration, and continuous improvement in the open...

ITS CodeHub's primary objectives are to:

- Source open source code.
- Encourage code reuse.
- Foster open-source development.

The Capabilities

More than just a catalogue of software development projects...

ITS CodeHub goes beyond cataloging U.S. DOT-funded software development projects. ITS CodeHub offers the transportation community the following capabilities:

- Discover projects and modules already built within the U.S. DOT and across the open-source community.
- Evaluate code health, statistics, dependencies, and compatibility to reuse in projects.
- Connect to developers and others who have reused and extended code.
- Analyze development trends and statistics to understand evolving software development needs.

The Community

The community plays a pivotal role in the development of open-source products—from discovery, to quality assurance, to coding and development, to adoption and integration.

ITS CodeHub fosters a community for the grassroots, collaborative development of open-source ITS software among the U.S. DOT, state and local agencies, researchers, and companies.

Contact Information

For more information about the ITS CodeHub, please contact the ITS JPO Data Program support team at: data.itsjpo@dot.gov.

It is hoped that by the end of 2021, CodeHub will expand to be a service available to all DOT offices and their funded researchers.

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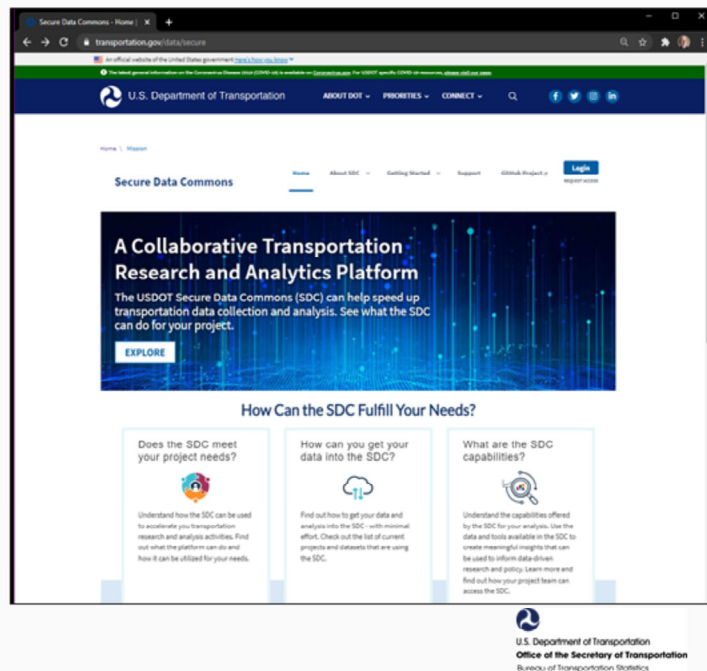
and needs change

<https://its.dot.gov/code/>]

U.S. DOT Secure Data Commons

The USDOT Secure Data Commons (SDC) can help speed up transportation data collection and analysis.

<https://www.transportation.gov/data/secure>



Slide Title: U.S. DOT Secure Data Commons

Speaker notes:

While we are moving to make our research and other data open, we also must be aware of the needs to protect privacy, provide security, and behave ethically. To help protect sensitive data, but also allowing for its analysis, the ITS JPO developed the Secure Data Commons (SDC). SDC has now become a DOT-wide shared service.

The Secure Data Commons (SDC) is a cloud-based analytics platform that enables traffic engineers, researchers, and data scientists to access transportation-related datasets. The U.S. Department of Transportation (USDOT) created the SDC to provide a secure platform for sharing and collaborating on research, tools, algorithms, and analysis involving moderate sensitivity level (PII & CBI) datasets using commercially available tools, without needing to install tools or software locally.

The SDC offers a common platform for innovative data analysis and sharing of results that cuts across the Department's data silos.

[Next slide]

[Slide text not presented orally:

The USDOT Secure Data Commons (SDC) can help speed up transportation data collection and analysis.

