Data Curation & Transparent Federal Statistics

Some Suggestions

Leighton L Christiansen http://orcid.org/0000-0002-0543-4268
Data Curator, National Transportation Library,
Bureau of Transportation Statistics,
OST-R , US Department of Transportation
leighton.christiansen@dot.gov
ntldatacurator@dot.gov

Presentation to Committee on Transparency and Reproducibility of Federal Statistics for NCSES , 2019-09-09

Overview

- About BTS & NTL
- About Data Curation
- NCSES Charge Review
- Data Curation for Transparent Statistics: Suggestions
- Conclude (about lunch time)

About BTS

Founded in 1991

Preeminent source of statistics on:

- Commercial Aviation,
- Multimodal Freight Activity, and,
- Transportation Economics,

Provides context to decision makers and the public for understanding transportation statistics

BTS Director is by law the senior advisor to the Secretary of Transportation on data and statistics

About NTL

NTL is an **open access** digital repository of transportation information

All collection materials are in the **public domain,** available for reuse **without restriction**

NTL is one of five national libraries

NTL is the only national library within a Principal Federal Statistical Agency

NTL **provides access** to:

- Digital collections
- Data services
- Reference services
- Knowledge networking

NTL’s Guiding Mandates

Transportation Equity Act for the 21st Century (TEA-21) 1998

Established NTL to provide national and international access to transportation information

Moving Ahead for Progress in the 21st Century (MAP-21) 2012

Expanded NTL role as a central clearinghouse for transportation research publications and data

US DOT Public Access Plan 2016

Requires NTL **host** repository for research and datasets; **provide** searchable DMP collection, and, **assign** persistent identifiers

Foundations for Evidence-Based Policymaking Act 2018

Codifies efforts to ensure public access to federally-funded research reports and datasets

About Me

- MLIS, CAS Data Curation (UIUC) 2012
- Library Director and Data Governance Committee (Iowa DOT) 2012 – 2016
- NTL Data Curator, May 2016
  - Public Access Implementation
  - BTS Data Curation

About Data Curation: Reactive Actions

Reactive

Curation & Preservation

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

About Data Curation: Proactive 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***

Benefits of Data Curation

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

Data Curation: Definitions

- Data Management:
  - deliberate planning, creation, storage, access and preservation of data produced from a given investigation[1, 2]
- Data Curation
  - enables data discovery and retrieval, maintains data quality, adds value, and provides for re-use over time[3]
- Data Science
  - drawing useful conclusions from large and diverse data sets through exploration, prediction, and inference[4]

