Guide to NSF Data Management Plans

Beginning January 18, 2011, proposals to NSF will be required to include a supplementary document labeled "Data Management Plan" (DMP). Please see the Grant Proposal Guide, Chapter II.C.2.j and the Data Management and Sharing Frequently Asked Questions(FAQs) for more detailed information.

Essentially, the DMP must be no more than two pages and not be included in the 15-page limit for proposal bodies. If more space is needed to describe a proposed DMP, the proposer may use part of the 15-page Project Description for additional data management information. However, the plan may not be used to circumvent the 15-page Project Description limitation. The Data Management Plan will be reviewed as an integral part of the proposal, coming under Intellectual Merit or Broader Impacts or both, as appropriate for the scientific community of relevance.

NOTE: Fastlane will not permit submission of a proposal that is missing the Data Management Plan.

The goal of the DMP is to provide clear, effective, and transparent implementation of the long-standing *NSF Policy on Dissemination and Sharing of Research Results,* which may be found in the Award Administration Guide, Section VI.D.4. After an award is made, compliance with the data management plan will be monitored through the Annual and Final Report process and through evaluation of subsequent proposals. Data management activities must be reported in subsequent proposals by the PI and Co-PIs under "Results of prior NSF support."

The following pages are designed to assist researchers, principal investigators, grant administrators, and other members of the New Mexico Highlands University community in preparing their data management plans in compliance with the new NSF requirements.

What Needs To Be Included in the DMP?

In addition to the name of the person(s) responsible for data management within your research project, the DMP, as stated in the Proposal and Award Policies and Procedures Guide, should include the following information:

1. **Products of the Research:** The types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project.
2. **Data Formats:** The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies).
3. **Access to Data and Data Sharing Practices and Policies:** Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements.
4. **Policies for Re-Use, Re-Distribution, and Production of Derivatives.**
5. **Archiving of Data:** Plans for archiving data, samples, and other research products, and for preservation of access to them.

What Data and/or Curriculum Material Are Needed in the DMP?

The *Grant Proposal Guide* does not define data types beyond the basic categories (e.g., samples, physical collections, software and curriculum materials). While in general research data may be anything an investigator would need to reproduce published results, it is best to review the guidelines offered by the appropriate NSF directorate and/or division, as well as any special requirements laid out in the NSF solicitation.

The federal government also provides a baseline definition of research data which may be useful when considering what to include in the DMP. *Research data* are formally defined by the U.S. Office of Management and Budget as "the recorded factual material commonly accepted in the scientific community as necessary to validate research findings." This definition includes both analyzed data and the metadata that describe how those data were generated. "

Analyzed data" include, but are not limited to, digital information that would be included in scientific publications, including digital images, published tables, and tables of the numbers used to create charts and graphs. "Necessary metadata" include, but are not limited to, descriptions or suitable citations of experiments, apparatuses, raw materials, computational codes, model parameters and input conditions.

What Data Types Should Not Be Included in the DMP?

The Office of Management and Budget's definition of research data does not include "preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues." For some NSF directorates, raw data fall into the category of "preliminary analyses" and are thus excluded from the DMP; others may require a DMP for raw data so be sure to review the guidelines from NSF's directorates. Below are DMP references from several directorates.

- Directorate for Biological Sciences.
  See http://www.nsf.gov/bio/pubs/BIODMP061511.pdf
- Directorate for Computer & Information Science & Engineering.
  See http://www.nsf.gov/cise/cise_dmp.jsp
- Directorate Education and Human Resources
  See http://www.nsf.gov/bfa/dias/policy/dmpdocs/ehr.pdf
- Directorate for Engineering
  See http://nsf.gov/eng/general/ENG_DMP_Policy.pdf
- Directorate for Geosciences See http://www.nsf.gov/geo/geo-data-policies/index.jsp\
- Directorate of Mathematical and Physical Sciences
  See http://www.nsf.gov/bfa/dias/policy/dmpdocs/phy.pdf
- Directorate for Social, Behavioral & Economic Sciences
  See http://www.nsf.gov/sbe/sbe_data_management_plan.jsp

What Data and Data Sharing Practices and Policies Do I Use?

NMHU has several policies to assist in describing data sharing practices. However, it is important to note the precedence relationships that exist between guidelines from various NSF units. Some NSF solicitations may impose their own data management requirements in addition to the guidelines published in the NSF's Proposal and Award Policies and Procedures Guide (PAPPG) and recommendations from NSF directorates and divisions. Below are data practice polices that may be of assistance to you.

NSF Policy on Dissemination and Sharing of Research Results

The NSF Policy on Dissemination and Sharing of Research Results (Award Administration Guide, Section VI.D.4) states:

1. *Investigators are expected to promptly prepare and submit for publication, with authorship that accurately reflects the contributions of those involved, all significant findings from work conducted under NSF grants. Grantees are expected to permit and encourage such publication by those actually performing that work, unless a grantee intends to publish or disseminate such findings itself.*

2. *Investigators are expected to share with other researchers, at no more than incremental cost and within a reasonable time, the primary data, samples, physical collections and other supporting materials created or gathered in the course of work under NSF grants. Grantees are expected to encourage and facilitate such sharing. Privileged or confidential information should be released only in a form that protects the privacy of individuals and subjects involved. General adjustments and, here essential, exceptions to this sharing expectation may be specified by the funding NSF Program or Division/Office for a particular field or discipline to safeguard the rights of individuals and subjects, the validity of results, or the integrity of collections or to accommodate the legitimate interest of investigators. A grantee or investigator also may request a particular adjustment or exception from the cognizant NSF Program Officer.*

3. *Investigators and grantees are encouraged to share software and inventions created under the grant or otherwise make them or their products widely available and usable.*

4. *NSF normally allows grantees to retain principal legal rights to intellectual property developed under NSF grants to provide incentives for development and dissemination of inventions, software and publications that can enhance their usefulness, accessibility and upkeep. Such incentives do not, however, reduce the responsibility that investigators and organizations have as members of the scientific and engineering community, to make results, data and collections available to other researchers.*

5. *NSF program management will implement these policies for dissemination and sharing of research results, in ways appropriate to field and circumstances, through the proposal review process; through award negotiations and conditions; and through appropriate*

support and incentives for data cleanup, documentation, dissemination, storage and the like.

