

The NIST Research Data Framework and Data Democratization

Julia Lane, NYU and RTI
And many colleagues

Overview

Context

Challenges

Opportunities

Practical Next Steps

RDAF

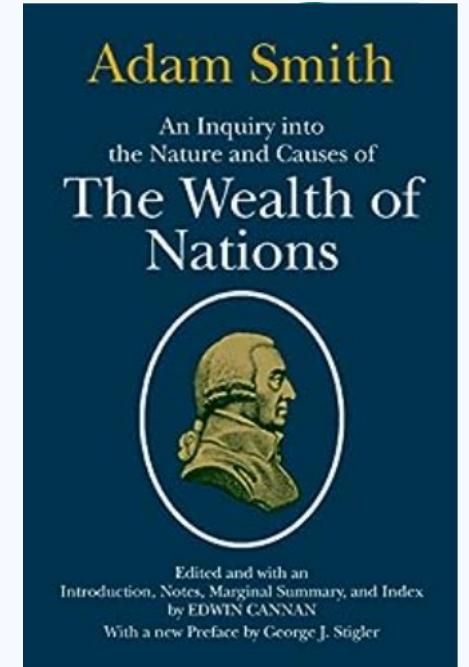
The NIST Research Data Framework (RDaF) is a multifaceted and customizable tool that aims to help shape the future of open data access and research data management (RDM). The RDaF will allow organizations and individual researchers to customize an RDM strategy.

Some thoughts

Research data is largely a public good

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." ~ Adam Smith

“There are two units of academic currency: publications and grants” ~Dan Hamermesh



