

# 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

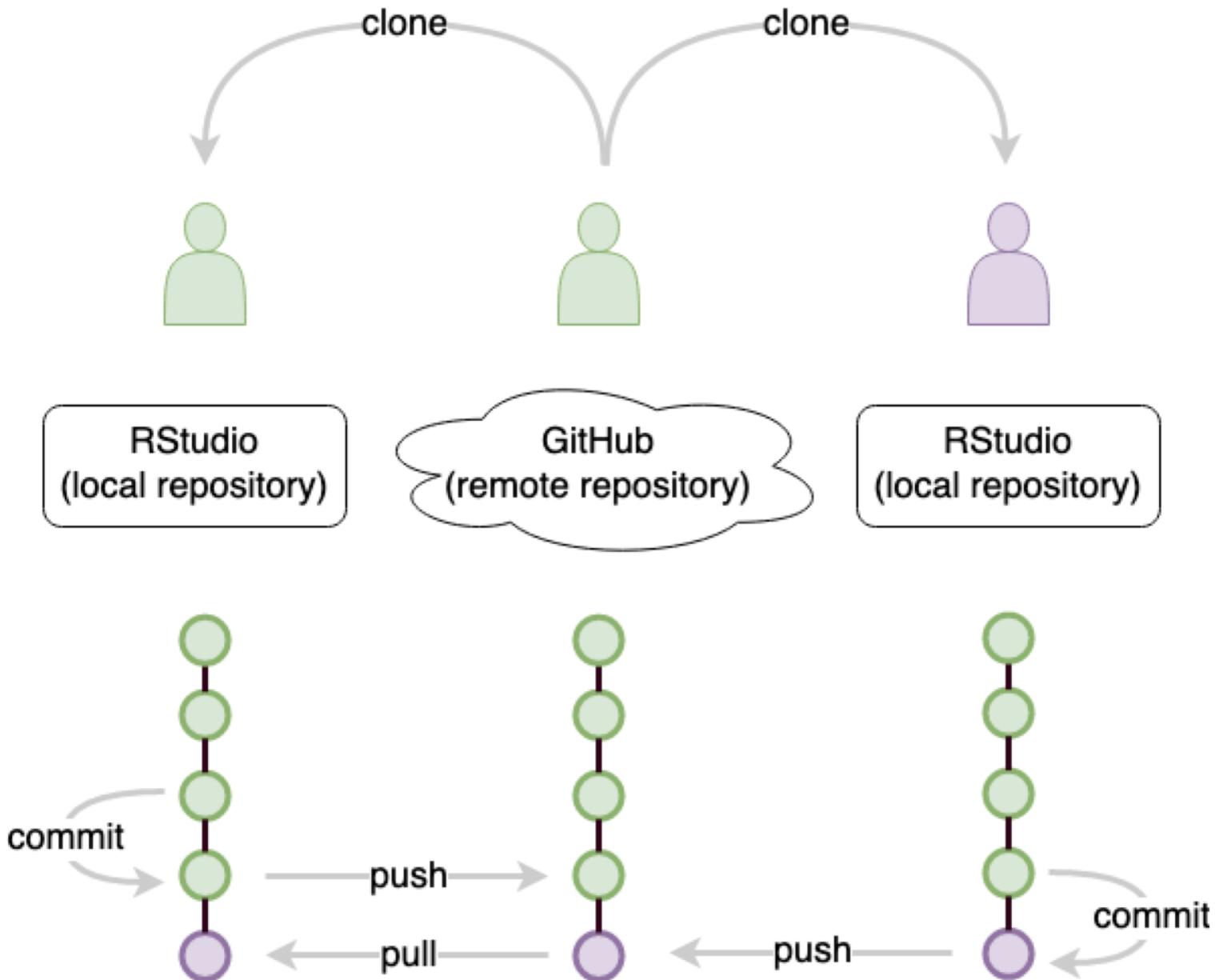
Initial commit

5 days ago

ae-04-rmarkdown.Rproj

Initial commit

5 days ago



# Homework Assignment 4 - Feedback

[rbtl-fs22/ae-04-rmarkdown-oda-vigen](#) Private

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

Open

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

Edit

New issue



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

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# 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

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Provides information on five main topics:

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# Data Management Plan

Documentation Spaces > Website ETH-Bibliothek Search Log in

 Research Data Management and Digital Curation

PAGE TREE

- > Forschungsdatenmanagement und Dat
- ⌄ Research Data Management and Digital
  - FAQ english
  - ⌄ Instructions and downloads
    - **What is a Data Management Plan**
    - Data Management Plan SNSF – Gui
    - Data Management Plan Instructions
    - Data Management Checklist
    - Standards and guidelines
    - Data Management Costing Tool an

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](#)<sup>1</sup>, 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

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# You got data. Is it enough?



Erika Berenguer @Erika\_Berenguer



Replies 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



Replies to @tomjwebb

@tomjwebb @ScientificData "Document. Everything." Data without documentation has no value.

