Data Management Plans

And also LaTeX

EEOB/BCB 546

March 22, 2023

Summary

Data Management Plans

Reproducible Research

Biological Data

Biology has become a data-intensive field. Without a comprehensive plan for collecting, storing, maintaining, and disseminating your data and research products your work will not be reproducible and your contribution will be limited.

Research Products

In addition to data, biology research also yields other products that are necessary for reproducibility and are tools that can advance the field (e.g., software, scripts, databases, tutorials).

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Planning for Data

Write it Down

A **Data Management Plan** (DMP) is a written plan for dealing with scientific data and all of the products of a research project. This plan accounts for how data (and software, tools, etc.) will be handled during a research project and *after* the project is completed.

Proposing Reproducible Research

White House Mandate

In 2013, a mandate from President Obama required that results of all federally funded research be made publicly available and that these funding agencies develop plans for data management. Data

DMPs are required for funding

NSF, NIH, USDA, NASA, DOE, HHS, CDC, FDA, NIST, NOAA, USAID, AHRQ etc. These and many other funding agencies require data management plans for all proposed research projects and/or awards.

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Requirements of Data Management Plans

In a DMP, you have to consider:

- **data type:** genome data, 3D models, CT scans, images, SQL databases, spreadsheets, sequence alignments, field observations, audio/video recordings, etc.
- **data format:** file type, file size, how metadata will be stored, etc.
- **data storage & presentation:** keeping data safe (backup), long-term storage and curation
- **data sharing:** public access of data, sharing agreements, access tophysical collections, privacy issues (like for clinical data), timing of data availability
- **publishing dissemination:** venues for reporting results, access to published papers (archiving or open access)
- **roles & responsibilities** which members of the project will carry out components of the DMP

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Exercise

Take a few minutes to write down the various aspects of data management needed for your research. Consider the following questions:

- What kinds of data are you generating?
- What are the current standards for storing, preserving, and sharing data?
- Are there any potential limitations or restrictions you have to consider when sharing or storing your data?

NSF BIO Data Management Plan

Description of Data Used and/or Generated

- Describe the types of data, physical samples or collections, software, curriculum materials, and other materials to be produced in the course of the project.
- Describe the standards to be used for all the data types anticipated, including data or file format and metadata.

Accountability

- Describe the roles and responsibilities of all parties with respect to the management of the data

Data sharing

- Describe the dissemination methods will be used to make the data and metadata available to others during the period of the award and any modifications or additional technical information regarding data access after the grant ends.
- Describe the PI's policies for data sharing, public access and re-use, including re-distribution by others and the production of derivatives.

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  - NSF-BIO grant
  - Overleaf URL: http://bit.ly/2KxWJVq
- NSF IOS-1546719
  - The DMP for a collaborative award entitled: The Genetics of Highland Adaptation in Maize
  - Overleaf URL (whole proposal): http://bit.ly/2o6NR0K
- NSF PRFB example
  - Project entitled Integrating cophylogenetic and trait data using deep learning (not funded)
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What are important data management issues for your research?

Think about your own work and the data you collect, how would you craft a DMP for your project? (data type, data format, data storage preservation, data sharing, publishing dissemination, roles responsibilities)

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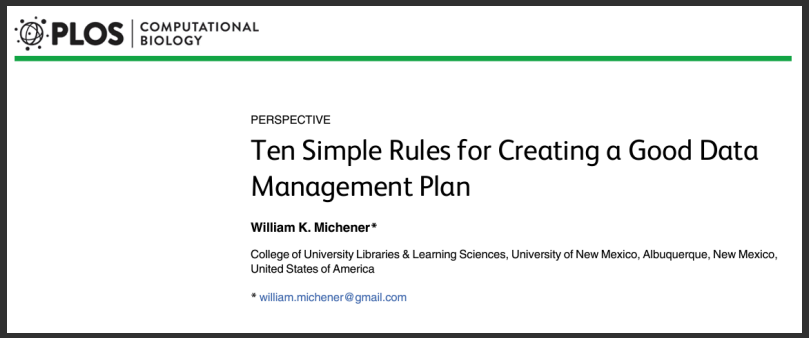
10 simple rules for writing a good DMP