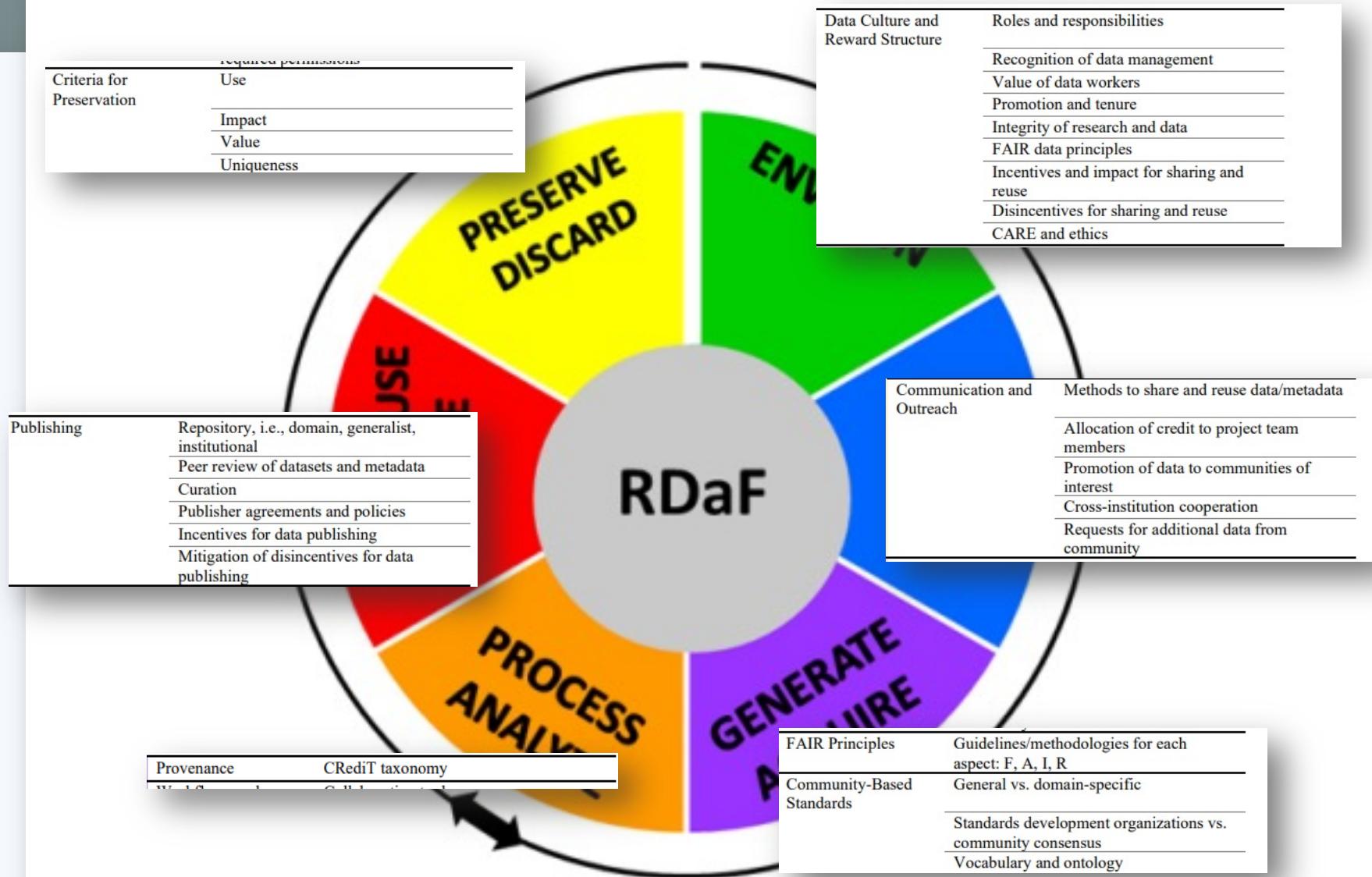


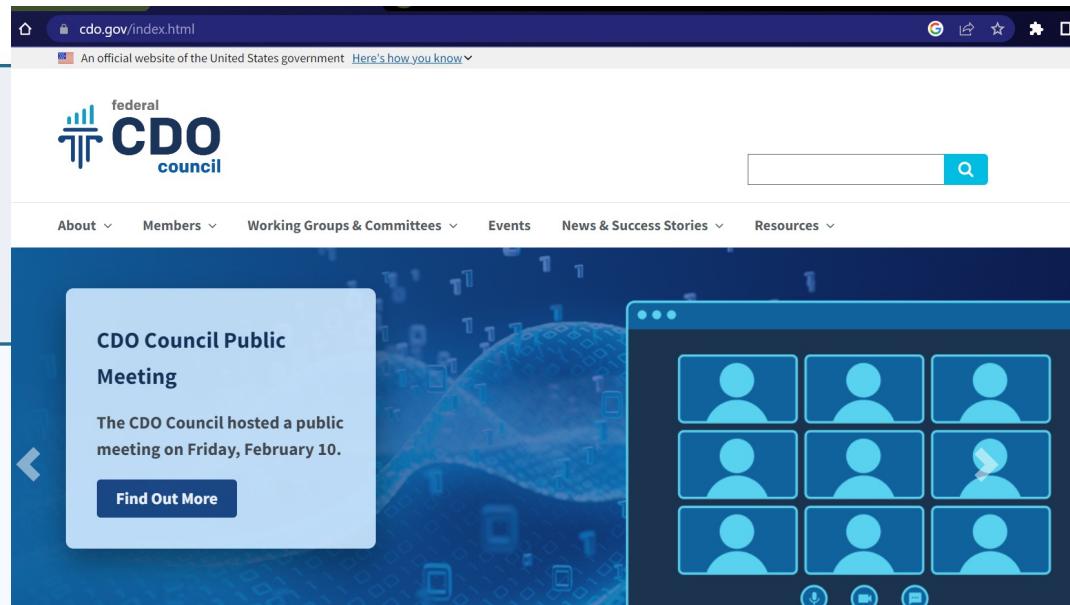
Fig. 2. Research Data Framework Lifecycle Stages

Incentives

Agencies
Researchers
Publishers
Institutions

SJVN: Of course, there's nothing new about answering programming questions. In a way, Stack Overflow is a direct descendant of Usenet group FAQs such as those on [comp.lang.c](#), which began in the 1980s. Since then, there have been other efforts to answer developer questions. But, you are so much more successful than anyone else. How did you do it?

PC: It's all thanks to the brilliance of our founders, Joel Spolsky, and Jeff Atwood, who created fast, automatic social management tools in 2008. They also brought together a community, and that's where they were really brilliant.



1. Basic Usage Information

How much are agency datasets used in research and how has that usage changed over time?

How often is each one of an agency's identified dataset used in research and how has that usage changed over time?

2. The Agency's Portfolio

What topics are an agency's datasets being used to study and what publications are associated with each topic?

What topics is each one of an agency's identified dataset used to study in research and what publications are associated with each topic?

What other datasets are being used to study each topic?

3. Drilling Into the Details for Each Dataset

Who are the main authors using each agency's datasets? Who are the main authors using each specific dataset?

What are the publications associated with each author?

What institutions are the centers of use for each agency dataset and in what geographic locations are the institutions located?