NMHU Policies

NMHU's Research Handbook provides the following specific guidance's and polices related data sharing practices and preservation of data.

Section 3.6. Openness in Research

Section 4.2.2. (#12): Record Retention

Section 5: Intellectual Property

Section 7: Research on Human Subjects

Section 8: Research on Laboratory Animals

Where Does NMHU Archive Data?

All original raw data files and data source processing programs are maintained in a date--stamped file structure with text files documenting the provenance at the Office of Research and Sponsored Projects. Project records, both scientific and administrative, are then retained by the university for three years, unless otherwise specified by the project sponsor or expanded in the case of lawsuits, patent applications, charges of misconduct, conflict of interest, etc. After the three-year period, databases are preserved in perpetuity and housed at the New Mexico Interstate Stream Commission Central Office.

NMHU also has clearly defined polices on responsibilities for communicating, creating and maintaining quality Intellectual Property and public data resulting from sponsored research activity http://nmhu.edu/FacultyStaff/research/project_management.aspx. According to Policy 5.6 in NMHU's Research Handbook, Investigators are expected to:

- *inform all research team members of the scope and the anticipated publications and/or products of the project;*
- *as part of the mission of the university to promote student learning, maximize opportunities for student research team members to co-author; if student(s) contribute significantly to ideas and the research effort, co-authorship should be justified;*
- *co-authors may refer to the research in a separate work of sole authorship if joint origin is prominently acknowledged and the opportunity for regular co-author publication is not preempted;*
- *as a matter of professional courtesy, co-authors should be consulted, reasonable requests be accommodated, and permission obtained for separate publications;*
- *all individuals involved in authorship have a shared responsibility for the published results and should have the opportunity to review all aspects of the report (e.g., review of literature, methodology, data analysis, and conclusions) during the writing process and before it is submitted for publication;*

- *all persons involved in a project should identify appropriate practices for maintaining data; and*
- *principal investigators and participating faculty are responsible for ensuring the overall soundness and validity of the publications of which they may appear as co-authors.*

University personnel are also required to execute what are generically referred to as Confidentiality Agreements in order to:

(1) *have a potential or pending patent reviewed by a third party; or*

(2) gain access to a third party's facilities, proprietary information or both. Specific procedures for completing confidential agreements for licenses and patents are provided in Policy 5.5., including that all agreements shall be governed and construed under the laws of the state of New Mexico. Any action arising out of an agreement shall be subject to the jurisdiction of the 1st Judicial State District Court in Santa Fe, NM, and the Federal District Court in Albuquerque, NM. In addition, tangible research property owned by the university is generally defined as discernible or corporeal items produced during the course of research projects at the university or by external sponsors. Examples of tangible research property include biological materials, equipment, computer databases and software, and prototype devices. Tangible research property is distinct from "intangible" or intellectual property such as inventions, patents, copyrights, and trademarks, which are subject to particular university policies and procedures set forth in this section. To remain consistent with NMHU's policy on Openness in Research and promote an open exchange of TRP, it is the university's policy to: encourage the open exchange of tangibly related research property; stimulate potential commercial value; promote the public use of university produced property; and protect the university and employees from liability claims arising from the use of such property.

If other disciplinary repositories, on-campus storage and data archiving solutions are required, the NMHU researcher is encouraged to contact their Chair or Dean and the Office of Research and Sponsored Projects.

Example Data Management Plans

Although we don't yet have examples of data management plans from successful NSF applications, ORSP has gathered a few examples of actual submitted plans, as well as a number of templates and DMP tutorials to assist in writing your plan. Be sure to consult the NSF guidelines, as well as any applicable directorate-level guidelines and any special requirements that have been provided in the solicitation.

DMPs From Submitted NSF Proposals

- Example Data Management Plans from NSF proposals submitted by researchers at Yale University.
- Example Data Management Plans from NSF proposals submitted by researchers at UC San Diego.

- Sample Data Management Plan from the University of Virginia's Odum Institute for Research in Social Science.

Templates, Outlines, Worksheets

- NSF Data Management Plan Guidance and Template from the Research Office at the University of Michigan's College of Literature, Science, and the Arts.

- NSF Data Management Plan template from the Data Conservancy and Johns Hopkins University.

- NSF Data Management Plan templates from the University of Virginia:
    1. Generic Template
    2. Generic Template, with UVa Guidance
    3. Template for NSF Biological Sciences Directorate (BIO)
    4. Template for NSF Engineering Directorate (ENG), with UVa guidance
    5. Template for NSF Division of Earth Sciences (EAR)
    6. Template for NSF Division of Materials Research (DMR)
    7. Template for NSF Division of Mathematical Sciences (DMS) (Guidance Only)
    8. Template for NSF Social, Behavioral and Economic Sciences Directorate (SBE)
    9. Template for NSF Division of Physics (PHY)

- DMP template and data worksheet from UC San Diego.

Guides and Tutorials

- How to Write a Data Management Plan for a National Science Foundation (NSF) Proposal from James Brunt at Long Term Ecological Research Network (LTER).

- How to develop a data management and sharing plan from Sarah Jones at the Digital Curation Centre (UK).

Getting Help With Your Plan

For further information in planning your DMP, contact the Office of Research and Sponsored Projects.