

rbtl - Research Beyond the Lab

Research Data Management

Lars Schöbitz

2022-04-28

Today

1. Homework Assignment 4 - Solutions
2. Week 5 - Learning Objectives
3. Research Data Management
4. Data Organisation in Spreadsheets
5. Homework Assignment 5

Homework Assignment 4

Think, Pair, Share

1. What is the difference between markdown and R Markdown?
2. How does a file written in markdown differ from a file in a proprietary file format (e.g. .docx)?

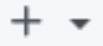
- **Think** for 2 minutes
- **Pair** with your neighbour for 4 minutes
- **Share** your answer with the class

02:00

Homework Assignment 4 - Solutions

main ▾

1 branch 0 tags



larnsce Added solutions file for ae-04-rmarkdown

76c1239 1 minute ago 2 commits

.gitignore Initial commit

5 days ago

LICENSE Initial commit

5 days ago

README.md Initial commit

5 days ago

ae-04-rmarkdown-solutions.Rmd Added solutions file for ae-04-rmarkdown

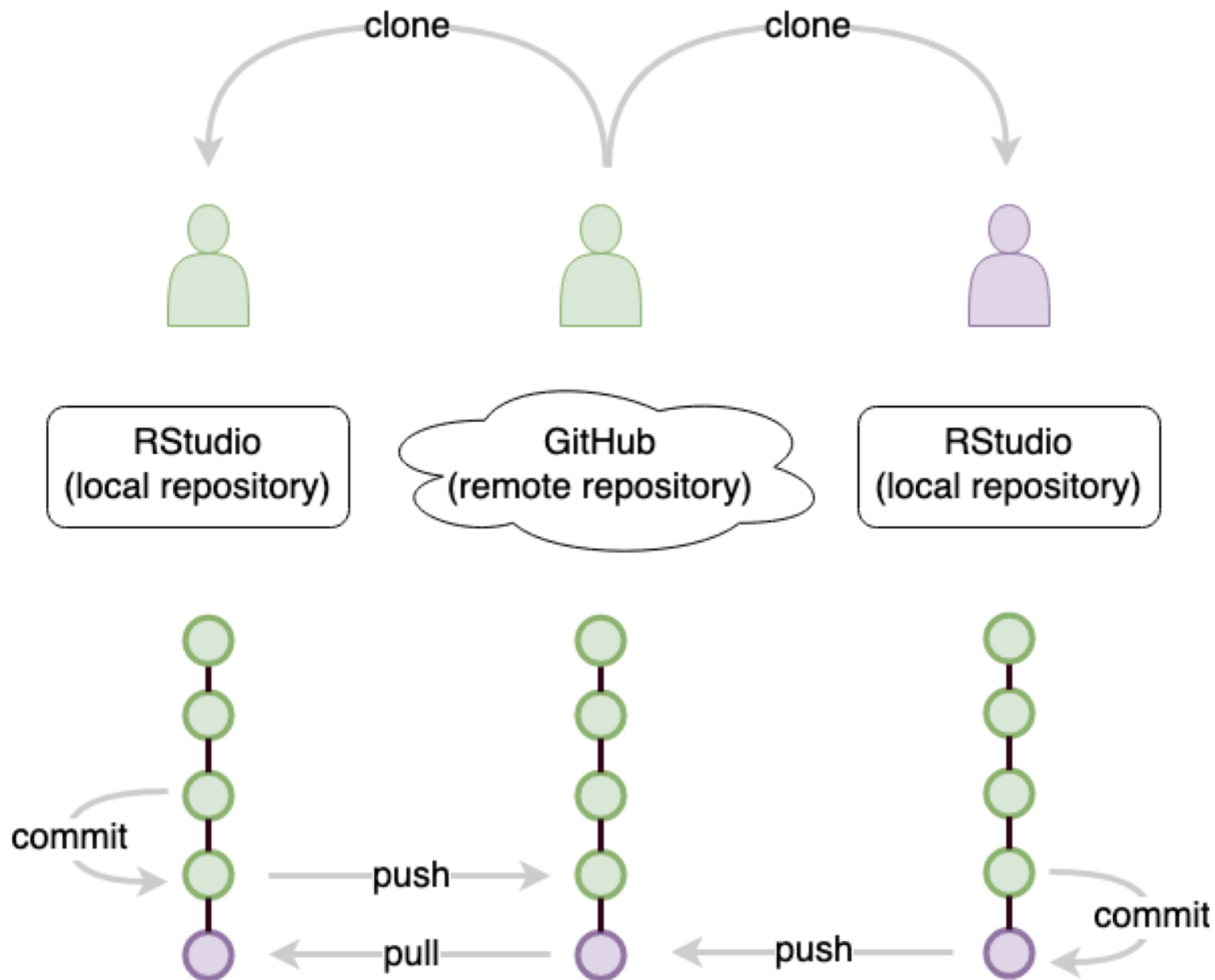
1 minute ago

ae-04-rmarkdown.Rmd Initial commit

5 days ago

ae-04-rmarkdown.Rproj Initial commit

5 days ago



Homework Assignment 4 - Feedback

🔒 [rbtl-fs22 / ae-04-rmarkdown-oda-vigen](#) Private 👁 Unwatch 1 🍴 Fork 0 ★ Star 0

generated from [ghe-learn/ae-04-rmarkdown](#)

[Code](#) **🕒 Issues 1** [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#) ⋮

Filters 🏷 Labels 9 📅 Milestones 0 New issue

🕒 1 Open ✓ 1 Closed Author Label Projects Milestones Assignee Sort

🕒 **Feedback on your research plan**
#2 opened 6 hours ago by elizabeth-tilley

Homework Assignment 4 - Feedback