Overview

Context

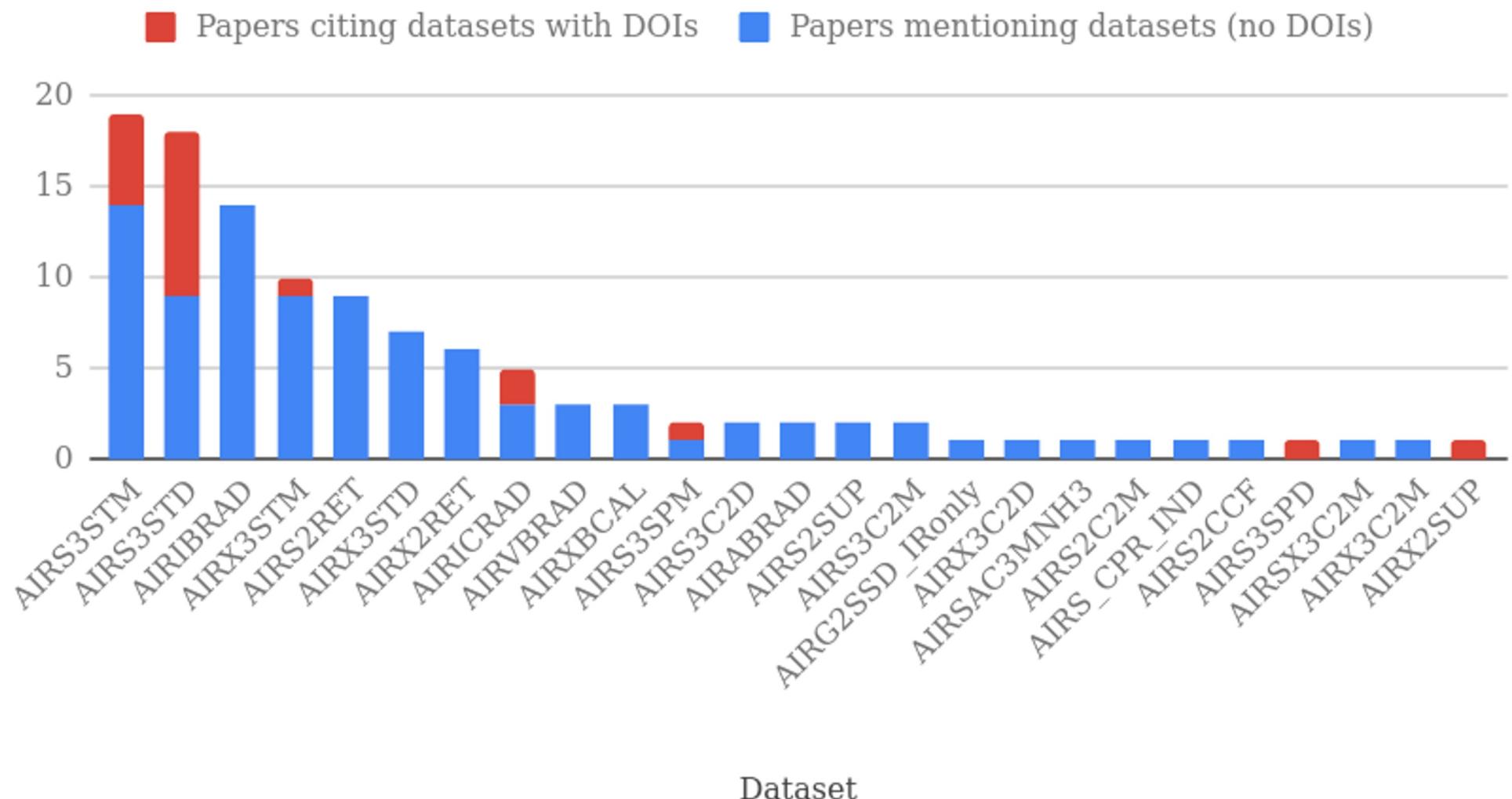
Challenges

Opportunities

Practical Next Steps

How do you get there from here?

2020 Publications using AIRS datasets



100 publications:

- 18 with dataset DOI citations
- 82 manually reviewed
- 10-15 minutes for paper review
- ~14 hours total review time

Or from here?

Research Policy 48 (2019) 1487–1492

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

3. Filling data gaps

Federal funding of doctoral recipients: What have we learned?

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ARTICLE INFO

JEL classification:
O30
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C8
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Keywords:
UMETRICS
Linked survey transaction data
Doctoral workforce
Survey of earned doctorates
Research impact

ABSTRACT

This technical note describes how the richness and funding channels can be used to improve the university payroll and financial reporting system. It also provides important US survey data on funding and the doctoral disciplines and by different funding sources. The program evolved to be led by universities (and called UMETRICS). It became institutionalized at the Institute for Research on Innovation and Science (IRIS) at the University of Michigan (Lane et al., 2014). It also included information that permitted linkages to Census data, ProQuest dissertations, US Patents, PubMed, and public information on the Internet.

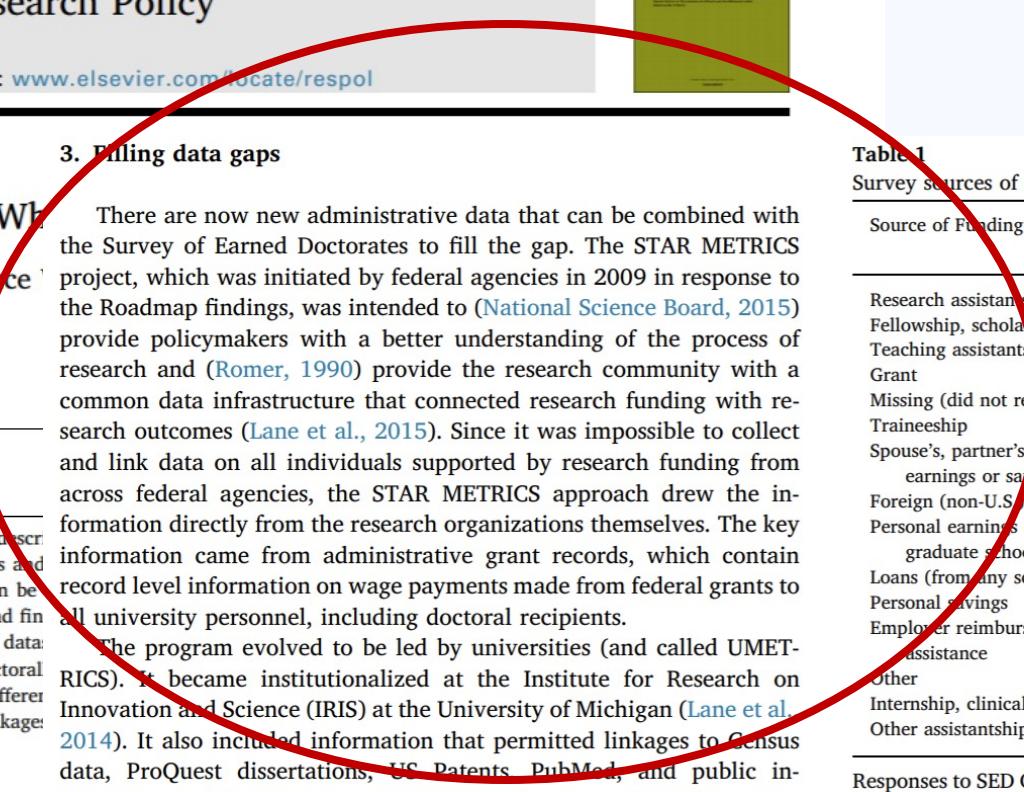


Table 1
Survey sources of federal funding.

Source of Funding	SED ¹	SED-UMETRICS ²	Federal SED-UMETRICS ³
Research assistantship	6117	4006	3410
Fellowship, scholarship	5703	3036	2522
Teaching assistantship	4745	2613	2166
Grant	2534	1494	1239
Missing (did not respond)	2584	1084	852
Traineeship	2054	882	689
Spouse's, partner's, or family's earnings or savings	1712	663	501
Foreign (non-U.S.)	1568	541	399
Personal earnings during graduate school	338	270	231
Loans (from any source)	391	200	164
Personal savings	550	177	135
Employer reimbursement/assistance	356	163	132
Other	375	117	81
Internship, clinical residency	680	341	268
Other assistantship	5	2	1

Responses to SED Question A5: Which of the following were sources of financial

Failure to align incentives has predictable results

Beginning in the Obama Administration, Agencies have been making datasets available for public use via Data. Gov. The Trump Administration augmented this by prioritizing data sets for AI R&D and those that support healthcare initiatives.

