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Writing Good Data Management Plans: Theory & Practice

Amber E Budden

Kathryn Meyer

Arctic Data Center Training August 13-17, 2018

NSF Award #1546024





https://www.dataone.org/best-practices



https://www.dataone.org/best-practices



Efficiency

4











What's in a Data Management Plan?

- Study design
- Data (including format)
- Metadata
- Policies for access, sharing & reuse
- Long-term storage & data management
- Budget



1. Engage everyone



- 1. Engage everyone
- 2. Plan from the start



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- 3. Follow good advice
 - DataONE
 - Institutional Libraries
 - Data Repositories



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- 4. Use good tools
 - DMPTool
 - DMPOnline



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- 4. Use good tools
 - DMPTool
 - DMPOnline
- 5. Review and revise

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PERSPECTIVE

Ten Simple Rules for Creating a Good Data Management Plan

William K. Michener 🖂

Published: October 22, 2015 • https://doi.org/10.1371/journal.pcbi.1004525

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Rule 2: Identify the Data	A. L ¹¹ multiple total total	A RABE X Decrease Tradis k Agent			Following Collections
Rule 3: Define How the Data Will Be Organized	B, ifter (Ver Contract			Open Data
Rule 4: Explain How the Data Will Be Documented	• 1.55				ADVERTISEMENT

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View

Subject Areas

10

Citation

323

Share

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Rule 5: Describe How Data Quality Will Be Assured

Citation: Michener WK (2015) Ten Simple Rules for Creating a Good Data



10 Simple Rules for Writing a Good DMP

- 1. Determine the research sponsor requirements
- 2. Identify the data to be collected
- 3. Define how the data will be organized
- 4. Explain how the data will be documented
- 5. Describe how quality data will be assured
- 6. Present a sound storage & preservation strategy
- 7. Define the project's data policies
- 8. Describe how the data will be disseminated
- 9. Assign roles & responsibilities
- 10. Prepare a realistic budget



Determine the research sponsor requirements







Identify the data to be collected: types; sources; volume; and data and file formats



Image credits: World Meteorological Organization on Flickr



Define how the data will be organized



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Explain how the data will be documented

- Dublin Core, ISO 19115, EML
- Morpho, metavist, readme.txt
- Electronic notebooks





Describe how data quality will be assured

 Training activities, instrument calibration and verification tests, double-blind data entry, and statistical and visualization approaches to error detection





Present a sound data storage and preservation strategy

- How long will the data be accessible?
- How will data be stored and protected during the project?
- How will data be preserved and made available for future use?





Define the project's data policies

- Licensing and data sharing arrangements
- Human subject and other sensitive data





Describe how the data will be disseminated

More active, robust and preferred approaches include: (1) publishing the data in an open repository or archive; (2) submitting the data as appendices or supplements to journal articles; and (3) publishing the data, metadata, and relevant code as a "data paper".





Assign roles and responsibilities

• Roles may include data collection, data entry, QA/QC, metadata creation and management, backup, data preparation and submission to an archive, and systems administration.





 Review your plan and make sure that there are lines in the budget to support the people that manage the data as well as pay for the requisite hardware, software





Research Funder Requirements

• NSF

NSF 14-1, Grantee Standards, Section j https://www.nsf.gov/pubs/policydocs/pappguide/nsf14001/ gpg_2.jsp#IIC2j

• NSF GEO

Directorate for Geosciences--Data Policies https://www.nsf.gov/geo/geo-data-policies/

• NSF Polar Programs

NSF 16-055 Dear Colleague Letter https://www.nsf.gov/pubs/2016/nsf16055/nsf16055.jsp

Check your funder for specific requirements



NSF Division of Polar Programs

- NSF requires submission to the Arctic Data Center within 2 years AON program requires submission within 6 months
- Need to document your data well enough for reuse
- There are exceptions for sensitive data Social sciences, endangered species



• Products of research

Types of data, samples, physical collections, software, curriculum materials, other materials produced during project



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• Data formats and standards

