

**Building Better Data Management Practices through Innovative Community Evaluation of  
Currently Available Online Data Management Training Materials**

**A Challenge Grant Proposal to the ICPSR / Alfred P. Sloan Foundation**

**Principal Investigator, Carol Beaton Meyer, Executive Director**

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**Institutional Letter of Commitment**

April 15, 2013

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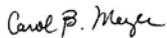
To Whom It May Concern:

Please accept this letter the submission of the following grant proposal – Building Better Data Management Practices through Innovative Community Evaluation of Currently Available Online Data Management Training Materials – on behalf of the Foundation for Earth Science. The Foundation for Earth Science is eager to work with the Interuniversity Consortium for Political and Social Research and Sloan Foundation.

- a. Name of Cooperating Institution: Foundation for Earth Science
- b. Name of Prime Institution: University of Michigan
- c. Name, title, and contact information of Principal Investigator at Cooperating Institution  
Carol Beaton Meyer, Executive Director  
Foundation for Earth Science  
6300 Creedmoor Road, Suite 170, #315  
Raleigh, NC 27612  
Email: [carolbmeyer@esipfed.org](mailto:carolbmeyer@esipfed.org) Phone: 919-870-7140
- d. Proposal Title: *Building Better Data Management Practices through Innovative Community Evaluation of Currently Available Online Data Management Training Materials*
- e. Proposed Project Period: June 1, 2013 – May 31, 2014
- f. Total requested dollar amount: \$20,000
- g. Type of Agency of Cooperating Institution: Nonprofit Organization
- h. Name, title, and contact information for Authorized Institutional Representative:  
Carol Beaton Meyer, Executive Director, same as above

If you have any questions, please feel free to contact me.

Sincerely,



Carol B. Meyer, Executive Director &amp; AOR

## Project Summary

The Federation of Earth Science Information Partners (“ESIP Federation”), the Data Observation Network for Earth (“DataONE”), and the Integrated Earth Data Applications (“IEDA”) data facility are funded projects that have developed data management training (DMT) initiatives in the last two years to fill a void in the community around data management, preservation, archiving, and citation for Earth science researchers. The approach taken by each organization in creating the online materials has been different in terms of length, depth of coverage, and format, but all have been created and vetted by Earth Science domain experts. The objective for this project is to provide community feedback to DMT creators on the audiences and effectiveness of their training resources and to recommend educational review criteria to be used by future educational resource creators.

To date, online course reviews have focused on content and technology, but have not focused on the user’s needs. The project will survey the currently available training resources in order to identify who is utilizing these online resources, and for what purpose(s). The survey results will provide the base materials to perform educational reviews of the effectiveness of the materials from the user perspective.

With understanding gained from a user assessment and gap analysis, two main benefits are achieved: (1) educational content can be more effectively delivered to appropriate audiences, and (2) data management trainers can iterate on their content to create more value. This small project will lead to a community-wide improvement in data management, thereby enabling better science.

## Project Narrative

### I. Background:

As societal problems become increasingly complex, it is clear that researchers need to be able to find, access and use a variety of distributed datasets. This data-intensive focus is forcing us to take a closer look at data management. Funding agencies are requesting data management plans as an important first step in capturing their own return on investment.

In midyear 2011, the Federation of Earth Science Information Partner's ("ESIP Federation") Data Stewardship Committee started discussing the need for educational materials on data management for research scientists. Over the course of the next year and a half, supported by the ESIP Federation, the National Oceanic and Atmospheric Administration ("NOAA"), and the Data Conservancy, a smaller workgroup of Earth and information scientists created a data management "short" course designed to "improve the understanding of scientific data management among scientists, emerging scientists, and data professionals of all sorts."<sup>1</sup> The group outlined a list of topics to be discussed in 3 – 7 minute modules, targeting scientists and data managers, and designed to be highly reusable based on need. The group then drafted initial modules based on their own expertise. About 100 additional Earth science data management and preservation experts were recruited to peer review each module. After revision and editorial review, a script was created and the modules were turned into screencasts. The full list of available modules can be found on the ESIP Commons at <http://commons.esipfed.org/datamanagementshortcourse>.