This has grown from a few datasets contributed by each Agency to today's status with over 300,000 datasets that are available in multiple formats, searchable, and tagged with industry protocols.

But just being available, does not mean that the data is "of value"

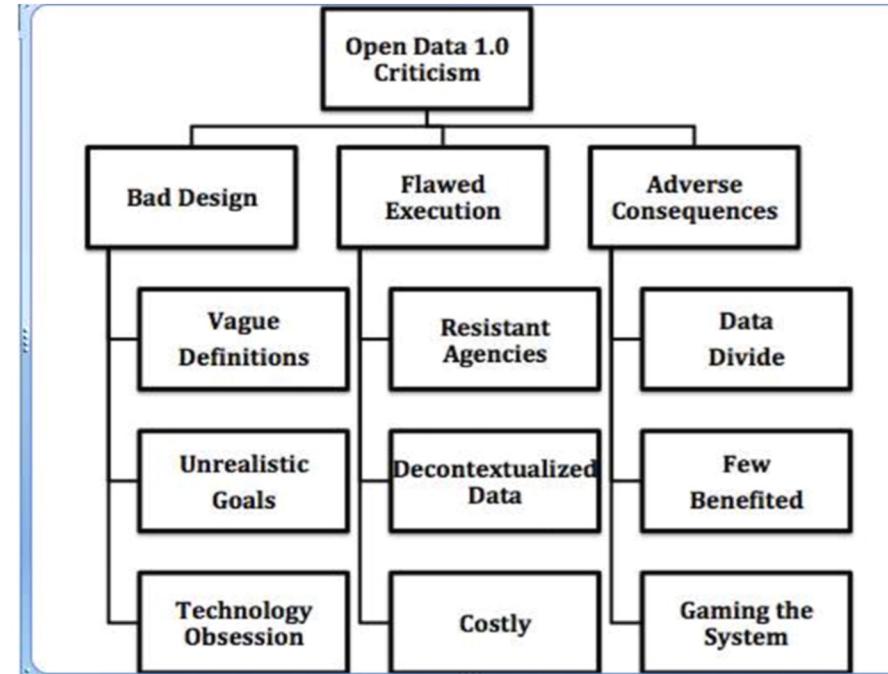


Figure 1: Open Data 1.0 Criticism

Peled, Alon. "Re-designing open data 2.0." *Conference for E-Democracy and Open Government*. 2013.

Opportunities: Evidence Act

Congress's intent for prioritizing evidence building is woven throughout the Evidence Act, including the following:

- The Evidence Act's Title I requires multi-year learning agendas, or evidence-building plans. In addition, Title I includes requirements for analyzing the capacity of federal agencies to engage in evidence-building activities. Agency "capacity assessments" assess agency capacity to support the development and use of evaluation.
- Title II, or the OPEN Government Data Act, establishes that the default for government data is open availability unless otherwise prohibited by law and requires agencies to publish data inventories. Notably, this requirement applies broadly to government data assets to support transparency and has implications and foundational benefits for evidence building across government.

- Title III, or the Confidential Information Protection and Statistical Efficiency Act of 2018 (CIPSEA), requires federal agencies to make data accessible to federal statistical agencies within a strong privacy framework and for those statistical agencies to ensure secure access to confidential data assets and to create a Standard Application Process (SAP).

Assist the public in expanding the use of public data assets

An Act

To amend titles 5 and 44, United States Code, to require Federal evaluation activities to improve Federal data management, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

SHORT TITLE.—This Act may be cited as the “Foundations for Evidence-Based Policymaking Act of 2018”.

TABLE OF CONTENTS.—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.

TITLE I—FEDERAL EVIDENCE-BUILDING ACTIVITIES

Sec. 101. Federal evidence-building activities.

TITLE II—OPEN GOVERNMENT DATA ACT

Sec. 201. Short title.

Sec. 202. OPEN Government data.

is Important
al Agencies?

2 – OPEN Government Data Act:

n with non-Government entities (including
ers, and the public for the purpose of
data users value and use government data

using public data assets of the agency and
on by publishing on the website of the
basis (not less than annually), information
assets by non-Government users



Opportunities: NAIRR

research community.

The NAIRR must be broadly accessible to a range of users and provide a platform that can be used for educational and community-building activities in order to lower the barriers to participation in the AI research ecosystem and increase the diversity of AI researchers. The NAIRR access portal and public website should provide catalogs and search and discovery tools to facilitate access to data, testbeds, and educational and training resources serving a range of experience levels.

Access Portal and User Interface

The Operating Entity is responsible for development of an NAIRR user portal that supports key user functionalities such as single sign-on, team allocations, data search and discovery, collaboration tools, resource discovery, job submission, consolidated accounting, spend alerts, information about data use, and cost-optimization of workflows. The portal will be one way to access NAIRR resources. Alternate access methods such as secure shell or scripting interfaces should also be made available for advanced users. The portal will allow users to select their AI applications, computational resources, and data sources from a curated catalog, and to launch and monitor jobs from a portal that provides a uniform, integrated view.

monitor jobs from a portal that provides a uniform, integrated view.

The portal should have built-in help functions and an integrated help desk ticketing system. The portal should maintain an up-to-date catalog of resource provider user documentation and training materials. Chat functions, meeting rooms, forums, and other functionality may be included to support collaboration and community building among students, researchers, resource providers, and other users. The portal should also enable data search and discovery and leverage automated technologies so that (1) metrics on data use can drive data acquisition and (2) diverse, community-driven data curation, linkage, and validation activities can be fostered. A user account would be required to manage computational allocations, monitor usage, submit jobs, and post to the community forum.