Standards to be used for data and metadata format and content (for initial data collection, as well as subsequent storage and processing)



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• Archiving of data

Plans for archiving data, samples, research products and for preservation of access



Current DMP Tools

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Step-by-step wizard for generating DMP Create | edit | re-use | share | save | generate Open to community





DMPTool by the Numbers





30,846 _{Users} 27,389 Plans More 236 Participating Institutions More

Top 5 Templates

Digital Curation Centre NSF-BIO: Biological Sciences NSF-SBE: Social, Behavioral, Economic Sciences USDA-NIFA: National Institute of Food and Agriculture NIH-GEN: Generic






DMPTool by the Numbers

-01 29,887 Users

Plans More

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26,353

234 Participating institutions More Top 5 templates

Digital Curation Centre NSF-SBE: Social, Behavioral, Economic Sciences NIH-GDS: Genomic Data Sharing NIH-GEN: Generic NEH-ODH: Office of Digital Humanities

More



Sign in options

Option 1: If your institution is affiliated with DMPTool.

Your institution

- or -

Option 2: If your institution is not affiliated with DMPTool.

Email address

- or -

Option 3: If not affiliated and you need an account.

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My dashboard Create plan

My dashboard

Welcome

You are now ready to create your first data management plan. Click the 'Create plan' button to begin.

There are no records associated

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My dashboard Create plan





My dashboard Create plan

Create a new plan

Before you get started, we need some information about your research project to set you up with the best DMP template for your needs.

What research project are you planning?

Select the primary research organization

Begin typing to see a filtered list

Select the primary funding organization

- Begin typing to see a filtered list No funder associated with this plan - or -Create plan Cancel About Terms of use & Privacy Privacy statement Accessibility I GitHub I GitHub 2 Contact us DMPTool is a service of the University of California Curation Center of the California Digital Library S DMP Tool Copyright 2010-2018 The Regents of the University of California
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Mock project for testing, practice, or educational purposes



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Before you get started, we need some information about your research project to set you up with the best DMP template for your needs.

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My dashboard Create plan

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- or -

What research project are you planning?

Arctic Data Center DMP Demo

Mock project for testing, practice, or educational purposes

Select the primary research organization

Begin typing to see a filtered list

National Science Foundation (NSF)

- or - 🔽 My research organisation is not on the list *or* no research organisation is associated with this plan

No funder associated with this plan

We found multiple templates corresponding to your funder.

Select the primary funding organization

Which template would you like to use?

Arctic Data Center: NSF Polar Programs [DRAFT]



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Project details	Plan overview	Write plan	Share	Download

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Funder

National Science Foundation (NSF)

Grant number

Project abstract

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Principal Investigator

Name

Kathryn Meyer

ORCID ID

Email

meyer@nceas.ucsb.edu

Data contact person

Same as Principal Investigator

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Plan guidance configuration

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To help you write your plan, DMPTool can show you guidance from a variety of organizations.

Select up to 6 organizations to see their guidance.

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Kathryn Meye	ər				
ORCID ID					
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- Types of data produced (0 / 3)

What types of data, samples, collections, software, materials, etc. will be produced during your project?	Guidance	Comments
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What will be the approximate number and size of data files that will be produced during your project?	Guidance	Comments

- Types of data produced (0 / 3)

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- Data and metadata formats (0 / 1)

What format(s) will data and metadata be collected, processed, and stored in?

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

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NSF example answer	image files, and NetCDF files ar many others. If you plan to subn
data will be collected in (Examples are handwritten lab notebooks, Microsoft Excel files, CSV files, R scripts, etc. Make sure to specify the collection format for each type of data detailed in your description of data.)	Arctic Data Center, include your methods to create open-source, ubiquitous, and easy-to-read da plan to work with any proprietary
All data will be transferred into the following formats for processing and storage: (Examples are CSV files, NetCDF files, etc.)	formats such as Excel workbook MATLAB files, please include a transform all data stored in these
Metadata will be collected in (Examples are handwritten lab notebooks, Microsoft Word files, etc.)	into an open-source format befo submission to the Arctic Data Ce you anticipate any data will not t
All metadata will be transformed from text into EML files by the Arctic Data Center online submission tool when submitting to the Arctic Data Center.	be transformed into an open-sou format, please provide your reas