<https://www.transportation.gov/data/secure>

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NCHRP 936: A Guide to Ensure Access to the Results of Federally Funded Transportation Research

- Report Link:
 - <http://www.trb.org/main/blurbs/180230.aspx>
 - Project NCHRP 20-110:
 - <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4062>
 - Designed to help DOT-funded researchers improve data management and data sharing
 - Already a little out of date because of things like Federal Data Strategy that came about while report in publication limbo
 - National Transportation Library planning series of video trainings

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Slide Title: NCHRP Report 936

Speaker notes:

The National Transportation Library staff has been leading U.S. DOT efforts to affect transportation research culture change towards public access and open science since 2014. We do this by offering training, creating guidelines, and consulting on the creation of new resources.

One example is NCHRP Report 936.

In late January, the Transportation Research Board (TRB) published the pre-print version of National Cooperative Highway Research Program (NCHRP) Report 936: A Guide to Ensure Access to the Results of Federally Funded Transportation Research.

I was one of the original authors of the research needs statement in 2014, and I and other NTL staff served on the research project panel, and helped to review and edit the report as it became finalized.

You can access the Report at <http://www.trb.org/Main/Blurbs/180230.aspx>

- This report is the final output of NCHRP Project NCHRP 20-110:
 - <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4062>

- The Guide is designed to help DOT-funded researchers improve data management and data sharing
- The Guide, which experienced some publication delays, is already a little out of date because of things like Federal Data Strategy that came about while report in publication limbo
- The National Transportation Library planning series of video trainings

Once we get DOT-funded researchers all managing their data well, the next questions is where to preserve and share that data.

Links to resources

United States. Government Publishing Office (GPO). (2021). Washington, D.C. <https://www.gpo.gov/>

United States. Government Publishing Office (GPO). (2021). *GPO Style Manual*. Washington, D.C. <https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf>

United States. National Technical Information Service (NTIS). (2021). Washington, D.C. <https://www.ntis.gov/>

United States. National Technical Information Service (NTIS). (2021). *National Technical Reports Library (NTRL)*. Washington, D.C. <https://ntrl.ntis.gov/NTRL/>

United State. Department of Transportation. Federal Highway Administration. (1976). *Freeway Data for Incident and Nonincident Conditions – Vol. 1: Traffic Data Sets from Widely Spaced Detectors*. Washington, D.C. <https://doi.org/10.21949/1520658>

United State. Department of Transportation. Federal Highway Administration. (1977). *Freeway Data for Incident and Nonincident Conditions – Vol. 2: Traffic Data Sets from Closely Spaced Detectors*. Washington, D.C. <https://doi.org/10.21949/1520659>

United State. Department of Transportation. Federal Highway Administration. (1977). *Freeway Data for Incident and Nonincident Conditions – Vol. 3: FORTRAN Program Documentation for Analyzing Individual Data Sets*. Washington, D.C. <https://doi.org/10.21949/1520660>



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Slide Title: Links to resources

Slide text:

United States. Government Publishing Office (GPO). (2021). Washington, D.C. <https://www.gpo.gov/>

United States. Government Publishing Office (GPO). (2021). *GPO Style Manual*. Washington, D.C. <https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf>

United States. National Technical Information Service (NTIS). (2021). Washington, D.C. <https://www.ntis.gov/>

United States. National Technical Information Service (NTIS). (2021). *National Technical Reports Library (NTRL)*. Washington, D.C. <https://ntrl.ntis.gov/NTRL/>

United State. Department of Transportation. Federal Highway Administration. (1976). *Freeway Data for Incident and Nonincident Conditions – Vol. 1: Traffic Data Sets from Widely Spaced Detectors*. Washington, D.C. <https://doi.org/10.21949/1520658>