Strengthening and Democratizing the U.S. Artificial Intelligence Innovation Ecosystem

*An Implementation Plan for a
National Artificial Intelligence Research Resource*



January 2023

Opportunities: CHIPS and Science



National Center for Science
and Engineering Statistics

About

Areas of Interest

Surveys & Analysis

Explore Data

Co

The National Secure Data Service
Demonstration Project

Authorizing Legislation

Oversight and Partnerships

Privacy and Confidentiality

The NSDS-D Project and
America's Data Hub

Demonstration Projects

The National Secure Data Service Demonstration Project



The National Secure Data Service Demonstration (NSDS-D) project is required under the 2022 CHIPS and Science Act to inform a governmentwide effort on strengthening data linkage and data access infrastructure. This effort facilitates statistical activities in support of increased evidence building for the American public. The goal of the NSDS-D project is to inform efforts for developing a shared services model that would streamline and innovate data sharing and linking to enable decision-making at all levels of government and in all sectors.

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Researchers

Evidence Act
-Statute
-Recommendations
Common Goals
Combined Approach

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3. Filling data gaps

Federal funding of doctoral recipients: What have we learned?

Wan-Ying Chang^a, Wei Cheng^b, Julia Lane^{c,*}, Bruce J. Weintraub^d

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ABSTRACT

This technical note describes the richness and funding channels can be used to improve the university payroll and financial information. The paper also discusses the importance of US survey data funding and the doctoral disciplines and by different incorporate more linkage.

There are now new administrative data that can be combined with the Survey of Earned Doctorates to fill the gap. The STAR METRICS project, which was initiated by federal agencies in 2009 in response to the Roadmap findings, was intended to (National Science Board, 2015) provide policymakers with a better understanding of the process of research and (Komer, 1990) provide the research community with a common data infrastructure that connected research funding with research outcomes (Lane et al., 2015). Since it was impossible to collect and link data on all individuals supported by research funding from across federal agencies, the STAR METRICS approach drew the information directly from the research organizations themselves. The key information came from administrative grant records, which contain record level information on wage payments made from federal grants to all university personnel, including doctoral recipients.

The program evolved to be led by universities (and called UMETRICS). It became institutionalized at the Institute for Research on Innovation and Science (IRIS) at the University of Michigan (Lane et al., 2014). It also included information that permitted linkages to Census data, ProQuest dissertations, US Patents, PubMed, and public information.

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Internship, clinical residency	680	341	268
Other assistant/ship	5	2	1

Responses to SED Question A5: Which of the following were sources of financial

Dashboard

Jupyter
Notebooks

API

Agencies, Researchers, Institutions, and Publishers

[democratizingdata.ai](#)

Outreach - Google... Bundesbank DSUD... ML Highlights - De... Dashboard : Anac... 02_01_Data_Explora... Home Page - Select...

Agencies ▾ Events Our Tools ▾ Resources ▾

Democratizing Data: A Search And Discovery Platform For Public Data Assets

Show how public data are being used in science so that the government can make more transparent public investments. By using automated NLP approaches we enable government agencies and researchers to quickly find the information they need.

[Learn More About Us](#)

WHAT DOES THE PLATFORM PROVIDE

Promotes better use of data

The Democratizing Data project is inspired by the 2018 Foundations for Evidence-based Policymaking Act. Its goal is to facilitate the collaboration between federal agencies and the public for the purpose of understanding how government data assets are used. The intent is to engage the public by providing information about the usage of the assets and expanding the use of the public data assets. As an initial step in meeting that goal, the Search and Discovery Platform describes how datasets identified by federal agencies have been used in scientific research. It uses machine learning algorithms to search over 90 million documents and find how datasets are cited, in what publications, and what topics they are used to study.

USDA Webinar
Watch the video and access slides from the March 28, 2023 webinar.
[Learn More](#)

NCSES

AUTHORS 4,513 COUNTRIES 76 INSTITUTIONS 1,626

Select a Dataset to Explore Usage

Name	Publications	Citation
Science & Engineering In...	1,695	12.30
Women, Minorities, and...	1,522	11.73
Survey of Doctorate Reci...	280	2.11
Survey of Earned Doctor...	165	1.14
Science and Engineering La...	123	.82
Higher Education R&D...	78	.46
National Survey of College Gra...	91	.28
Academic...

Filter by Topic(s) Word Cloud

Co-Authorship Competence Beliefs

Intergovernmental Panel on Climate Change
Teaching Research Research Personnel Consulta
Science Communication Community Participation
Science Education Science Policy
Science Outreach Science Education
Science Policy Science Education
Science Outreach Science Education
Science Policy Science Education
Science Outreach Science Education

Filter by Year(s)

Year	Institutions	Publications	Citations
2021	1,626	17	295
2020	1,626	5	181
2019	1,626	21	173
2018	1,626	5	140
2017	1,626	6	138
2016	1,626	10	125
2015	1,626	10	118
2014	1,626	6	94

Publications by geography

© 2023 Mapbox © OpenStreetMap

1,626 Institutions DOWNLOAD SPREADSHEET

Institution Name	Publications	Citations
Michigan State University	17	295
University of Texas at Austin	5	181
University of California	21	173
Learning Research and Development Center, University of Pittsburgh	5	140
School of Information Management, Wuhan University	6	138
University of Michigan	10	125
University of Wisconsin-Madison	10	118
Department of Physics and Astronomy, University	6	94

NCSES

PUBLICATIONS 3,749 AUTHORS 10,124 JOURNALS 1,483 INSTITUTIONS 2,869

Select a Dataset to Explore Usage

Name	Publications	Citation
Science & Engineering In...	1,695	12.30
Women, Minorities, and...	1,522	11.73
Survey of Doctorate Reci...	280	2.11
Survey of Earned Doctor...	165	1.14
Science and Engineering La...	123	.82
Higher Education R&D...	78	.46
National Survey of College Gra...	91	.28
Academic...