Feedback on your research plan #2

Edit

New issue

Open

elizabeth-tilley opened this issue 6 hours ago · 0 comments



elizabeth-tilley commented 6 hours ago · edited



great job! A couple of comments below:

1. Difference in what waste?

```
ae-04-rmarkdown-oda-vigen/ae-04-rmarkdown.Rmd  
Line 89 in 1100c8d  
89 - What is the difference when the bin is standing near to recycle bins
```

2. What are the units of "amount"?

```
ae-04-rmarkdown-oda-vigen/ae-04-rmarkdown.Rmd  
Line 93 in 1100c8d  
93 - How does the amount of cigarettes differ depending on whether the bi
```

Assignees

No one—assign yourself

Labels

None yet

Projects

None yet

Milestone

No milestone

Week 5 - Learning Objectives

Week 5 - Learning Objectives

1. Learners can use a tool for survey design for 12 to 15 questions ~~using at least two elements of survey logic~~
2. Learners can apply 12 principles for data organisation in spreadsheets in the layout of a collected dataset
3. Learners understand the importance of documentation and metadata for (research) data management

Research Data Management

Research Data Management

Acronym: RDM. Refers to the organisation, storage and preservation of data created during a research project. It covers initial planning, day-to-day processes and long-term archiving and sharing. Shortened to RDM. -

Reference

Research Data Management

- ensures efficiency in research workflows
- enables greater reach and impact (FAIR principles)
- prevents loss and data corruption
- documentation and metadata ensures access and enables reuse for others