Linked Processes

DM is **Necessary** element of DC

Data Management ∈ Data Curation

DC **Enables** DS

Data Curation ⇒ Data Science

Data Curation Dependencies Model

Data Management ∈ Data Curation ⇒ Data Science

$\mathrm{DM} \in \mathrm{DC} \Rightarrow \mathrm{DS}$

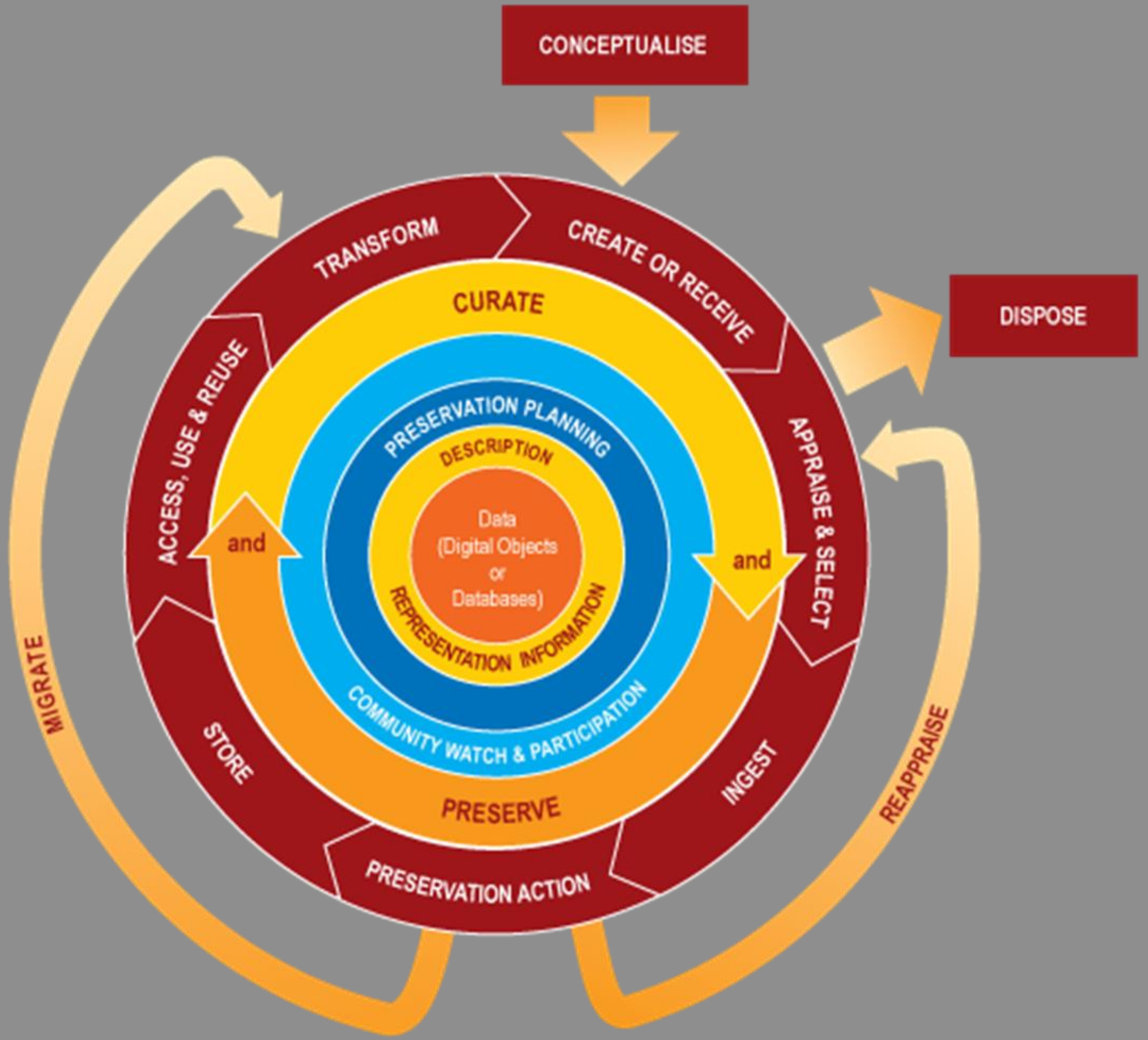
Data Curation & the Data Lifecycle

- Data Curation
  - Enables data discovery and retrieval, maintains data quality, adds value, and provides for re-use over time[3]

- Data Lifecycle
  - All the phase of data's existence from planning to collection, through preservation, to reuse and potential destruction

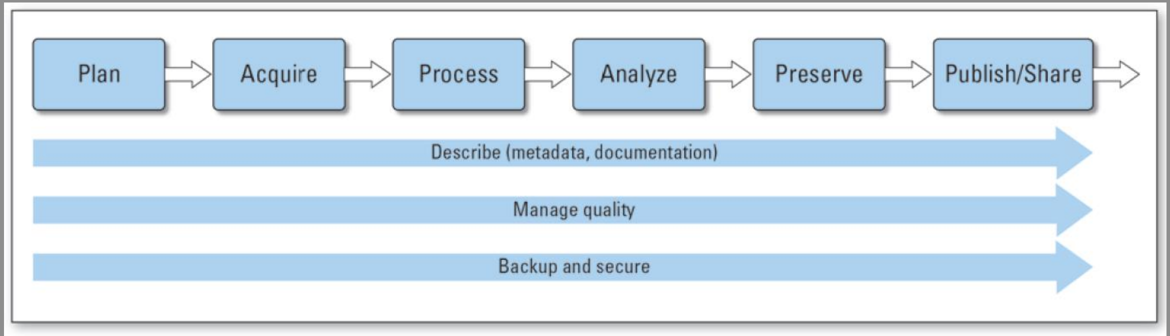
DCC Data Curation Lifecyle Model[5]

Preservation Planning near the Center



USGS Data Lifecyle Model[6]