Filter by Topic(s) Word Cloud

Publications Count per Year

Institutions Count per Year

Authors Count per Year

NCSES Dashboard: Usage At Publication Level

PUBLICATIONS 3,749 JOURNALS 1,483

Select a Dataset to Explore Usage

Name	Publications	Citation
Science & Engineering...	1,695	12.30
Women, Minorities, and...	1,522	11.73
Survey of Doctorate R...	280	2.11
Survey of Earned Doctor...	165	1.14
Science and Engineering...	123	.82
Higher Education R...	78	.46
National Survey of C...	91	.28
Academic...

Filter by Topic(s) Word Cloud

Publications

The Gender Equality Paradox in Science, Technology, Engineering, and Mathematics Education
Science audiences, misinformation, and fake news
Unusual effects of the COVID-19 pandemic on scientists
Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math
Financing innovation: Evidence from R&D grants
Individuals with greater science literacy and education have more polarized beliefs on controversial science topics
Prioritizing diversity in human genomics research
Teacher participation of STEM integration and education: a meta-analysis
Race and gender differences in how sense of belonging influences decisions to major in STEM
Researcher Perceived Bias Productive: The Impact of Interdisciplinary on Scientific Research
Scopus as a curated, high-quality bibliometric data source for

1,483 Journals DOWNLOAD SPREADSHEET

Journal	Publications	Citations
ASCE Annual Conference and Exposition, Conference Proceedings	267	264
Journal of Water Resources Planning and Management	87	478

NCSES Dashboard

Explore how NCSES data assets are used in published research.

The goal of the Democratizing Data Initiative is to enable different communities to understand how government data assets are used.

One way to build this understanding is through usage dashboards. Each dashboard on the right draws from a database that describes how NCSES data assets are referenced in research publications.

The database links mentions of NCSES data assets in research publications with the research topics of those publications, the publication authors, and their affiliated institutions.

Please note that this pilot project only reflects the information associated with the datasets requested by the agency for the project and is not intended to find all references to all datasets and data assets produced or supported by the agency.

Further exploration:

- For more information about how the database is generated, go to our website (<https://democratizingdata.ai>) or to the user guide <https://soda.umd.gitbook.io/userguide/>
- For users interested in exploring the data further, check out the APIs at the link below.
- For our community of users interested in exploring data further, please

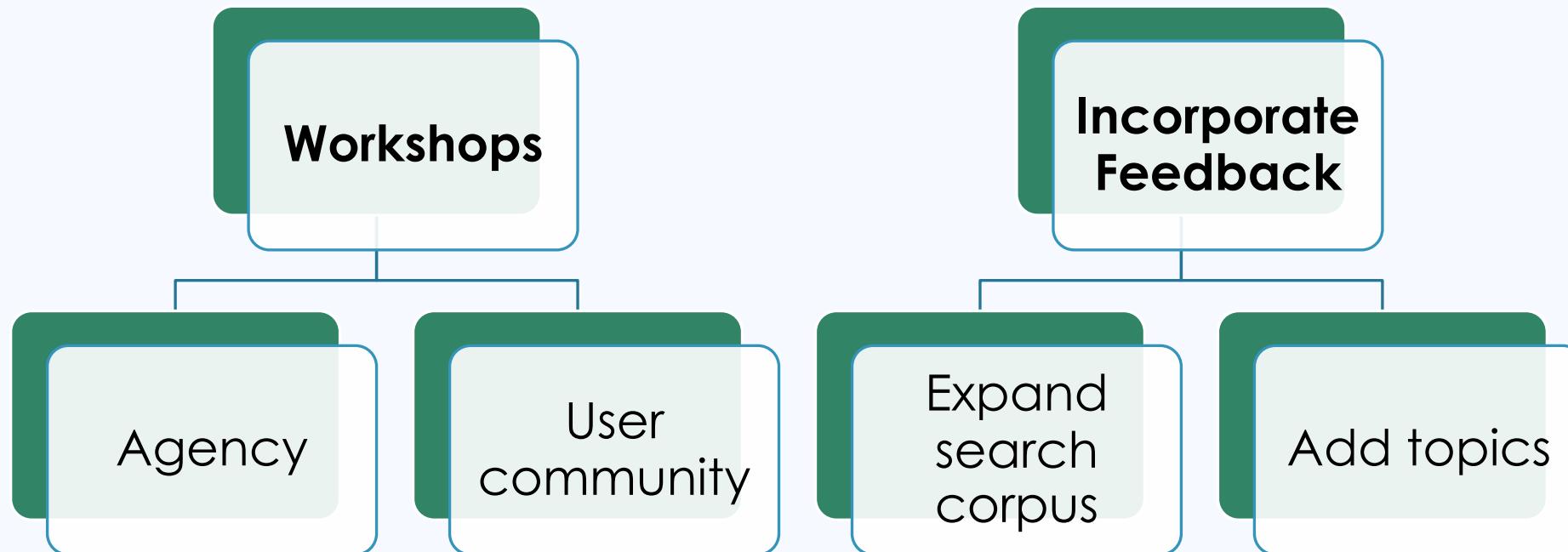
Name	Publications	Authors	Citations
Early Childhood	1,000	5,000	2,000
Computer Science	1,000	1,000	1,000
National	1,000	1,000	1,000
Mathematics	100	5,000	500
International	700	4,000	2,000
Health Literacy	100	5,000	500
Education	100	5,000	500

[View usage at publication level](#)