The FAIR principles

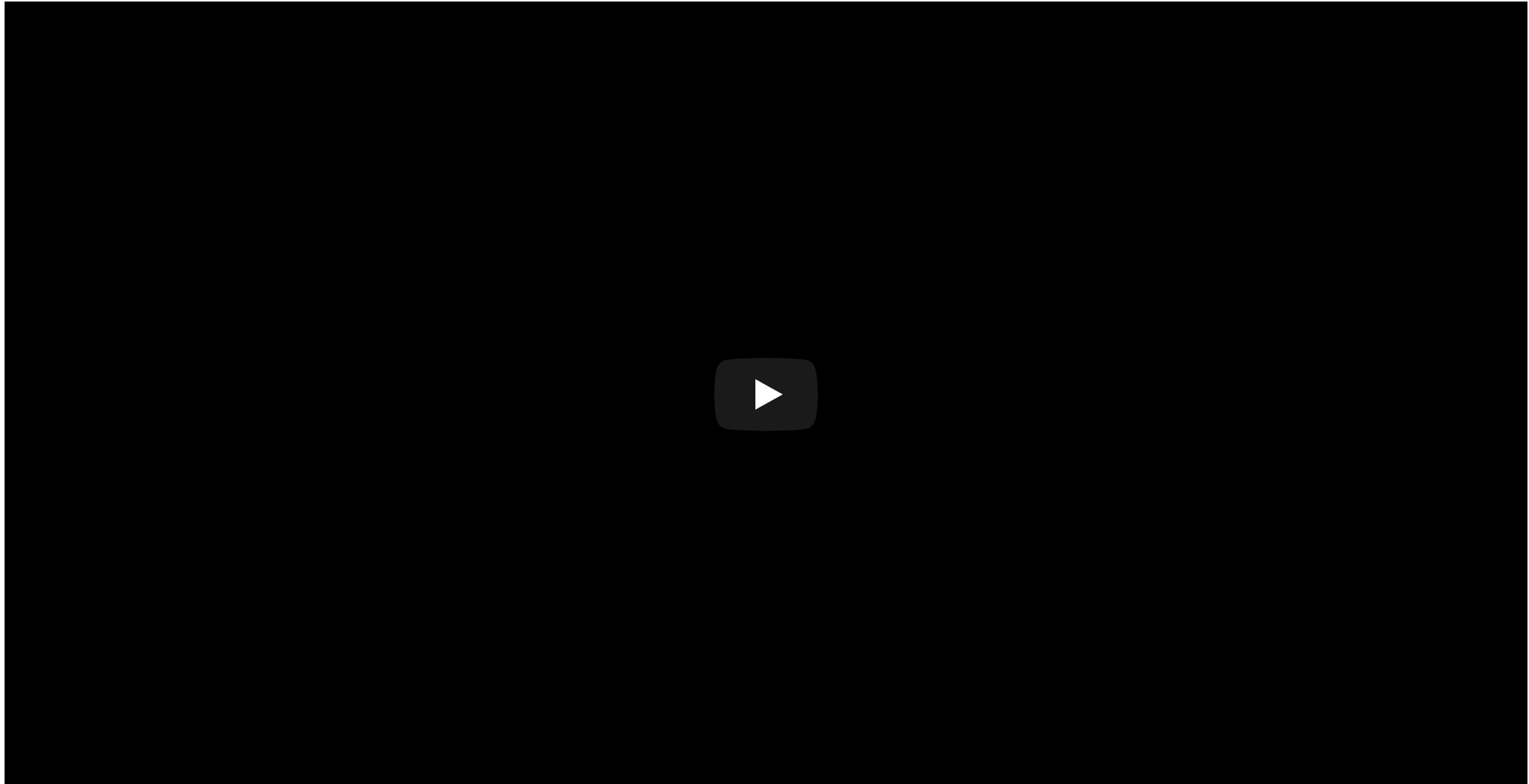


The Turing Way Community, & Scriberia. (2021). Illustrations from the Turing Way book dashes. Zenodo.
<https://doi.org/10.5281/zenodo.5706310>

Scriberia 

Research Data Lifecycle

Research Data Lifecycle



Reference: <https://www.youtube.com/watch?v=-wjFMMQD3UA>

Data Management Plan

Data Management Plan

Provides information on five main topics:

1. Roles and Responsibilities
2. Type and size of data collected and documentation/metadata generated
3. Type of data storage used and back up procedures that are in place
4. Preservation of the research outputs after the project
5. Reuse of your research outputs by others

Data Management Plan

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Data Management Plan

The screenshot shows a web page from the ETH Library. The top navigation bar is dark red with 'Documentation Spaces > Website ETH-Bibliothek' on the left, a search bar in the center, and a 'Log in' button on the right. The main content area has a white background. On the left, there is a sidebar with a red icon containing binary code and the text 'Research Data Management and Digital Curation'. Below this is a 'PAGE TREE' section with a list of links: 'Forschungsdatenmanagement und Data Management', 'Research Data Management and Digital Curation' (expanded), 'FAQ english', 'Instructions and downloads' (expanded), and a list of sub-links including 'What is a Data Management Plan', 'Data Management Plan SNSF – Guidelines', 'Data Management Plan Instructions', 'Data Management Checklist', 'Standards and guidelines', and 'Data Management Costing Tool and...'. The main content area features a breadcrumb trail 'Pages / ... / Instructions and downloads', a heading 'What is a Data Management Plan?', and two paragraphs of text. The first paragraph explains the purpose of a data management plan. The second paragraph states that it is recommended to start early and provides a link to 'Guidelines for Research Integrity at the ETH Zurich'. Below this is a list of two bullet points: 'The project management is responsible for proper storage of the data after project completion.' and 'Primary data must be securely stored. The results must be completely reproducible from the...'. A vertical red banner on the right side of the page reads 'ETH-Bibliothek Website'.