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



NCSES Charge Review

From
Emilda B. Rivers
May 21, 2019

1. Best practices to foster transparency and reproducibility
2. Guidance, standards, and tools for documenting and archiving
3. Approaches to minimize cost
4. Feasible implementation steps – low hanging fruit

Data Curation for Transparent Statistics: Four Main Suggestions

Data Management & Sharing Plans

Make Statistics FAIR

Plan for Sharing

Embed Data Curators

Suggestion 1:
Data Management [& Sharing] Plans

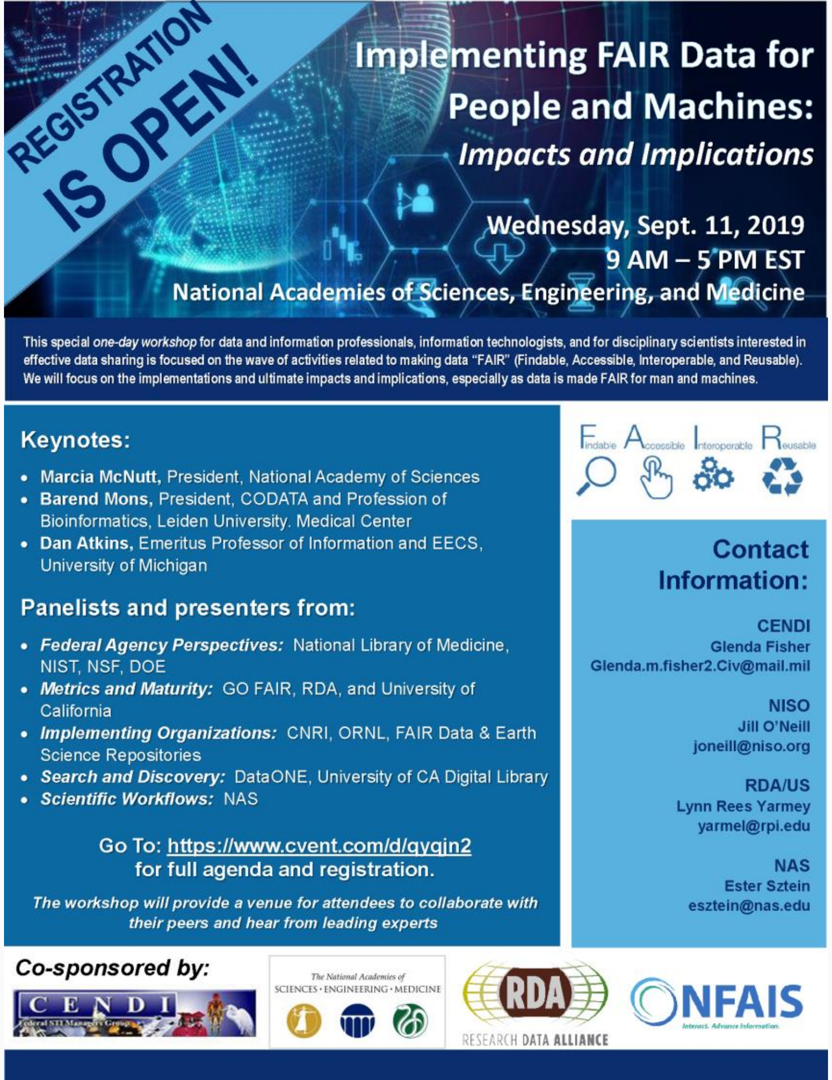
- Explicit documentation of knowledge
  - Sets project standards
  - Plan for data capture
  - Links to policies
- Living document: review and update

Potential DMP Sections

- Project Title and Information
- Data Description
- Roles & Responsibilities
- Standards Used
- Access Policies
- Sensitive Data Policies
- Sharing Policies
- Archiving and Preservation Plans
- Applicable laws and policies

Suggestion 2: Make Statistics *FAIR*[7]

- Findable
- Accessible
- Interoperable
- Reusable



REGISTRATION IS OPEN!

Implementing FAIR Data for People and Machines: *Impacts and Implications*

Wednesday, Sept. 11, 2019
9 AM – 5 PM EST
National Academies of Sciences, Engineering, and Medicine

This special *one-day workshop* for data and information professionals, information technologists, and for disciplinary scientists interested in effective data sharing is focused on the wave of activities related to making data "FAIR" (Findable, Accessible, Interoperable, and Reusable). We will focus on the implementations and ultimate impacts and implications, especially as data is made FAIR for man and machines.