PLOS | COMPUTATIONAL BIOLOGY

PERSPECTIVE

Ten Simple Rules for Creating a Good Data Management Plan

William K. Michener*

College of University Libraries & Learning Sciences, University of New Mexico, Albuquerque, New Mexico, United States of America

* william.michener@gmail.com

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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 data quality will be assured
6. Present a sound data storage and preservation strategy
7. Define the project's data policies
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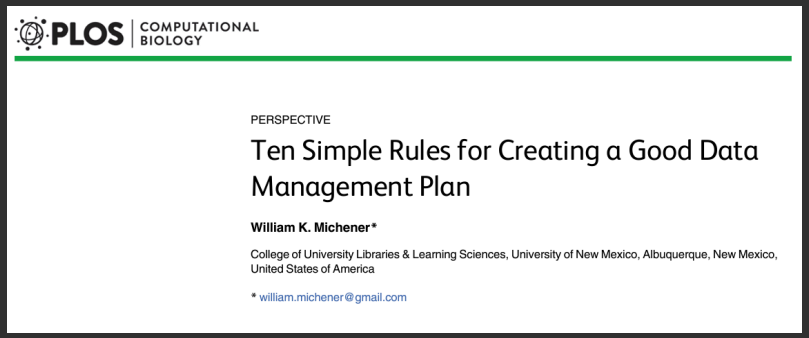

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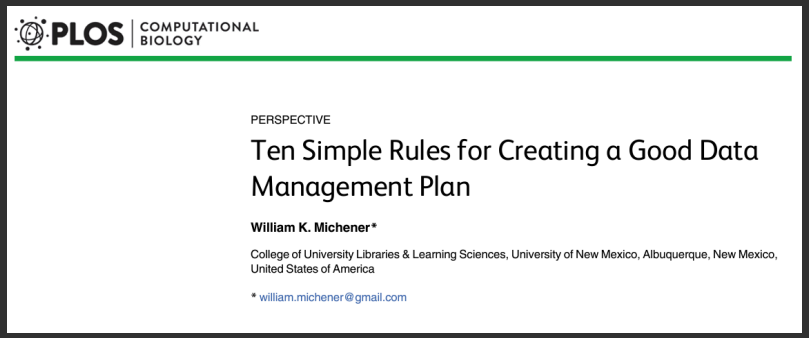

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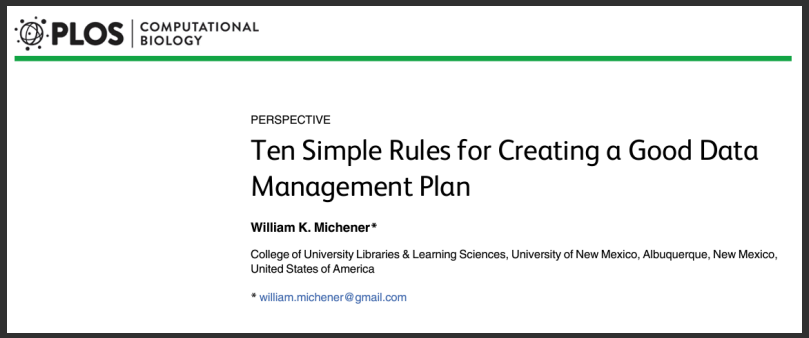

PLOS | COMPUTATIONAL BIOLOGY

PERSPECTIVE

Ten Simple Rules for Creating a Good Data Management Plan

William K. Michener*

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* william.michener@gmail.com