United State. Department of Transportation. Federal Highway Administration. (1977). *Freeway Data for Incident and Nonincident Conditions – Vol. 2: Traffic Data Sets from Closely Spaced Detectors*. Washington, D.C. <https://doi.org/10.21949/1520659>

United State. Department of Transportation. Federal Highway Administration. (1977). *Freeway Data for Incident and Nonincident Conditions – Vol. 3: FORTRAN Program Documentation for Analyzing Individual Data Sets*. Washington, D.C. <https://doi.org/10.21949/1520660>

Links to resources (continued)

United States. Office of Management and Budget (OMB). (2005). Memo M-06-02, "Improving Public Access to and Dissemination of Government Information and Using the Federal Enterprise Architecture Data Reference Model."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2006/m06-02.pdf>

United States. White House. (2009). "Transparency and Open Government." [Memorandum].

<https://obamawhitehouse.archives.gov/the-press-office/transparency-and-open-government>

United States. Office of Management and Budget (OMB). (2009) Memo M-10-06, "Open Government Directive."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2010/m10-06.pdf>

United States. White House. Office of Science and Technology Policy (OSTP). (2013). "Increasing Access to the Results of Federally Funded Scientific Research." [Memorandum.]

https://web.archive.org/web/20130308142014/https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf

United States. Office of Management and Budget (OMB). (2013). Memo M-13-13, "Open Data Policy – Managing Information as an Asset."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2013/m-13-13.pdf>

United States. White House. (2013). Executive Order 13642, "Making Open and Machine Readable the New Default for Government Information."

<https://www.govinfo.gov/content/pkg/FR-2013-05-14/pdf/2013-11533.pdf>



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Slide text:

United States. Office of Management and Budget (OMB). (2005). Memo M-06-02, "Improving Public Access to and Dissemination of Government Information and Using the Federal Enterprise Architecture Data Reference Model."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2006/m06-02.pdf>

United States. White House. (2009). "Transparency and Open Government."

[Memorandum]. <https://obamawhitehouse.archives.gov/the-press-office/transparency-and-open-government>

United States. Office of Management and Budget (OMB). (2009) Memo M-10-06, "Open Government Directive."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2010/m10-06.pdf>

United States. White House. Office of Science and Technology Policy (OSTP).

(2013). "Increasing Access to the Results of Federally Funded Scientific Research." [Memorandum.]

https://web.archive.org/web/20130308142014/https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf

United States. Office of Management and Budget (OMB). (2013). Memo M-13-13, "Open Data Policy – Managing Information as an Asset."

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2013/m-13-13.pdf>

13.pdf

United States. White House. (2013). Executive Order 13642, "Making Open and Machine Readable the New Default for Government Information."

<https://www.govinfo.gov/content/pkg/FR-2013-05-14/pdf/2013-11533.pdf>

Links to resources (continued)

United States. House of Representatives. (2017). H.R. 4174, "Foundations for Evidence-Based Policymaking Act of 2018." <https://www.congress.gov/bill/115th-congress/house-bill/4174>

United States. Senate. (2017). S.760 - "Open, Public, Electronic, and Necessary Government Data Act." <https://www.congress.gov/bill/115th-congress/senate-bill/760/text>

United States. (2019). Public Law No. 115-435 "Foundations for Evidence-Based Policymaking Act of 2018." <https://www.congress.gov/115/plaws/publ435/PLAW-115publ435.pdf>

United States. National Science and Technology Council. Interagency Working Group on Digital Data. (2009). *Harnessing the Power of Digital Data for Science and Society*. Washington, D.C. <https://www.nitrd.gov/Publications/PublicationDetail.aspx?pubid=25>

White House. Office of Science and Technology Policy (OSTP). (2020). <https://www.whitehouse.gov/ostp/>

United States. Department of Transportation. (2015). "Plan to Increase Public Access to the Results of Federally-Funded Scientific Research." <https://doi.org/10.21949/1520559>

United States. General Services Administration. Technology Transformation Services. (2021). "Data.gov." <https://www.data.gov/>

