

# Iowa DOT Data Management Plans

**Final Report**  
**June 2022**

## **About the Institute for Transportation**

The mission of the Institute for Transportation (InTrans) at Iowa State University is to save lives and improve economic vitality through discovery, research innovation, outreach, and the implementation of bold ideas.

## **Iowa State University Nondiscrimination Statement**

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a US veteran. Inquiries regarding nondiscrimination policies may be directed to the Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, telephone: 515-294-7612, hotline: 515-294-1222, email: eooffice@iastate.edu.

## **Disclaimer Notice**

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. The opinions, findings and conclusions expressed in this publication are those of the authors and not necessarily those of the sponsors.

The sponsors assume no liability for the contents or use of the information contained in this document. This report does not constitute a standard, specification, or regulation.

The sponsors do not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

## **Iowa DOT Statements**

Federal and state laws prohibit employment and/or public accommodation discrimination on the basis of age, color, creed, disability, gender identity, national origin, pregnancy, race, religion, sex, sexual orientation or veteran's status. If you believe you have been discriminated against, please contact the Iowa Civil Rights Commission at 800-457-4416 or the Iowa Department of Transportation affirmative action officer. If you need accommodations because of a disability to access the Iowa Department of Transportation's services, contact the agency's affirmative action officer at 800-262-0003.

The preparation of this report was financed in part through funds provided by the Iowa Department of Transportation through its "Second Revised Agreement for the Management of Research Conducted by Iowa State University for the Iowa Department of Transportation" and its amendments.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Iowa Department of Transportation.

**Technical Report Documentation Page**

<b>1. Report No.</b> InTrans Project 21-768	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>	
<b>4. Title and Subtitle</b> Iowa DOT Data Management Plans		<b>5. Report Date</b> June 2022	
		6. Performing Organization Code	
<b>7. Author(s)</b> Megan O'Donnell (orcid.org/0000-0002-4632-6642) and Katie Wampole (orcid.org/0000-0002-8676-9042)		<b>8. Performing Organization Report No.</b> InTrans Project 21-768	
<b>9. Performing Organization Name and Address</b> Institute for Transportation Iowa State University 2711 South Loop Drive, Suite 4700 Ames, IA 50010-8664		<b>10. Work Unit No. (TRAIS)</b>	
		<b>11. Contract or Grant No.</b>	
<b>12. Sponsoring Organization Name and Address</b> Iowa Department of Transportation 800 Lincoln Way Ames, IA 50010		<b>13. Type of Report and Period Covered</b> Final Report	
		<b>14. Sponsoring Agency Code</b> HR-3031	
<b>15. Supplementary Notes</b> Visit <a href="http://www.intrans.iastate.edu">www.intrans.iastate.edu</a> for color pdfs of this and other research reports.			
<b>16. Abstract</b> <p>The Iowa Department of Transportation's (DOT's) data management plan (DMP) policy requires researchers to write a short document outlining their U.S. DOT's public access requirement compliance plans and to follow through and report their publicly accessible research data outcomes.</p> <p>The primary goal of this project was to develop and deliver training and materials to help researchers funded by the Iowa State Transportation Innovation Council (STIC) comply with the Iowa DOT policy requirements and write DMPs that meet or exceed the requirements.</p> <p>The project team revised the Iowa DOT DMP guidance document to clean up some of the language and ensure that requirements were clearly stated. The team also completed curriculum development and workshop delivery during the funded period. They also developed and implemented an Iowa DOT template for use in DMPTool.</p> <p>While 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.</p>			
<b>17. Key Words</b> Data Management Plans—DMP guidance—DMPTool—Iowa DOT DMPs		<b>18. Distribution Statement</b> No restrictions.	
<b>19. Security Classification (of this report)</b> Unclassified.	<b>20. Security Classification (of this page)</b> Unclassified.	<b>21. No. of Pages</b> 17	<b>22. Price</b> NA