Name	Publications	Authors	Citations
United States	1,000	5,000	2,000
China	1,000	1,000	1,000
United Kingdom	1,000	1,000	1,000
Germany	100	5,000	500
Japan	100	5,000	500
Canada	100	5,000	500
Australia	100	5,000	500
France	100	5,000	500
South Korea	100	5,000	500
Spain	100	5,000	500
Italy	100	5,000	500
Sweden	100	5,000	500
Switzerland	100	5,000	500
Netherlands	100	5,000	500
Denmark	100	5,000	500
Austria	100	5,000	500
Hong Kong	100	5,000	500
Ireland	100	5,000	500
Portugal	100	5,000	500
Malta	100	5,000	500
Greece	100	5,000	500
Poland	100	5,000	500
Hungary	100	5,000	500
Romania	100	5,000	500
Bulgaria	100	5,000	500
Slovenia	100	5,000	500
Croatia	100	5,000	500
Serbia	100	5,000	500
Macedonia	100	5,000	500
Montenegro	100	5,000	500
Nicaragua	100	5,000	500
Costa Rica	100	5,000	500
Panama	100	5,000	500
El Salvador	100	5,000	500
Argentina	100	5,000	500
Bolivia	100	5,000	500
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Uruguay	100	5,000	500
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Paraguay	100	5,000	500
B			

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NOAA	Sea Level Rise Data		2001	2002 SLR	Acronym
NOAA	Sea Level Rise Data		2001	2003 Sea Level Rise Wetland Impacts and Mig	Alias
NOAA	Sea Level Rise Data		2001	2004 Sea Level Rise Viewer	Alias
NOAA	Global Forecast System		2005	2005 Global Forecast System	Parent
NOAA	Global Forecast System		2005	2006 GFS	Acronym
NOAA	Global Forecast System		2005	2007 GFS model	Acronym
NOAA	Global Forecast System		2005	2008 GDAS	Acronym
NOAA	Stock SMART		2009	2009 Stock SMART	Parent
NOAA	Stock SMART		2009	2010 Fish Stock Assessment	Alias
NOAA	Stock SMART		2009	2011 Fish Stock Status	Alias
NOAA	Stock SMART		2009	2012 Fish Stock Management, Assessments & Res	Alias
NOAA	Special Weather Statement		2013	2013 Special Weather Statement	Parent
NOAA	Special Weather Statement		2013	2014 Hazardous Weather Outlook	Alias
NOAA	Special Weather Statement		2013	2015 SAME event code SPS	Alias
NOAA	Special Weather Statement		2013	2016 SPS	Acronym
NOAA	Special Weather Statement		2013	2017 SPSs	Acronym
NOAA	Integrated Water Vapor Data		2018	2018 Integrated Water Vapor Data	Parent
NOAA	Integrated Water Vapor Data		2018	2019 Atmospheric River Data	Alias
NOAA	Integrated Water Vapor Data		2018	2020 IVV	Acronym

Design Incentives



Build an incentive based platform

https://www.americasdatahub.org/opportunities/



- + Creation of Synthetic Data for the Annual Doctorate Survey (ADS) and S&D Synthesis Metrics (SDSM)
- + Models for a Data Concierge Service for a National Secure Data Service (DCS)
- + Evaluation of Noise Infusion for the Survey of Doctorate Recipients (SDRN)
- + Utilizing Privacy Preserving Record Linkage to Link Data from Two Federal Statistical Agencies (PPRL1)
- + Utilizing Privacy Preserving Record Linkage with Parent Agency Data and Statistical Agency Data to Inform Programs and Policies (PPRL2)
- + Creation of Synthetic Data for the Survey of Earned Doctorates and Development and Use of Verification Metrics (SEDSyn)
- Data Usage Platform as a Federal Data Asset (DUP)

On June 20, 2023, ATI published the following Request for Solution (RFS): [Data Usage Platform as a Federal Data Asset Synopsis \(DUP\)](#).

The submission deadline for the project was July 11, 2023 3PM ET. The Government anticipates there will be one or more award for each project. Membership in ADC is not required for submission. However, if chosen, the selected organization must join ADC.

A webinar was held on June 21st at 11AM ET to review the [Data Usage Platform as a Federal Data Asset Synopsis](#) and [Development of a Prototype for the Standard Application Process \(SAP\) Portal](#) topics, RFS submission requirements, and provide the opportunity for attendees to ask questions. View the webinar and presentation in [Past Events](#).

Data Usage Platform as a Federal Data Asset

The Government is seeking a robust and sustainable framework that will enable the federal data ecosystem to better understand the uses of federal data in support of a potential, future National Secure Data Service (NSDS).