Documentation Spaces > Website ETH-Bibliothek

Search

Log in

Research Data Management and Digital Curation

PAGE TREE

- > Forschungsdatenmanagement und Data Management
- ▼ Research Data Management and Digital Curation
 - FAQ english
 - ▼ Instructions and downloads
 - **What is a Data Management Plan**
 - Data Management Plan SNSF – Guidelines
 - Data Management Plan Instructions
 - Data Management Checklist
 - Standards and guidelines
 - Data Management Costing Tool and...

Pages / ... / Instructions and downloads

What is a Data Management Plan?

A data management plan will help you in the management of research data generated in your project. Put simply, a data management plan describes the data that is collected or generated in the course of your work and what happens to this data during its life-cycle (storage, publication, citation, long-term availability, anonymity, deletion, etc.). The goal of a data management plan is to meet the requirements of good scientific practice and to allow for reproducibility of research results.

It is recommended to start early with the preparations for the handling of research data and to update the procedures during the project. The following specifications guide you in this process.

In the [Guidelines for Research Integrity at the ETH Zurich](#)¹, some data management guidelines are specified (see Article 11 "Collection documentation and storage of primary data" and Article 12 "Rights to the primary data and materials"):

- The project management is responsible for proper storage of the data after project completion.
- Primary data must be securely stored. The results must be completely reproducible from the

ETH-Bibliothek Website

Documentation and Metadata

You got data. Is it enough?



Erika Berenguer

@Erika_Berenguer



Replying to @Erika_Berenguer

[@tomjwebb](#) I see tons of spreadsheets that i don't understand anything (or the student), making it really hard to share.

4:32 PM · Jan 16, 2015



1 Reply Copy link

[Explore what's happening on Twitter](#)



Sven Kochmann

@indianalytics



Replying to @tomjwebb

[@tomjwebb](#) [@ScientificData](#) "Document. Everything." Data without documentation has no value.

5:08 PM · Jan 16, 2015



1 Reply Copy link

[Explore what's happening on Twitter](#)

Slide taken from: <https://annakrystalli.me/rrresearchACCE20/metadata-slides.html#metadata-slides>

You got data. Is it enough?



Canadian Journal of Fisheries and Aquatic Sciences

@cjfas



Replying to @tomjwebb

[@tomjwebb](#) Annotate, annotate, annotate!

4:22 PM · Jan 16, 2015



♡ 2 💬 Reply 🔗 Copy link

[Explore what's happening on Twitter](#)



Ward Appeltans

@WrdAppltns



Replying to @tomjwebb

Document all the metadata (including protocols).[@tomjwebb](#)



4:19 PM · Jan 16, 2015



♡ 4 💬 Reply 🔗 Copy link


[Explore what's happening on Twitter](#)




Think, Pair, Share

 **Leigh Dodds**
@ldodds 

You download a zip file of [#OpenData](#). Apart from your data file(s), what else should it contain?

Nothing	7.2%
Dataset metadata	11.6%
Metadata & documentation	52.5%
I didn't want a zip	28.7%

181 votes · Final results
6:30 PM · Feb 6, 2017 

 10  Reply  Copy link

[Read 8 replies](#)

Think, Pair, Share

Thought experiment: Imagine a dream open data set

1. How would you locate it?
2. What details would you need to know to determine relevance?
3. What information would you need to know to use it?

- **Think** for 2 minutes
- **Pair** with your neighbour for 4 minutes
- **Share** your answer with the class

02:00

ETH library

Data Management Plan Instructions for ETH Zurich Researchers

Section 1: Data collection and documentation

- 1.3 What documentation and metadata will you provide with the data?
 - What information about your data (i.e., metadata) is required to make reuse of your data in the future?
 - Are you using certain community standards for the annotation of metadata?
 - How will data documentation be carried out?