During the same time period, the Data Observation Network for Earth ("DataONE"), one of the initial DataNets funded by the National Science Foundation ("NSF"), created 10 modules on data management for scientists. DataONE is building a distributed framework and sustainable cyberinfrastructure that will ensure the preservation, access, use and reuse of multi-scale, multi-discipline, and multi-national science data via three primary cyberinfrastructure elements and a broad education and outreach program. The DataONE modules were designed to form the basis for a two-day course, or incorporated into longer courses, if desired. They were presented and evaluated by participants in a two-day course in Santa Barbara, CA in May of 2012. The full list of modules, and results of the evaluation can be found at: <http://www.dataone.org/education-modules>.

Finally, Integrated Earth Data Applications ("IEDA") is a community-based data facility funded by NSF to "support the preservation, discovery, retrieval, and analysis of a wide range of observational field and analytical data types from the marine and terrestrial environments."<sup>2</sup> In support of this mission, IEDA has created a number of educational resources and tools to support creation of data management plans and data publication designed for the research scientist. These include FAQs on adding Digital Object Identifiers ("DOIs") to data, and on using an IEDA-created data management planning (DMP) tool.<sup>3</sup> In addition, IEDA curates a list of community-created tutorials, workshops, and other educational resources on topics related to creating and managing various types of Earth Science data. Resource materials are geared toward all levels from K – 12 through undergraduate and graduate student to research scientist.

Each of these organizations has devoted a great deal of time and energy to the creation of these educational resources. Fundamentally, there are two parts of the data management training (DMT) cycle – the creation cycle and the usage cycle (Fig. 1).

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<sup>1</sup> [http://wiki.esipfed.org/index.php/Data\\_Management\\_Short\\_Course](http://wiki.esipfed.org/index.php/Data_Management_Short_Course)

<sup>2</sup> <http://dev.iedadata.org/services>

<sup>3</sup> <http://www.iedadata.org/compliance/dmp/FAQ>

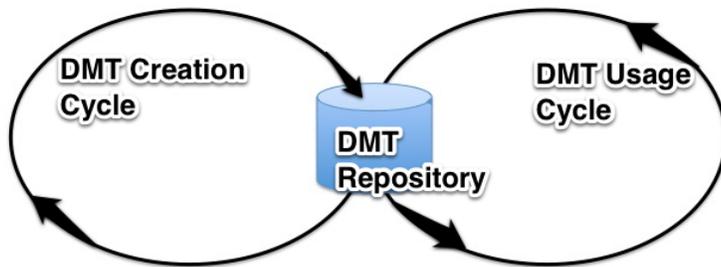


Figure 1. Data Management Training Life Cycle

All three groups are ready to move extensively into the usage cycle. The ESIP Federation, DataONE and IEDA all consider it important to quantify the success of the resources to answer questions like who is using the modules or what is their educational effectiveness? Through this proposal the ESIP Federation, DataONE and IEDA have agreed to collaboratively work toward a common evaluation method. Further the output of this study will inform and improve the development of additional data management resources.

## II. Project Partners

The work of the ESIP Federation is facilitated and managed by the Foundation for Earth Science (“Foundation”), created in 2001 to serve as the secretariat for the Federation. Under a Memorandum of Understanding between the ESIP Federation and Foundation, the Foundation supports the ESIP Federation by providing professional staff support, strategic planning, meeting planning, fundraising, grant and financial management services. Fiscal and management responsibility for the project will be done under the auspices of the Foundation, while guidance for the scope and direction of the work will be done by a small advisory group comprised of domain experts from the ESIP Federation, DataONE, and IEDA.

A key asset that this team brings is a strong network of broader Earth science data management experts. Many of those involved in the DMT cycle as creators or reviewers will be tapped again. This evaluation project will involve as many of those same people as possible in order to get the work done, but also to ensure that the work is done by experts from the natural and social sciences.

The activities proposed will be achieved through voluntary support from a project working group comprised of members from the ESIP Federation’s Data Stewardship Committee, the DataONE Community Education and Engagement Working Group, and IEDA. [See attached letters of support from DataONE and IEDA.] Carol Meyer, Executive Director of the Foundation will serve as PI and Nancy Hoebelheinrich, Knowledge Motifs LLC and active ESIP Federation community member, will serve as project manager.