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Comments

Guidance

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data will be collected in (Examples are handwritten lab notebooks, Microsoft	many others. If you plan Arctic Data Center, inclu
Excel files, CSV files, R scripts, etc. Make sure to specify the collection format for each type of data detailed in your description of data.)	methods to create open ubiquitous, and easy-to- plan to work with any pr
All data will be transferred into the following formats for processing and storage: (Examples are CSV files, NetCDF files, etc.)	formats such as Excel w MATLAB files, please in transform all data stored
Metadata will be collected in (Examples are handwritten lab notebooks, Microsoft Word files, etc.)	into an open-source forr submission to the Arctic you anticipate any data
All metadata will be transformed from text into EML files by the Arctic Data Center online submission tool when submitting to the Arctic Data Center.	be transformed into an of format, please provide y

Guidance Comments Format Center primarily pen-source, read data ich formats are es (CSV) files, PEG or TIFF files among to submit to the ide your planned source, read data. If you oprietary data orkbooks or clude a plan to in these formats nat before Data Center. If will not be able to ppen-source our reasoning.

- Roles and responsibilities (0 / 1)

1. What parties and individuals will be involved with data management in this project?

2. What will be the roles and responsibilities of each party and or individual with respect to management of the data

3. Who will be the lead or primary person responsible for ultimately ensuring compliance with the Data Management Plan?

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

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Sav	Э				
NSF e	xampl	e answer			
The	follow	ving orga	inization	s and i	ndividuals will be involved with data management in this project:
		<u> </u>			
		up syster	ms, inter	facing	or (Examples are collecting data, maintaining data storage with data repository personnel, etc. Make sure to specify the tion/individual detailed above.)
		Arctic Da or the pr		er will p	provide data archival, preservation, access and metadata authoring

NSF DMPTool	
Guidance	
Arctic Data Center	Identification Policy:
The Arctic Data Cer	nter utilizes ORCiDs
(https://orcid.org/) to	o identify individuals
associated with eac	h dataset. An ORCiD
will be required for t	the primary contact of
will be required for i	the prinary contact of
	iDs are not required
	iDs are not required
each dataset. ORC for all associated pa	iDs are not required
each dataset. ORC for all associated pa encouraged so that	iDs are not required arties but are
each dataset. ORC for all associated pa encouraged so that	iDs are not required arties but are proper identification be given. Please plan
each dataset. ORC for all associated pa encouraged so that and attribution can	iDs are not required arties but are proper identification be given. Please plan necessary) and
each dataset. ORC for all associated pa encouraged so that and attribution can on creating (when r	iDs are not required arties but are proper identification be given. Please plan necessary) and for each individual

- Policies for access and sharing (0 / 4)

Will any of the data and/or related materials produced need provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements? If so describe them and detail any requested exceptions from the archiving requirements set for Arctic Sciences research.

	NSF DMPTool
	 Guidance NSF Office of Polar Programs Guidelines Arctic Data Center Guidelines on who must submit
ave F example answer	
data are expected to need provisions for (Examples are appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Make sure to specify all the types of data that are expected to need provisions.)data are expected to need provisions due to (Examples are ethical restrictions, release of indigenous knowledge, etc. Make sure to specify explanations for all expected provisions detailed above.)	

Guidance

Comments

- Policies for re-use and re-distribution (0 / 2)

How do you anticipate the data for this project will be used? Consider the following: 1. Which bodies/groups are likely to be interested in the data? 2. What and who are the intended or foreseeable uses/users of the data?	Guidance Comments				
B I ⋮≡ • ⋮≡ • Ø ⊞•	Guidance				
NSF example answer					
Other groups that may be interested in data are (Examples are academic researchers, government agencies, non-profit organizations, etc. Make sure to specify interest expectations for each type of data detailed in your description of data.)					
Will any permission restrictions need to be placed on the data? Consider the following:					

- Plans for archiving and preservation (0 / 1)

What is the long-term strategy for maintaining, curating, and archiving the data?