United States. General Services Administration. Technology Transformation Services. (2021). "Department of Transportation Data Catalog." <https://catalog.data.gov/organization/dot-gov>

United States. Department of Transportation. (2021). "Data.transportation.gov." <https://data.transportation.gov>



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Slide Title: Links to resources

Slide text:

United States. House of Representatives. (2017). H.R. 4174, "Foundations for Evidence-Based Policymaking Act of 2018." <https://www.congress.gov/bill/115th-congress/house-bill/4174>

United States. Senate. (2017). S.760 - "Open, Public, Electronic, and Necessary Government Data Act." <https://www.congress.gov/bill/115th-congress/senate-bill/760/text>

United States. (2019). Public Law No. 115-435 "Foundations for Evidence-Based Policymaking Act of 2018." <https://www.congress.gov/115/plaws/publ435/PLAW-115publ435.pdf>

United States. National Science and Technology Council. Interagency Working Group on Digital Data. (2009). *Harnessing the Power of Digital Data for Science and Society*. Washington, D.C.

<https://www.nitrd.gov/Publications/PublicationDetail.aspx?pubid=25>

White House. Office of Science and Technology Policy (OSTP). (2020). <https://www.whitehouse.gov/ostp/>

United States. Department of Transportation. (2015). "Plan to Increase Public Access to the Results of Federally-Funded Scientific Research." <https://doi.org/10.21949/1520559>

United States. General Services Administration. Technology Transformation Services. (2021). "Data.gov." <https://www.data.gov/>

United States. General Services Administration. Technology Transformation Services.
(2021). "Department of Transportation Data Catalog."

<https://catalog.data.gov/organization/dot-gov>

United States. Department of Transportation. (2021). "Data.transportation.gov."

<https://data.transportation.gov>

Links to resources (continued)

United States. Department of Transportation. Bureau of Transportation Statistics. National Transportation Library. (2021). "Repository & Open Science Access Portal (ROSA P)." <https://doi.org/10.21949/1398953>

United States. Department of Energy. Office of Scientific and Technical Information. (2021). "Science.gov." <https://www.science.gov/>

United States. Department of Transportation. Office of the Assistant Secretary for Research and Technology. (2021). "Research Hub." <https://researchhub.bts.gov/search>

United States. Department of Transportation. Bureau of Transportation Statistics. (2021). "COVID-19 Related Transportation Statistics." <https://www.bts.dot.gov/covid-19>

United States. General Services Administration. Technology Transformation Services. (2021). "resources.data.gov." <https://resources.data.gov/>

United States. Department of Health and Human Services. National Institutes of Health. (2020). "The National Library of Medicine expands access to coronavirus literature through PubMed Central."

<https://www.nih.gov/news-events/news-releases/national-library-medicine-expands-access-coronavirus-literature-through-pubmed-central>



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Slide text:

United States. Department of Transportation. Bureau of Transportation Statistics. National Transportation Library. (2021). "Repository & Open Science Access Portal (ROSA P)." <https://doi.org/10.21949/1398953>

United States. Department of Energy. Office of Scientific and Technical Information. (2021). "Science.gov." <https://www.science.gov/>

United States. Department of Transportation. Office of the Assistant Secretary for Research and Technology. (2021). "Research Hub."

<https://researchhub.bts.gov/search>

United States. Department of Transportation. Bureau of Transportation Statistics. (2021). "COVID-19 Related Transportation Statistics." <https://www.bts.dot.gov/covid-19>

United States. General Services Administration. Technology Transformation Services. (2021). "resources.data.gov." <https://resources.data.gov/>

United States. Department of Health and Human Services. National Institutes of Health. (2020). "The National Library of Medicine expands access to coronavirus literature through PubMed Central." <https://www.nih.gov/news-events/news-releases/national-library-medicine-expands-access-coronavirus-literature-through-pubmed-central>