# IOWA DOT DATA MANAGEMENT PLANS

**Final Report**  
**June 2022**

**Principal Investigator**

Shauna Hallmark, Director  
Institute for Transportation, Iowa State University

**Co-Principal Investigators**

Megan O'Donnell, Head, Research Data Services  
University Library, Iowa State University

Curtis Brundy, Lead, Collections and Technical Services Division  
University Library, Iowa State University

**Project Contributors**

Erin Thomas, Kris Stacy-Bates, and Katie Wampole  
University Library, Iowa State University

**Authors**

Megan O'Donnell and Katie Wampole

Sponsored by  
Iowa Department of Transportation

Preparation of this report was financed in part  
through funds provided by the Iowa Department of Transportation  
through its Research Management Agreement with the  
Institute for Transportation  
(InTrans Project 21-768)

A report from  
**Institute for Transportation**  
**Iowa State University**  
2711 South Loop Drive, Suite 4700  
Ames, IA 50010-8664  
Phone: 515-294-8103 / Fax: 515-294-0467  
[www.intrans.iastate.edu](http://www.intrans.iastate.edu)



## TABLE OF CONTENTS

ACKNOWLEDGMENTS .....	vii
EXECUTIVE SUMMARY .....	ix
INTRODUCTION .....	1
Problem Statement .....	1
Background .....	1
Project Goal .....	1
Project Scope, Objectives, and Overview .....	1
OUTCOMES.....	2
Guidance Document Revision .....	2
Workshop.....	2
Workshop Effectiveness Assessment .....	4
CONCLUSION.....	5
Project Outputs/Deliverables .....	5
Future Recommendations .....	5
REFERENCES .....	6
APPENDIX: DMP WORKSHOP EVALUATION RUBRIC.....	7

**LIST OF FIGURES**

Figure 1. DMPTool Create a new plan showing Iowa Department of Transportation can be selected as a primary funding organization.....3  
Figure 2. First section of the Iowa DOT template in the DMPTool.....4

**LIST OF TABLES**

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* .....7

**LIST OF ACRONYMS, ABBREVIATIONS, AND INITIALISMS**

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

## **ACKNOWLEDGMENTS**

The authors would like to thank the Iowa Department of Transportation (DOT) for sponsoring this work and Vanessa Goetz for her guidance on the project. They also want to thank Leighton L. Christiansen at the National Transportation Library (NTL) for his assistance and willingness to answer questions related to the U.S. DOT and NTL workflow requirements.



## **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

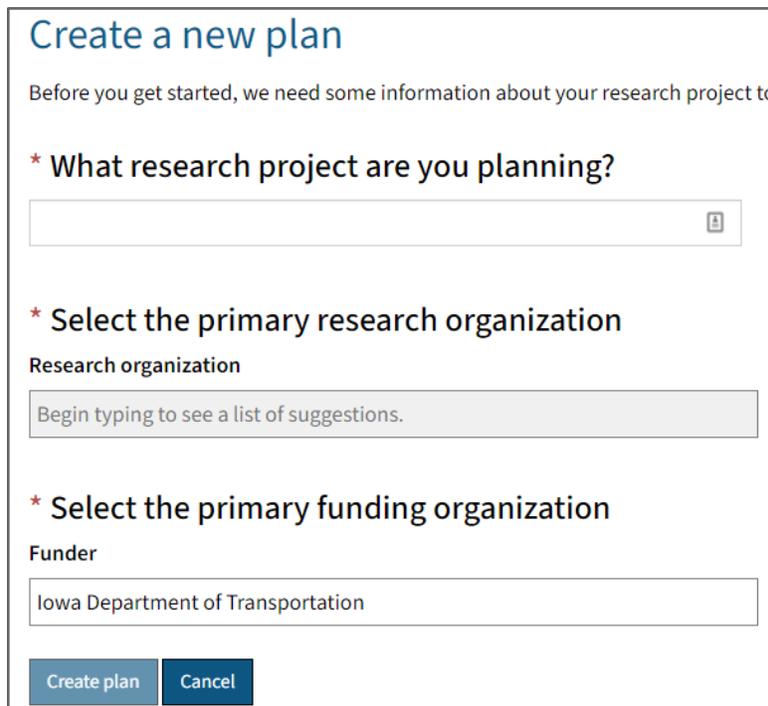
After the guidance document revisions were finalized, the project team created a corresponding template in DMPTool (<https://dmptool.org>). DMPTool administrators approved the request to add the Iowa DOT template developed by the project team, and it is now available to all DMPTool users to access and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