Note: The Office of Polar Programs policy requires that metadata files, full data sets, and derived data products be deposited in a long-lived and publicly accessible archive.

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

B I Image:	Guidance Arctic Data Center Data Preservation Policy: The Arctic Data Center ensures the long-term preservation of the data entrusted to the repository. The guiding principles for the preservation plan follow: 1. Preserve the bits 2. Open science, open standards 3. Replicate data and metadata 4. Strong versioning 5. Frequent auditing 6. A wind down plan
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Guidance

NSF

DMPTool

Comments

Arctic Data Center DMP Demo

Project details Plan overview

Write plan Share

Set plan visibility

Public or organizational visibility is intended for finished plans. You must answer at least 50% of the questions to enable these options. Note: test plans are set to private visibility by default.

- Private: visible to me, specified collaborators and administrators at my organization
- Organizational: anyone at my organization can view
- Public: anyone can view

Manage collaborators

Invite specific people to read, edit, or administer your plan. Invitees will receive an email notification that they have access to this plan.

Download

Email address	Permissions
meyer@nceas.ucsb.edu	Owner
Invite collaborators * Email	
* Permissions	
 Co-owner: can edit project details, change visibility, and add collaborators Editor: can comment and make changes Read only: can view and comment, but not make changes 	
Send invitation	

Arctic Data Center DMP Demo

Project details	Plan overview	Write plan	Share	Download						
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Download pla	n									



Build your Data Management Plan

Public Plans

Public plans are plans created using the DMPTool service and shared publicly by their owners. They are not vetted for quality, completeness, or adherence to funder guidelines.

Project title 🗢	Template 🗢	Organization	Owner	Download PDF
UNDERSTANDING THE ROLE OF PHYSICIAN INTEGRATION WITHIN NURSING HOMES IN POST-ACUTE CARE OUTCOMES	NIH-GEN: Generic	University of Pennsylvania (UPenn)	Kira Ryskina	
"A Microgravity-Themed Collaborative Intervention Promoting Student Selection of a STEM Career Pathway"	NSF-EHR: Education and Human Resources	Baylor University	Stacey Smith	PDF
A Framework for Adaptive Sampling of Social Science Research Data Using the Twitter API: Understanding Social Media Communication During Crisis Events	NSF-SBE: Social, Behavioral, Economic Sciences	University of California, Davis (UCD)	Carl Stahmer	PDF
A Political Ecology of Value: A Cohort-Based Ethnography of the Environmental Turn n Nicaraguan Urban Social Policy	NSF-SBE: Social, Behavioral, Economic Sciences	Josh Fisher	PDF	
A unified approach to preserving cultural software objects and their development histories	NEH-ODH: Office of Digital Humanities	University of California, Office of the President (UCOP)	DMP dmpcurator	PDF
A unified approach to preserving cultural software objects and their development histories	NEH-ODH: Office of Digital Humanities	University of California, Los Angeles (UCLA)	Christopher Cabrera Thompson	PDF
Additive Manufacturing for Spare Parts Supply Chain	NSF-ENG: Engineering	University of Tennessee, Knoxville	Nawei Liu	PDF
analysis of Brazilian financial investment funds CVM - Escola Politécnica - PPGEE - PCS	Department of Energy (DOE): Generic	Non Partner Institution	Antonio Newton Licciardi Jr	PDF
AR or HAI Data Management Plan	NSF-EAR: Earth Sciences	Emory University	Scott Fridkin	PDF
Arthropod responses to grassland nutrient limitation	NSF-GEN: Generic	DMP dmpcurator	PDF	

View all

1 2 3 4 5 ... Next Last



- Good data management plans will save you time and effort overall
- Data management plans are not static revise as you do your research project
- Take advantage of DMP resources to create your plan
- The Arctic Data Center is available to assist with your DMP development