DUP RFS

ATT 1 DUP TOPIC

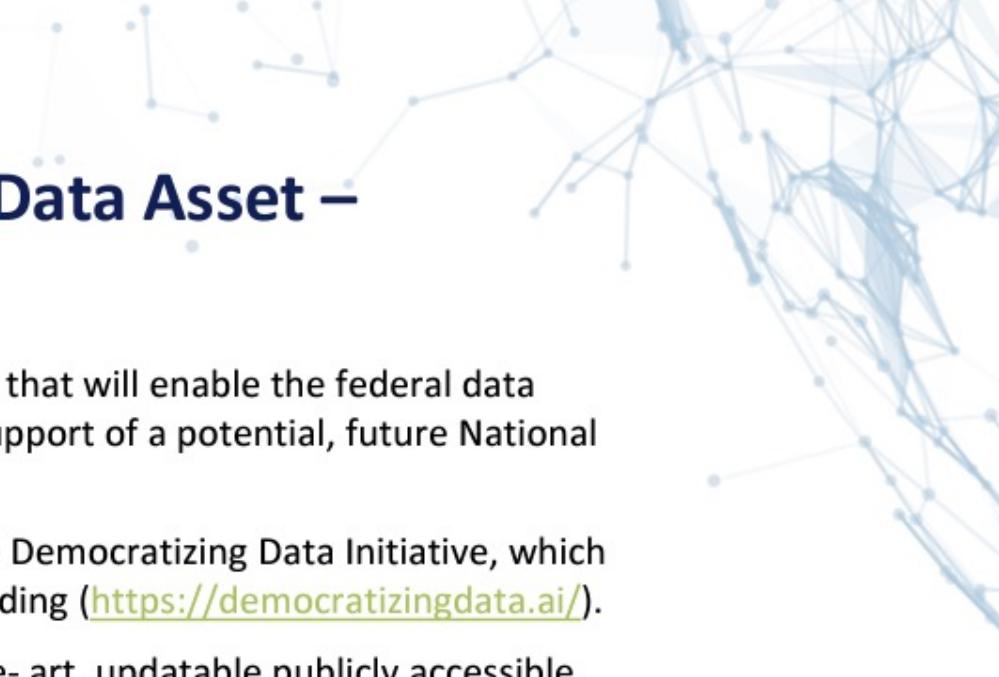
ATT 2 WHITEPAPER FORMAT

ATT 3 FULL PROPOSAL FORMAT

BASE AGREEMENT

FAQs

- + Development of a Prototype for the Standard Application Process Portal (SAP)
- + Expanding Equitable Access to Restricted-Use Data through Federal Statistical Research Data Centers (FSRDC)



Data Usage Platform as a Federal Data Asset – Objective

To research and develop a robust and sustainable framework that will enable the federal data ecosystem to better understand the uses of federal data in support of a potential, future National Secure Data Service (NSDS).

Related work includes the dashboard prototype efforts of the Democratizing Data Initiative, which promotes the use of federal data and assets for evidence building (<https://democratizingdata.ai/>).

This project will produce possibilities for a future, state-of-the-art, updatable publicly accessible platform that provides information on federal data usage as part of the National Secure Data Service demonstration project.



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Data Usage Platform as a Federal Data Asset - Background

The Democratizing Data Initiative is a cross-agency, multidisciplinary effort to demonstrate the value of statistical data through aggregated usage statistics that are displayed on dashboards and for use in other tools.

- The Advisory Committee on Data for Evidence Building recommended the development and application of usage statistics to respond to the future needs of a National Secure Data Service (<https://www.bea.gov/system/files/2022-10/acdeb-year-2-report.pdf>).
- Building on prototype efforts, this project aims to explore alternative dashboard technologies, approaches, techniques, and methods to meet the sustainability and transparency needs of the federal statistical system and to inform the efforts of the National Secure Data Service Demonstration Project as required by the 2022 CHIPS and Science Act.

Data Usage Platform as a Federal Data Asset - Information Gaps

What is user feedback on the Democratizing Data pilot dashboards and tools? What information do users report is useful in the current dashboard and what additional information would be useful?

What open data software, data science, best practices, and other cutting-edge technologies can be used to generate aggregated usage data that meet the quality and sustainability requirements of federal agencies?

What additional types of federal data, features and functions of the dashboard or other interface are required to support evidence-building use cases for a wide variety of stakeholders, federal agencies, and consumers of federal statistics? Does this vary by sector, geographies, federal agencies, and user groups?

Do these usage statistics offer a vision for understanding the health and progress of the federal statistical system?

What are the resources required for flexibility, sustainability and scalability of the dashboard platform and related tools?

How can these usage data be leveraged in a profile to inform tiered data access needs, transparency priorities, and open data requirements for federal agencies?

How can these usage data be used as a shared service to inform public trust of official statistics, and engagement in a possible, future National Secure Data Service (NSDS)?



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Data Usage Platform as a Federal Data Asset – Project Objectives

1. Identify sustainable, state of the art, updatable solutions, tools, or frameworks to ingest, aggregate and deploy usage statistics. Approaches may include but are not limited to data science techniques and tools such as machine learning and natural language processing.
2. Identify, interview, and document use cases across sectors and subgroups to ensure usability and accessibility of usage data for collaboration, evidence building, and other purposes.
3. Identify alternative data, formats, and tools (e.g. APIs) to present and complement usage data.
4. Develop, refine, and/or enhance dashboard interface, functions, and features to encourage use across various stakeholder communities.



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Data Usage Platform as a Federal Data Asset – Project Objectives (continued)

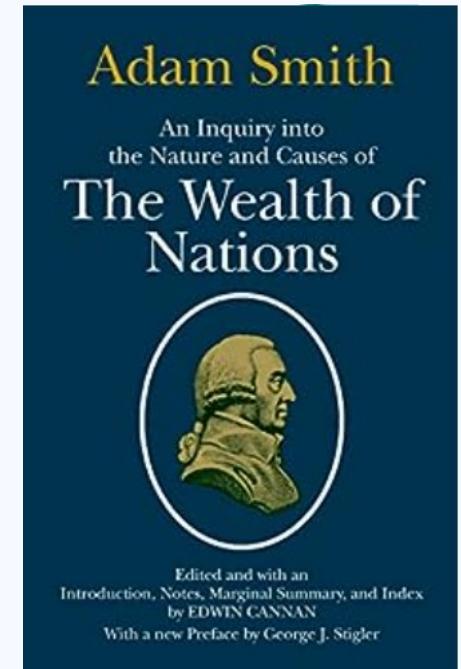
- 
- 5. Identify workflow processes and other mechanisms to ensure efficient, quality, timely and up-to-date usage data, and information.
 - 6. Implement technologies, techniques, and processes to build a prototype dashboard platform and tools using publicly available federal data and information.
 - 7. Identify approaches and best practices to implement data quality flags to communicate reliability and fitness for use of usage statistics.
 - 8. Building on findings and lessons learned, advise on the integration of the platform and tools within the federal data ecosystem and possible, future NSDS.

Some thoughts

Research data is largely a public good

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." ~ Adam Smith

“There are ~~two~~ THREE units of academic currency: publications, datasets, and grants”
~Dan Hamermesh and RDAF



Questions?

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