5:08 PM · Jan 16, 2015



1 Reply Copy link

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

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

# You got data. Is it enough?



Canadian Journal of Fisheries and Aquatic Sciences

@cjfas



Replies to @tomjwebb

@tomjwebb Annotate, annotate, annotate!

4:22 PM · Jan 16, 2015



2 likes · 0 replies · 0 retweets · Copy link

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



Ward Appeltans

@WrdAppltns



Replies to @tomjwebb

Document all the metadata (including protocols).@tomjwebb

4:19 PM · Jan 16, 2015



4 likes · 0 replies · 0 retweets · 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?



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

## 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



Photo by: [Blake Wisz](#)

# Data Collection Tools

# Data Collection Tools

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

# Surveys

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# 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



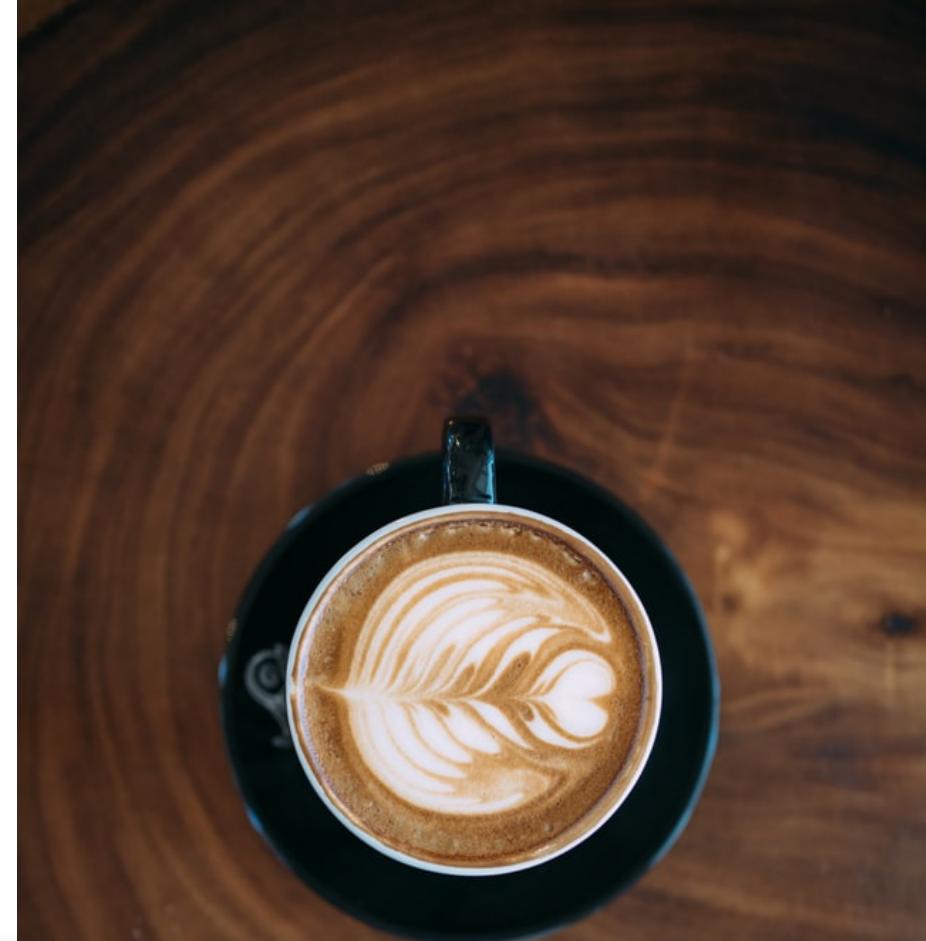
## Task - Fill out questionnaire

- 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



Photo by: [Blake Wisz](#)

# Data Organisation in Spreadsheets

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# 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:

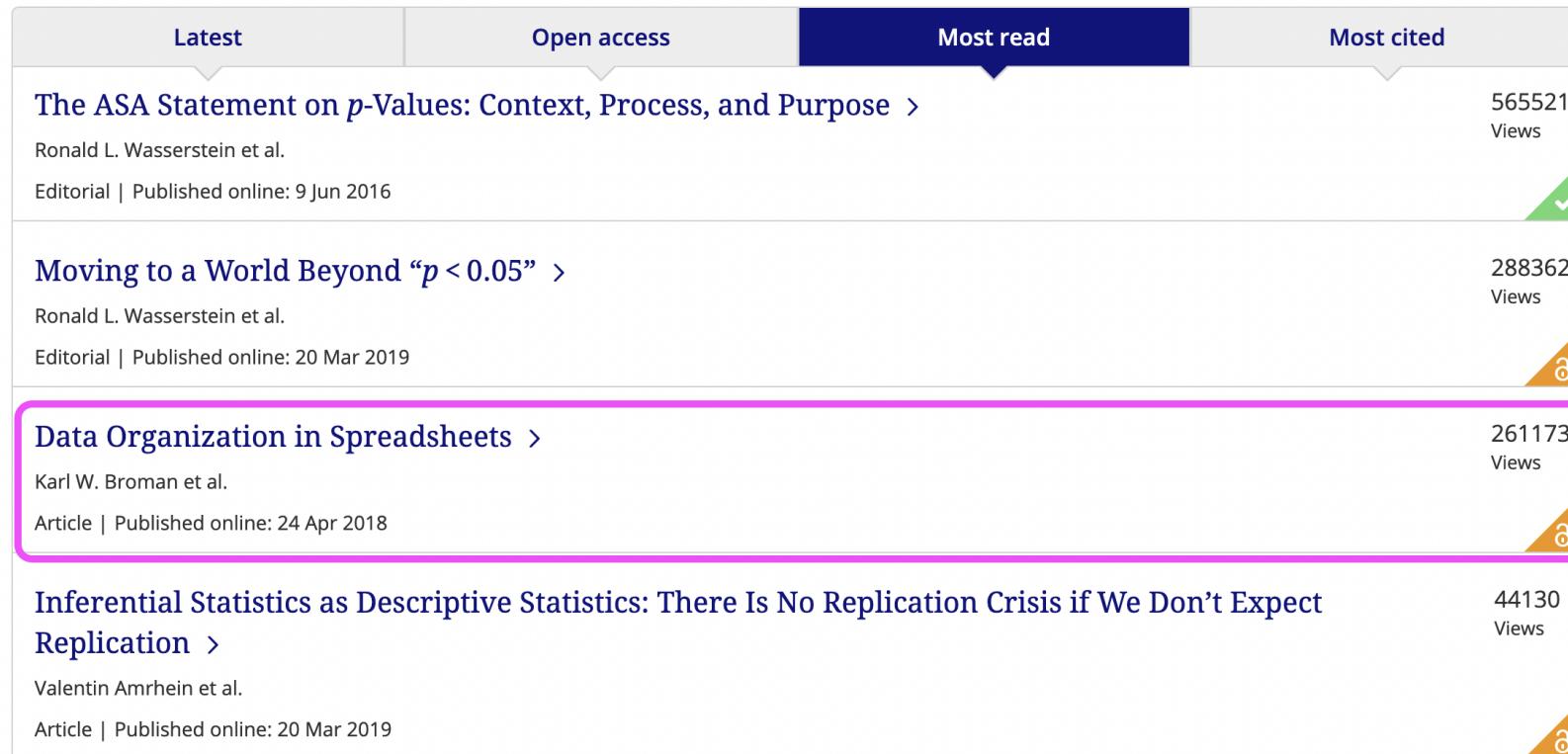
- Go through the annotated slides:  
[https://kbroman.org/Talk\\_DataOrg/dataorg\\_notes.pdf](https://kbroman.org/Talk_DataOrg/dataorg_notes.pdf)
- Watch Karl Broman give the talk (02:36 to 45:00):  
<https://youtu.be/t74E0a90gkA?t=156>
- Read the content on a website: <https://kbroman.org/dataorg/>

But, especially apply it to your data



# Why?

Because it will make your life easier!



# License? CCO (!)

☰ 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](https://kbroman.org/Talk_DataOrg/dataorg.pdf)

PDF of slides with notes: [https://kbroman.org/Talk\\_DataOrg/dataorg\\_notes.pdf](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 image shows a computer monitor with a spreadsheet open, likely Microsoft Excel, containing data for goat pens. In front of the monitor are two handwritten logs on lined paper.

**Handwritten Log 1 (Top Right):**

		kg		
2	23/7	3.5	73	1.890
3	27/7	400	237	2.016
4	23/7	400	185	1.495
1	24/7	6.5	123	1.290
2	24/7	3.5	238	2.230
3	24/7	200	203	2.765
4	24/7	400	223	1.155
1	25/7	7kg (1)	225	1.300
2	25/7	3kg (1)	757	1.460
3	25/7	400	709	1.670
4	25/7	400	295	1.000

**Handwritten Log 2 (Bottom Left):**

Feed and water intake							
Pen	Date	Creep in	Creep out	Hay in	Hay out	Straw in	Straw out
1	19/7	6kg	838	2.00	730	965	370 215
2	19/7	500	346	990	990	780	265 95
3	19/7	300	240	905	785	1.040 650	+
4	19/7	400	174	1.020	1.020	655	290 4
1	20/7	6kg	1.021	1.420	1.420	600	440 18
2	20/7	600	94	1.380	465	705	260 4915 X
3	20/7	300	271	1.175	800	680	645 .4 1.81
4	20/7	400	183	975	810	750	215 + 2.38

# 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/xaringanthemer

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

Access slides as PDF on [GitHub](#)

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