

Iowa DOT Data Management Plans

Final Report
June 2022

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IOWA DOT DATA MANAGEMENT PLANS

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LIST OF ACRONYMS, ABBREVIATIONS, AND INITIALISMS

DMP	Data Management Plan
DOT	Department of Transportation
NTL	National Transportation Library
STIC	State Transportation Innovation Council

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EXECUTIVE SUMMARY

Although it was implemented in 2016, researchers have continued to struggle to comply with the Iowa Department of Transportation's (DOT's) data management plan (DMP) policy, which requires researchers to write a short document outlining their compliance plans and to follow through and report their publicly accessible research data outcomes.

The primary goal of this project was to develop training to help researchers funded by the Iowa State Transportation Innovation Council (STIC) to comply with the U.S. DOT's public access requirement and write DMPs that meet or exceed Iowa DOT requirements.

As work on the project started, a revision of the Iowa DOT DMP guidance document was added to the scope of the project to clean up some of the language and ensure that requirements were clearly stated. The project team completed the guidance document revision, curriculum development, and workshop delivery during the funded period. They also developed and implemented an Iowa DOT template for use in DMPTool (<https://dmptool.org/>).

Assessment of the effectiveness of the project was unable to be completed due to a low number of participants. Future iterations of the workshop with different assessment plans are recommended.

INTRODUCTION

Problem Statement

Data management, while a vital part of the research process, is often unplanned, overlooked, or handled ad-hoc. Poor data management produces work that is error-prone, difficult to replicate, and difficult or impossible to reuse both by the original researchers and by others.

Background

In 2016, the Iowa Department of Transportation (DOT) implemented a new data management plan (DMP) requirement for projects funded by the State Transportation Innovation Council (STIC) to comply with the U.S. DOT's public access requirement.

A DMP requires the articulation and formalization of workflows that ensure the data's usefulness and persistence beyond its initial purpose. However, while researchers are competent in managing research data, most lack the conceptual expertise and vocabulary needed to develop a data management and public access plan that meets policy requirements.

Project Goal

To address the knowledge gap, the Iowa DOT contracted with the Iowa State University Library's Research Data Services unit through the university's Institute for Transportation to develop and deliver training on how to write a DMP that meets the Iowa DOT requirements.

Project Scope, Objectives, and Overview

The original scope of the work for this project consisted of the following:

- Design and develop a DMP workshop curriculum and support materials specific to the needs of the Iowa DOT
- Deploy the curriculum through a virtual workshop
- Schedule follow-up, virtual, small group meetings with each research principal investigator (PI) and, optionally, their team to answer questions, troubleshoot problems, and prepare a final draft of their DMP
- Assess the training program to date

Work started with an assessment of the Iowa DOT's 2016 DMP guidance document (Office of Research & Analytics 2016). The assessment found that, while the guidance was comprehensive, the sections and sample questions often overlapped, which made the expectations difficult to understand and to train. After discussion with Iowa DOT Research staff, a revision of the Iowa DOT DMP guidance document was added as a project outcome.

OUTCOMES

Guidance Document Revision

DMP guidance and requirements from the U.S. DOT (National Transportation Library 2016) and other federal agencies (Agency for Healthcare Research and Quality 2020) were examined, along with similarly structured DMP materials (Data Services of the Virginia Tech University Libraries 2019). Comparing and contrasting these documents with the Iowa DOT document helped the team identify common themes, important concepts, and areas for clarification.

Before finalizing the document revision plan, team members met with the data curator for the National Transportation Library (NTL) to confirm that the planned revisions aligned with the U.S. DOT's Public Access Plan. Major changes and additions to the document included the following:

- Expanded instructions to clarify scope, purpose, and formatting
- A glossary
- Revised definition of research data that includes software and code
- A new Roles and Responsibilities section
- Reduction in the total number of required sections from seven to six
- Instructions for reporting public data sets to the NTL

Workshop

Curriculum development started with setting specific learning objectives for a virtual workshop. The 2001 revised Bloom's taxonomy (CELT 2018) was used to create objectives that addressed known DMP knowledge gaps and mapped to the sections of the new guidance document as follows:

1. Be able to identify resources and people that can help with writing a DMP
2. Understand the parts of a DMP and how they relate to good data management practices
3. Be able to draft a DMP following the Iowa DOT guidelines documentation

A backwards design approach, where learning objectives drive the content, was then used to build the workshop curriculum. Because of the workshop format (virtual) and the small number of anticipated attendees (10 or less and maximum 20), including a strong interactive component was a challenge.

After some consideration, a free online writing platform for DMPs, DMPTool (<https://dmptool.org>), was chosen given it provided an opportunity for attendees to apply their new knowledge. The next section, DMPTool Template, describes the set up and customization done in DMPTool by the team prior to the workshop.

The workshop was delivered on April 18, 2022 to an audience of five representing two STIC-funded projects.

DMPTool Template

After the guidance document revisions were finalized, the project team created a corresponding template in DMPTool (<https://dmptool.org>). DMPTool administrators approved the request to add the Iowa DOT template developed by the project team, and it is now available to all DMPTool users to access and use, including future STIC funding awardees.

The template provides a focused platform with the same prompts and sections as the guidance document, which displays alongside boxes in which answers can be typed.

DMPTool can also accomplish the following:

- Publicly publish data management plans
- Track associated research outputs such as data sets, software, models, and more
- Display specialized guidance that applies to each section, such as glossary terms

Figure 1 shows an opening screenshot from DMPTool.

Create a new plan

Before you get started, we need some information about your research project to

* What research project are you planning?

* Select the primary research organization

Research organization

Begin typing to see a list of suggestions.