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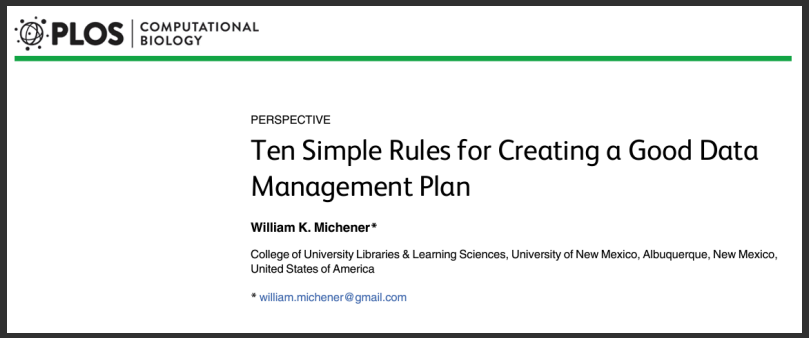

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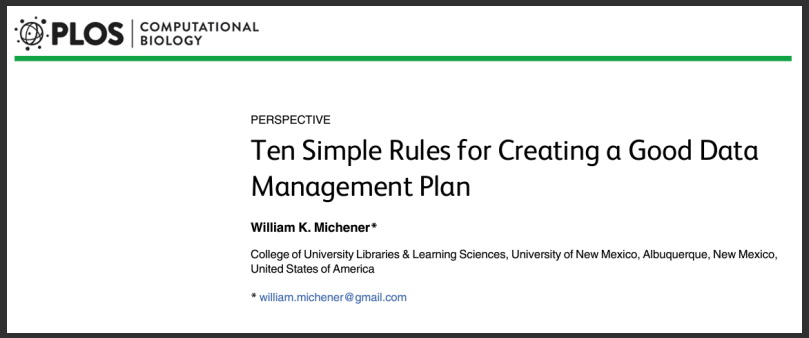

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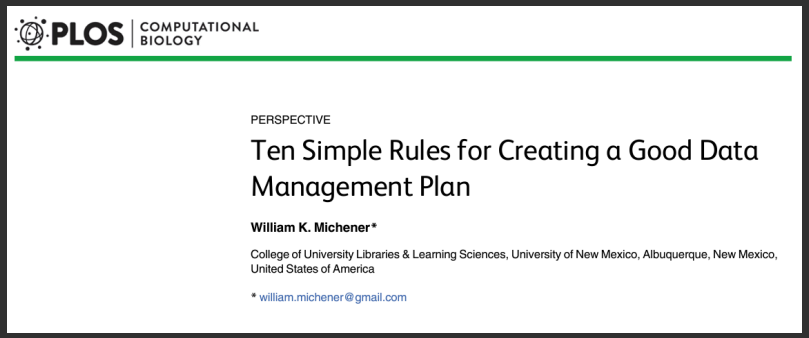

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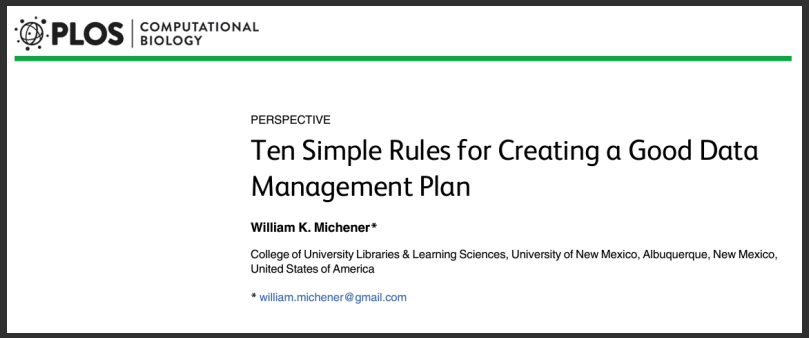