Keynotes:

- **Marcia McNutt,** President, National Academy of Sciences
- **Barend Mons,** President, CODATA and Profession of Bioinformatics, Leiden University. Medical Center
- **Dan Atkins,** Emeritus Professor of Information and EECS, University of Michigan

Panelists and presenters from:

- ***Federal Agency Perspectives:*** National Library of Medicine, NIST, NSF, DOE
- ***Metrics and Maturity:*** GO FAIR, RDA, and University of California
- ***Implementing Organizations:*** CNRI, ORNL, FAIR Data & Earth Science Repositories
- ***Search and Discovery:*** DataONE, University of CA Digital Library
- ***Scientific Workflows:*** NAS

Go To: https://www.cvent.com/d/qyqjn2
for full agenda and registration.

The workshop will provide a venue for attendees to collaborate with their peers and hear from leading experts

Findable Accessible Interoperable Reusable

Contact Information:

CENDI
Glenda Fisher
Glenda.m.fisher2.Civ@mail.mil

NISO
Jill O'Neill
joneill@niso.org

RDA/US
Lynn Rees Yarmey
yarmel@rpi.edu

NAS
Ester Sztein
esztein@nas.edu

Co-sponsored by:

CENDI Federal STI Managers Group
The National Academies of SCIENCES · ENGINEERING · MEDICINE
RDA RESEARCH DATA ALLIANCE
NFAIS Interact. Advance Information.

Suggestion 3:
Plan for Sharing

- 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

Suggestion 4:
Embed Data Curators & Curation Practices

- Necessary skills other team members may not possess
- Fresh eyes for workflows and implicit knowledge
- Assume preservation and sharing

- Improve team efficiency around sharing and preservation
- Lifecycle view of data
- End of lifecycle planning

NCSES Charge Challenge

JISC Report:
FAIR in Practice[8]

Tools are needed, remain elusive

While there is "[s]trong support for growing the body of tools and resources available that reduced the burden of data management," there is also a "[l]ack of good tooling to support metadata capture at data generation."

Jisc

FAIR in practice

Jisc report on the Findable Accessible Interoperable and Reuseable Data Principles

May 2018

http://doi.org/10.5281/zenodo.1245568

Conclusions

- Data curation enables data science
- Data Curation lifecycle view defaults to transparency
- Data management and sharing planning is ***THE*** first step
- FAIR data principles apply to metadata, data, and paradata
- Plan for sharing; create a sharing culture
- Embed data curators and curation into projects from the start for best results and most transparent statistics

References

1. University Library, Texas A&M University. “Data Management Defined - Research Data Management - Guides at Texas A&M University.” Research Data Management, October 1, 2013. http://guides.library.tamu.edu/DataManagement
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. 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
4. 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
5. Digital Curation Centre. Data Curation Lifecycle Model. http://www.dcc.ac.uk/resources/curation-lifecycle-model
6. Faundeen, J.L., Burley, T.E., Carlino, J.A., Govoni, D.L., Henkel, H.S., Holl, S.L., Hutchison, V.B., Martín, Elizabeth, Montgomery, E.T., Ladino, C.C., Tessler, Steven, and Zolly, L.S., 2013, The United States Geological Survey Science Data Lifecycle Model: U.S. Geological Survey Open-File Report 2013–1265, 4 p., http://dx.doi.org/10.3133/ofr20131265
7. FORCE11. “The FAIR Data Principles.” 2016. https://www.force11.org/group/fairgroup/fairprinciples
8. Allen, Robert, & Hartland, David. (2018, May 21). FAIR in practice - Jisc report on the Findable Accessible Interoperable and Reuseable Data Principles (Version 1). Zenodo. http://doi.org/10.5281/zenodo.1245568

Thank you!

Questions?

Leighton L Christiansen http://orcid.org/0000-0002-0543-4268
Data Curator, National Transportation Library,
Bureau of Transportation Statistics, OST-R , USDOT
leighton.christiansen@dot.gov
ntldatacurator@dot.gov