**Comment [n1]:** Note this would have to be changed if we don’t get a letter from IEDA.

## III. Research Questions

Each organization has an on-going commitment to DMT for a wide variety of end users in science and education. This can’t be a push-only process. As shown in Fig. 1, content creators need to assess the effectiveness of the resources and provide mechanisms for user feedback to improve the module content and creation process. More specifically, the questions to be asked are:

1. What DMT resources are currently available and how can they be categorized?

2. Who is using these DMT resources and for what purposes? How often are they being used?
3. By what community-generated criteria could future DMT resources be reviewed? Do the criteria change when moving from one community to another?
4. Are these DMT resources effectively meeting the training needs of the research scientist user?
5. What are the best mechanisms for users to provide feedback? What can DMT resource creators learn from the feedback in order to improve training materials in the future?
6. How are the DMT materials currently marketed? Based on the feedback received, are there other mechanisms that would increase the usage?

To answer these questions, the organizations will work with educational review experts, social scientists and Earth science domain experts on the effectiveness of the promotion, design and use of the educational resources they have created to date.

#### **IV. Research Plan**

##### **Step 1: Inventory existing DMT resources available from the ESIP Federation, DataONE and IEDA**

We will assess the publicly available educational resources from each organization, and other organizations as time and resources allow. Depending upon completeness, it may be necessary to survey or interview key individuals from each organization to determine the breadth, extent and nature of the educational resources that should be included in the assessment. Additional information may be added to the inventory as the educational review experts identify the evaluation criteria.

##### **Step 2: Develop and conduct a survey or use other mechanisms to assess the usability and review the educational effectiveness of the inventoried DMT resources**

As the user group is being formed to help with assessment, review and assessment criteria and mechanisms will be developed and/or adapted by project team members in conjunction with educational review experts who also have domain knowledge. Criteria may include, but are not limited to those used by or adapted from the Climate Literacy and Energy Awareness Network (CLEAN) Review Criteria for various types of educational resources that measure educational resources for scientific accuracy, pedagogic effectiveness and usability.<sup>4</sup> Criteria may also be used or adapted from those recommended by the DataONE Usability and Assessment Working Group, as appropriate<sup>5</sup>. The user assessments may be done either online or as a face to face event.

##### **Step 3: Identify existing ways in which DMT resources have been marketed**

Prior to asking users of the educational resources to assess their effectiveness, the team will identify how and where the resources have been marketed and what response the resources have received. The markets (or audiences) to which the educational resources of each organization have been targeted will be important to understand. This understanding, and knowledge about the promotional activities and marketing mechanisms used, will help the project team and the educational review experts understand how and why the modules have been designed, as well as the scope of each module.

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<sup>4</sup> CLEAN Review Process: <http://cleanet.org/clean/about/review.html>

<sup>5</sup> Usability and Assessment Working Group: [http://www.dataone.org/working\\_groups/usability-and-assessment](http://www.dataone.org/working_groups/usability-and-assessment)

#### **Step 4: Evaluate the effectiveness of the marketing**

Once the audiences for the marketing techniques have been identified, the project team can evaluate their reach and effectiveness by looking at metrics suitable for the marketing mechanisms being used, including, but not limited to:

- Characteristics of targeted audiences
- Number of users and re-use rates to date
- Types of uses (e.g., in online courses, as supplementary material to academic in-person courses, as prep for students learning to do research and manage data, etc.)
- Demographics of users

#### **Step 5: Perform gap analysis and identify alternative markets and marketing / promotion techniques for the DMT resources**

Based on feedback received, a gap analysis may be performed to identify potential targets of opportunity to increase DMT usage. If little to no marketing has been done for the educational resources, it likely will be necessary to spend some project resources on promoting the DMT resources of each organization, so that a large enough and broad enough group of users can be identified. By comparing what each organization has done and the number and types of users for each, the project team will be in a good position to identify what worked well, and what did not for a given type of resource, and to recommend other audiences or marketing techniques that could be used.

#### **Step 6: Promote existing DMT resources through new channels**

In order to achieve the project objective of identifying a core group of users that the project can rely upon for assessment of the DMT resources, it would be feasible for some promotion to be done under the auspices of the project. Certainly, with the help of volunteer members from each organization, it may be necessary to bring the resources to the attention of various targeted audiences at annual conferences or other kinds of events usually attended by the volunteer members such as the International Association for Social Science Information Services and Technology (IASSIST), the American Geophysical Union (AGU), the American Meteorological Society (AMS), the Geological Society of American (GSA), and Ecological Society of America (ESA).