Q1: What information about your data (i.e., metadata) is required to make reuse of your data in the future?

- Codebook or data dictionaries that define and explain all variables in your data
- A human and machine-readable file (e.g. README.md) that contains general information on:
 - Title of the dataset
 - Description of the dataset
 - Author information (Name, Institution, Address, Email)
 - Date of data collection (begin, end)
 - Geographic location of data collection
 - etc.
- A license to clarify reuse possibilities

Q2: Are you using certain community standards for the annotation of metadata?

- General metadata standards (e.g. [DublinCore](#), [schema.org](#), [R3data.org](#))
- Domain specific standards (**we won't get into this**)

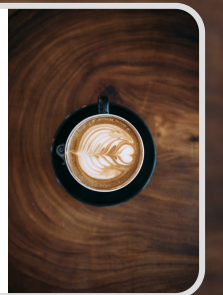
Q3: How will data documentation be carried out?

- Repository hosted on GitHub with license that clarifies use: [CC-BY-4.0](#)
- Repository has `/data` directory which contains:
 - **Codebook** (stored as `attributes.csv`) that describes all variables following [schema.org](#) standards
 - **README** hat contains information for each dataset, following variation of Cornell University README template

Let's take a break



10:00



Data Collection Tools

Data Collection Tools

- Questionnaires for survey based data collection
- Spreadsheets for experimental data collection

Surveys

Surveys

Commonly used in our sector

- KOBO Toolbox
- mWater
- OpenDataKit

ETH tool - Select Survey

- Select Survey Portal <https://selectsurvey.ethz.ch/>
- Select Survey User Manual
- Select Survey IT Knowledge Base

Live Demonstration - Select Survey



Task - Fill out questionnaire

- Open Slack and find the link to the questionnaire we have just created
- Fill out the questionnaire

Live Demonstration - Writing a codebook



Let's take a break



10:00



Data Organisation in Spreadsheets

Data Organisation in Spreadsheets




Article

Data Organization in Spreadsheets

Karl W. Broman & Kara H. Woo

Pages 2-10 | Received 01 Jun 2017, Accepted author version posted online: 29 Sep 2017, Published online: 24 Apr 2018

 Download citation

 <https://doi.org/10.1080/00031305.2017.1375989>



Data Organisation in Spreadsheets

Read the paper (it's part of your homework), but you can also:


- Go through the annoated slides:
https://kbroman.org/Talk_DataOrg/dataorg_notes.pdf
- Watch Karl Broman give the talk (02:36 to 45:00):
<https://youtu.be/t74E0a90gkA?t=156>
- Read the content on a website: <https://kbroman.org/dataorg/>

But, especially apply it to your data



Why?

Because it will make your life easier!

Latest	Open access	Most read	Most cited
		The ASA Statement on p-Values: Context, Process, and Purpose >	565521 Views
		Ronald L. Wasserstein et al. Editorial Published online: 9 Jun 2016	
		Moving to a World Beyond “$p < 0.05$” >	288362 Views
		Ronald L. Wasserstein et al. Editorial Published online: 20 Mar 2019	
		Data Organization in Spreadsheets >	261173 Views
		Karl W. Broman et al. Article Published online: 24 Apr 2018	
		Inferential Statistics as Descriptive Statistics: There Is No Replication Crisis if We Don't Expect Replication >	44130 Views
		Valentin Amrhein et al. Article Published online: 20 Mar 2019	

License? CC0 (!)

☰ README.md

Data organization in spreadsheets

Slides for a talk for the [OSGA Webinar Series](#), on 24 Sept 2021, based on [my paper of the same title with Kara Woo](#). Also see the [related website](#).

PDF of slides: https://kbroman.org/Talk_DataOrg/dataorg.pdf

PDF of slides with notes: https://kbroman.org/Talk_DataOrg/dataorg_notes.pdf

Video of presentation: <https://youtu.be/t74E0a90gkA>

License

To the extent possible under law, [Karl Broman](#) has waived all copyright and related or neighboring rights to "[Data organization in spreadsheets](#)". This work is published from the United States.