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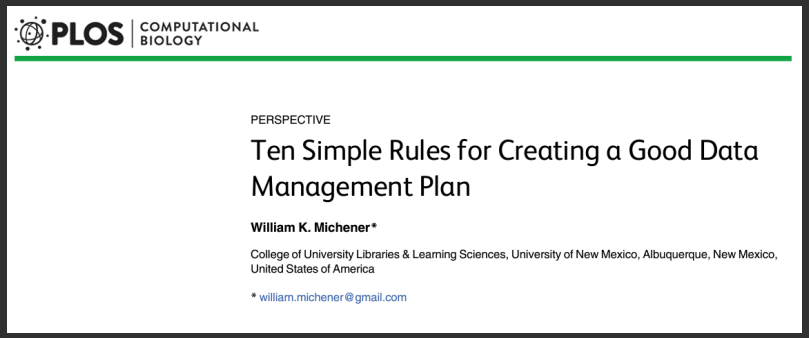

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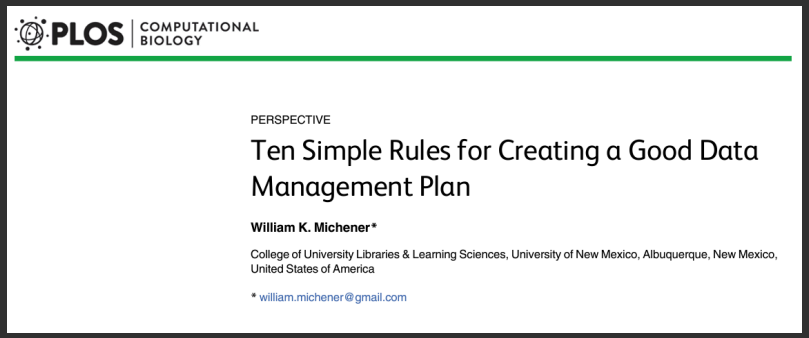

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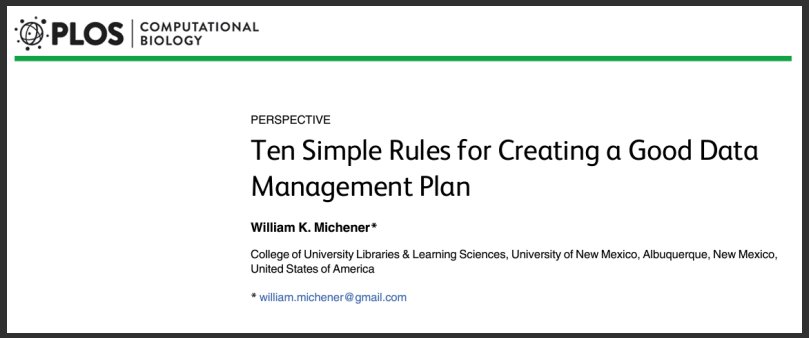

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Assignment: Write a DMP

Due: April 5, 2023
Write a DMP based on your research

LaTeX for typesetting

LaTeX for typesetting

The intention of this lesson is mainly to give you an introduction to LaTeX so that you understand the benefits of using a typesetting system for creating documents.

What is LaTeX

Pronunciation

- LaTeX is pronounced "LAH-tekh" or "LAH-tek" or "LAY-tek" (i.e., don't say the 'x')

TeX

1978 Donald Knuth introduced a typesetting system called TeXthat provides "anyone" the ability to produce high-quality typeset documents (like books).

LaTeX

- In 1985 Leslie Lamport released LaTeX , which is a set of macros for document preparation that uses the TeXtypesetting program and language.

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What are the Advantages of LaTeX ?

- It's FREE!
- very flexible and CAN create gorgeous documents
- automation of many tasks like bibliographies and cross-referencing
- major document format changes can be done by changing a single line (or with generally minimal effort)
- based on portable files (plain text) making version control, sharing, and collaboration very easy
- beautiful rendering of math and graphics
- excellent online editors
- you can make modular files that compile into a single PDF
- you can comment out sections or include based on conditional statements

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What are the Advantages of a WYSIWYG?

What you see is what you get (WYSIWYG)

- Word processing tools like Microsoft Word or Mac OS X Pages or LibreOffice Writer or Google Docs are all excellent tools for creating documents.
- editing is intuitive and easy to start right away
- almost everyone has Word installed knows how to use it
- you are required to use it for many documents as an academic

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What are the Disadvantages of a WYSIWYG?