* Select the primary funding organization

Funder

Iowa Department of Transportation

Create plan Cancel

Figure 1. DMPTool Create a new plan showing Iowa Department of Transportation can be selected as a primary funding organization

The screenshot in Figure 2 shows the first section of the Iowa DOT template in the DMPTool with instructions from the guidance document displayed above a free-text box on the left while relevant glossary terms display on the right.

1. Data Description
Provide a description of the data that you will be gathering in the course of your project and how the project will use that data. Address the types, origins, and sizes of the data that will be collected or generated, as well as the anticipated file formats and **standards** that will apply to your data.

Consider the following questions when answering this section:

1. What types of data (tabular, image, source code, database, text, etc.) will be used or collected?
2. What file formats and file extensions are being used? Are they platform-independent (i.e. can be used by different kinds of computers)? Are they non-proprietary (i.e., do not require special software)? If not, you should provide a justification to explain why the format(s) are being used.
3. How will the data be collected or obtained? What equipment, software, or other resources will be used?
4. What limits, parameters, and/or sample sizes are planned for the data?
5. How much data is expected to be collected or generated? What will be its rate of growth? How many files will there be and how much storage is needed?
6. If using **secondary data**, describe its use and reuse terms or licensing.

Save

Comments & Guidance

Guidance | Comments

IDOT | iastate | **DMPTool**

Data (or, **research data**): The recorded factual material, software, or code as commonly accepted in the scientific community that is of sufficient quality to validate and replicate research findings, regardless of whether the data are used to support scholarly publications. Research data do not include laboratory notebooks, preliminary analyses, completed case report forms, drafts of scientific papers, plans for future research, peer reviews, communications with colleagues, or physical objects, such as laboratory specimens.

Secondary data: Data produced or procured by someone else. Secondary data may be freely shared, purchased, or obtained through a data use agreement. It is important to know what, if any, limitations secondary data has as it may restrict or prevent you from sharing derivative data.

Standards: An agreed-upon way of doing things, with the purpose of establishing shared expectations. Using standards for data helps ensure consistency in the format, organization,

Figure 2. First section of the Iowa DOT template in the DMPTool

Workshop Effectiveness Assessment

Two different methods of assessing workshop effectiveness were planned. The first would use an analytic rubric that was developed to judge if the workshop provided enough context for attendees to develop a DMP that met or exceeded Iowa DOT policy requirements (see the Appendix). The second planned assessment would take place at follow-up meetings with each STIC project team. During these meetings, the team planned to collect qualitative feedback about the workshop, the new guidance document, and use of the DMPTool.

However, it would have been difficult to establish proper assessment practice given the small pool of participants, so these plans were canceled after requests for follow-up meetings were not returned. Additionally, some aspects of this project would be difficult to measure given there was no control group of untrained users to compare against.

CONCLUSION

The project team successfully designed and held a virtual workshop tailored to the Iowa DOT DMP requirements. The team also revised the Iowa DOT guidance document and added an Iowa DOT specific template to DMPTool to improve the quality and effectiveness of the workshop. While workshop assessment was not possible during this grant period, the developed rubric can be reused in the future.

Project Outputs/Deliverables

- New Iowa DMP guidance and template (<http://publications.iowa.gov/40404/>)
- Workshop slides (https://intrans.iastate.edu/app/uploads/2022/06/iowa_dot_dmp_training.pdf)
- DMP Workshop Evaluation Rubric (Appendix)
- Iowa DOT DMPTool (<https://dmptool.org/>) template

Future Recommendations

- Continue to hold DMP workshops when STIC projects with research data are funded
- Update the workshop assessment plan to include a survey sent during the workshop that includes an option to request a follow-up meeting
- Work with Iowa DOT Research staff to assess the feasibility of applying the DMP rubric to past, current, and future Iowa DOT DMPs to see what, if any, effect the revised guidance document and workshop had on submitted DMPs

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APPENDIX: DMP WORKSHOP EVALUATION RUBRIC

The rubric shown as Table 1 was designed to assess which parts of the workshop needed refinement based on the ability of attendees to successfully complete a draft DMP that meets or exceeds in every category.

Table 1. Rubric for evaluating Iowa DOT DMPs created using the 2022 (version 3) *Guidance on Data Management Plan (DMP) Requirements for Federally Funded Research Projects*

Task	Not meeting	Meeting	Exceeding
DMP draft completeness	DMP draft barely started or not started at all	Has supplied information for at least half the DMP sections	Thorough information supplied for more than half the DMP sections
Description	Description of data is partial, unfinished, or not present	Description of the data is present, but may be incomplete or too long	Full, concise description of the data is present
Documentation	Insufficient or no information about how data will be documented and organized	Provides a general idea of how data will be documented and organized	Thorough explanation of how data will be documented and organized
Security	Insufficient or no information about how data will be secured (or not)	Addresses how data will be backed up and or who has access to it during the research stage	Thorough explanation of how data will be backed up and provides detail for any necessary access limitations
Sharing	Insufficient or no information about which data will be shared and how	Provides a general idea of which data will be shared and how	Thorough explanation of which data will be shared, including when and how
Preservation	Insufficient or no information about how (or if) data will be preserved long-term	Provides a general idea of how (or if or what) data will be preserved long-term	Thorough explanation of which data will be preserved long-term, and how
Roles/ Responsibilities	Insufficient or no information about who is responsible for oversight of project data	Provides broad information on who is responsible for oversight of project data	Detailed information on who is responsible for different parts of the data management process (training, back-ups, etc.)

The rubric should only be used to evaluate Iowa DOT DMPs created using the 2022 (version 3) *Guidance on Data Management Plan (DMP) Requirements for Federally Funded Research Projects*, which is available at: <http://publications.iowa.gov/40404/>.

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