\* **Select the primary funding organization**

Funder

**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.

The screenshot displays the DMPTool interface. On the left, the '1. Data Description' section is active, featuring a title, a paragraph of instructions, a list of six questions, a rich text editor with a toolbar (bold, italic, bulleted list, numbered list, link, table), and a 'Save' button. On the right, a vertical sidebar labeled 'Comments & Guidance' contains a 'Guidance' tab and a 'Comments' tab. Below these are three sub-tabs: 'IDOT', 'iastate', and 'DMPTool'. The 'DMPTool' sub-tab is selected, showing definitions for 'Data (or, research data)', 'Secondary data', and 'Standards'.

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](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

## REFERENCES

- Agency for Healthcare Research and Quality. 2020. *The Agency for Healthcare Research and Quality Data Management Plan Policy*. NOT-HS-20-011. National Institutes of Health, Washington, DC. <https://grants.nih.gov/grants/guide/notice-files/NOT-HS-20-011.html>.
- Data Services of the Virginia Tech University Libraries. 2019. *Questionnaire to Help with the Creation of a Data Management Plan* (.docx). [https://guides.lib.vt.edu/ld.php?content\\_id=30800868](https://guides.lib.vt.edu/ld.php?content_id=30800868).
- National Transportation Library. 2016. *U.S. Dot Public Access: Creating Data Management Plans for Extramural Research*. U.S. Department of Transportation, Bureau of Transportation Statistics, Washington, DC. <https://doi.org/10.21949/1520571>.
- Office of Research & Analytics. 2016. *Guidance on Data Management Plan (DMP) Requirements for Federally Funded Research Projects*. Iowa Department of Transportation, Ames, IA. <http://publications.iowa.gov/id/eprint/21913>.
- Research and Analytics Bureau. 2022. *Guidance on Data Management Plan (DMP) Requirements for Federally Funded Research Projects, Version 03 2022/04/01*. Iowa Department of Transportation, Ames, IA. <http://publications.iowa.gov/40404/http://publications.iowa.gov/40404/>.
- CELT. 2018. *Revised Bloom's Taxonomy*. Iowa State University Center for Excellence in Learning and Teaching (CELT), Ames, IA. <https://www.celt.iastate.edu/teaching/effective-teaching-practices/revised-blooms-taxonomy/>.

## 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***

<b>Task</b>	<b>Not meeting</b>	<b>Meeting</b>	<b>Exceeding</b>
<b>DMP draft completeness</b>	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
<b>Description</b>	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
<b>Documentation</b>	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
<b>Security</b>	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
<b>Sharing</b>	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
<b>Preservation</b>	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
<b>Roles/ Responsibilities</b>	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/>.





**THE INSTITUTE FOR TRANSPORTATION IS THE FOCAL POINT FOR TRANSPORTATION  
AT IOWA STATE UNIVERSITY.**

**InTrans** centers and programs perform transportation research and provide technology transfer services for government agencies and private companies;

**InTrans** contributes to Iowa State University and the College of Engineering's educational programs for transportation students and provides K–12 outreach; and

**InTrans** conducts local, regional, and national transportation services and continuing education programs.



**IOWA STATE  
UNIVERSITY**

Visit [InTrans.iastate.edu](http://InTrans.iastate.edu) for color pdfs of this and other research reports.