#### **Step 7: Develop a targeted group of users to assess all (or a subset) of the DMT resources**

From the various venues by which the users of the educational resources are identified throughout the activities of the project, a targeted group of users would be identified to assess the educational resources. If it proves helpful to provide some kind of incentive or reward to users for participating in the evaluation study, project team members may solicit them from their organizations, or some incentive funding may be used from grant monies.

#### **Step 8: Compile the results in a report submitted to each organization as well as project sponsor**

As a final step, the project team will compile the results of the activities in the form of reports, presentations or articles that will describe the work done and recommend best practices for the marketing and assessment of DMT resources, for assessment and review criteria for educational resources on these topics, and for target areas to be covered by new or revised DMT resources.

#### **V. Project Deliverables / Grant Selection Criteria (GSC):**

1. Inventory of existing DMT resources targeted to Earth Science research scientists  
*GSC: Potential for improving current practices; Applicability to multiple scientific domains*
2. Collaborative promotion of existing DMT resources from each project partner  
*GSC: Potential for improving current practices; Applicability to multiple scientific domains; Impact on the community*
3. Evaluation of marketing and promotional activities designed to make the existence of the DMT resources known and used  
*GSC: Innovation; Potential for improving current practices; Impact on the community*
4. Recommendation of criteria for the review of new or revised educational resource materials on data management planning and data publication for research scientists  
*GSC: Potential for improving current practices; Applicability to multiple scientific domains; Impact on the community*
5. Focused feedback to each DMT creation organization on effectiveness of DMT resources in meeting educational and training goals that can be used for future efforts  
*GSC: Potential for improving current practices; Impact on the community*

## **VI. Summary:**

Each of the organizations included in this grant proposal has completed work piloting the development of educational resource materials of various types on the subjects of data management planning and data publication. Each of the organizations remains concerned about these areas because their members are heavily involved in the day to day creation, management, provision, and preservation of Earth science data, and they see the need to train both mature and early career scientists in the principles and practices of working effectively with data. While the resources being proposed for review were developed to serve a broad scientific domain, we recognize that many data management principles, techniques and trends are consistent across many domains and therefore, we expect that these reviews will further knowledge to support not only the Earth science data management community, but other science domains as well.

The significant amount of work that has gone into prior efforts by each of the organizations included in this proposal coupled with the commitment to move forward clearly demonstrate a common overarching concern about data management planning and publication. The cost of disparate efforts could be reduced and the impact of the efforts increased by combining efforts to create a unified inventory of modules, identify gaps in coverage, evaluate training module effectiveness, and provide data and information for creating new modules. By funding this proposal, the ICPSR and Sloan Foundation could leverage their resources and harness the interests, enthusiasm and expertise of the members of these three organizations. By facilitating the movement of these three organizations into the next phase of work to expedite the creation, management, and stewardship of data of all kinds, ICPSR and the Sloan Foundation can make a large positive impact on the broad community of data users.

## **Project Budget and Budget Justification**

In order to complete the tasks and submit the deliverables for this project, we request funds for the following:

- Project Manager (\$14,000) to coordinate the project, work with a DMT Advisory Group and liaison with the ESIP Federation, DataONE, and IEDA working groups as necessary, inventory the existing educational resources, and support the assessment of marketing /promotional materials, the creation of additional promotional materials, and the promotion of the educational resources by members of the DMT project group
- Stipends for Educational Review Expert(s) to advise on the criteria for or perform reviews of the educational resources (\$1500)
- Incentives for promoters or users / evaluators (e.g., travel assistance, gift cards) (\$4000)
- Materials and supplies such as survey or promotional materials (e.g., design, printing) (\$500)

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### **Project Timeline**

Steps 1 – 4 in Q1 of project year (June – August 2013)

\* NOTE: Step 2 may need to continue throughout Q2 and Q3 as the evaluation criteria are developed and refined.

Step 5 in Q1 – Q2 (June – November 2013)

Steps 6 and 7 in Q2 – Q3 (September 2013 – March 2014)

Progress Report due: December 1, 2013

Step 8 in Q4 (March – May 2014)

Final Report and invoicing due: May 31, 2014