- many are costly
- formatting is often mysterious and challenging to get exactly right
- terrible for equations
- files are difficult to manage using version control, thus collaboration is sometimes clunky (requiring versioned copies of files, tracking changes)
- bibliography management is nearly impossible without second-party software
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What are the Disadvantages of LaTeX ?

- Substantial learning curve
- it is challenging to collaborate with people who don't know how to use it
- sometimes error messages are cryptic
- it can take some effort to figure out how to do something you've never done before (e.g., create a numbered list that goes in reverse order, which is impossible to do in Word, by the way)
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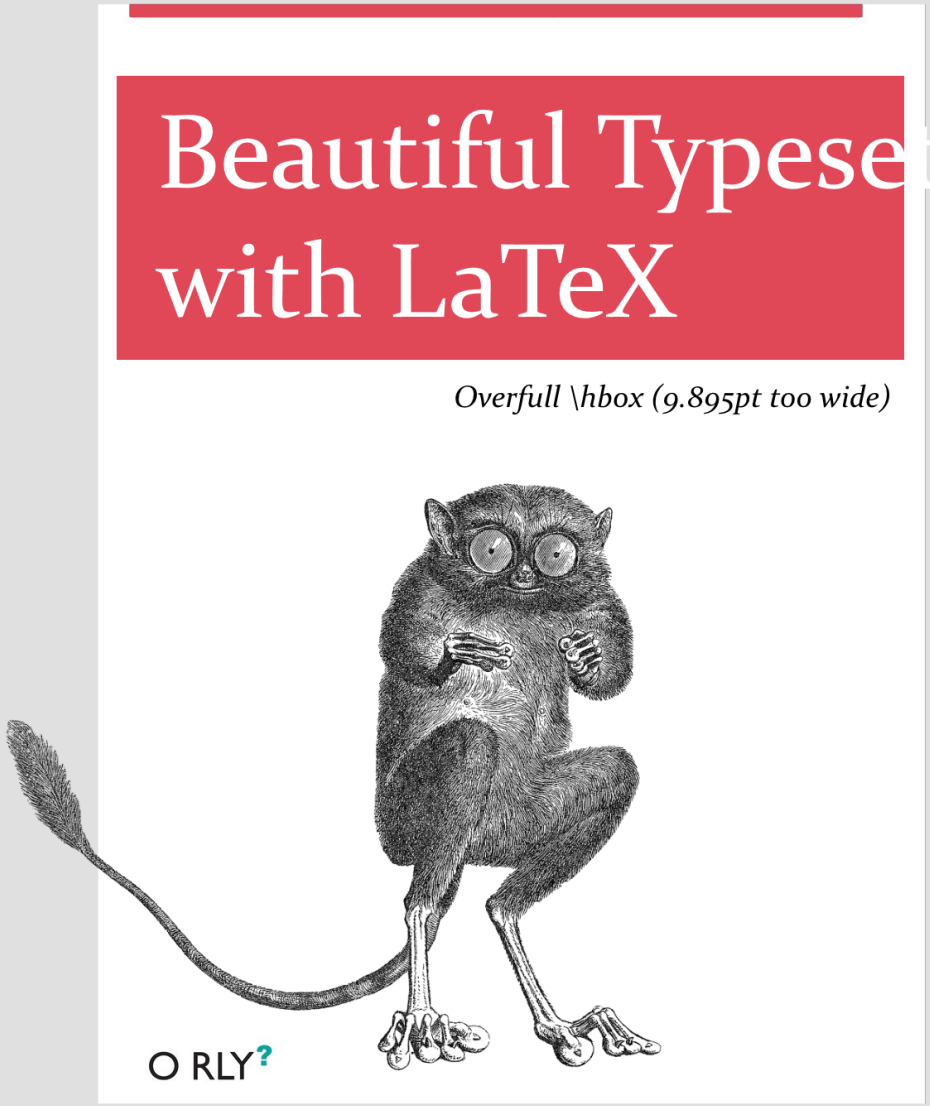

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