Waste Characterisation - Data example

bin_id	collection_date	waste_category	weight
234	2022-03-22	plastics	2.5
234	2022-03-22	metal	1.7
234	2022-03-22	pet	0.8
234	2022-03-22	other	15.0
682	2022-03-22	plastics	6.5
682	2022-03-22	metal	1.1
682	2022-03-22	pet	7.8
682	2022-03-22	other	9.1

Waste Characterisation - How to collect your data?



Holly Vickery
@SkylarkHolly



Working with goats 🤔🙄

The collage shows three different data collection methods:

- Printed Table (Weights):** A table with columns for date, pen, and various weight measurements.
- Handwritten Table (Feed and Water Intake):** A table with columns for Pen, Date, Creep in, Creep out, Hay in, Hay out, Straw in, Straw out, and Water.
- Handwritten Table (Cardboard):** A table with columns for pen number, date, weight, and other measurements.

Pen	Date	Weight 1	Weight 2	Weight 3	Weight 4	Weight 5			
1	18-Jul	6000	277	640	735	420	4	1.06	
2	18-Jul	600	19	1770	150	835	380	4	1.59
3	18-Jul	300	194	1555	330	970	235	6	1.14
4	18-Jul	400	259	880	880	915	330	4	2.75
1	19-Jul		234	1210	410	670	295	4	1.53

Pen	Date	Creep in	Creep out	Hay in	Hay out	Straw in	Straw out	Water
1	19/7	6kg	838	2.00	730	965	370	2.5
2	19/7	500	346	490	990	780	265	4
3	19/7	300	240	905	785	1.040	650	4
4	19/7	400	174	1.020	1.020	655	290	4
1	20/7	6kg	1.021	1.420	1.420	600	440	4
2	20/7	600	94	1.380	465	705	260	4
3	20/7	300	271	1.175	800	680	645	4
4	20/7	400	183	975	810	750	215	4

Pen	Date	Weight	Weight	Weight	Weight
2	23/7	3.5	73	1.890	
3	23/7	300	237	1.495	
4	23/7	400	185	1.290	
1	24/7	6.5	123	2.230	
2	24/7	3.5	238	2.765	
3	24/7	200	203	1.155	
4	24/7	400	223	1.300	
1	25/7	7kg	225	1.460	
2	25/7	3kg	757	1.670	
3	25/7	400	209	1.000	
4	25/7	400	295	1.570	

Assignment 5

Assignment 5

Submit via GitHub by 2022-03-29 23:59

1. ~~Groups~~ Students will program their revised questionnaire onto a digital platform so it is ready to use for the following class
2. ~~Groups~~ Students will transfer their variables into a spreadsheet database
3. ~~Groups~~ Students will write a codebook for their spreadsheet database
4. ~~Groups~~ Students will write a README for documentation of metadata

All details on website: <https://rbtl-fs22.github.io/website/am-05-data-management.html>

Final excursion - File naming conventions

File naming conventions

Why?

- to stay organised
- to not end up with: `'text is FINAL_v2-Ls.docx'`

File naming conventions - Directories and files

Rule 1: Avoid capital letters

```
project/rbtl/website/data/
```

(if you want them, be consistent)

File naming conventions - Directories and files

Rule 2: Avoid empty spaces

```
project/rbtl/website/data/tab-01-rbtl-assignments.csv
```

File naming conventions - Directories and files

Rule 3: Use dash '-' to connect text strings in file names

```
tab-01-rbtl-assignments.csv
```

File naming conventions - Directories and files

Rule 4: Avoid special characters (e.g %, £)

File naming conventions - Directories and files

Rule 5: Use ISO 8601 date format: YYYY-MM-DD

2022-03-21-waste-characterization-erz.csv

File naming conventions - Directories and files

Rule 6: Use names that are descriptive for the content

2022-03-21-waste-characterization-erz.csv

Thanks! 

Slides created via the R packages:

xaringan

[gadenbuie/xaringantheme](#)

The chakra comes from [remark.js](#), **knitr**, and R Markdown.

Access slides as PDF on [GitHub](#)

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