

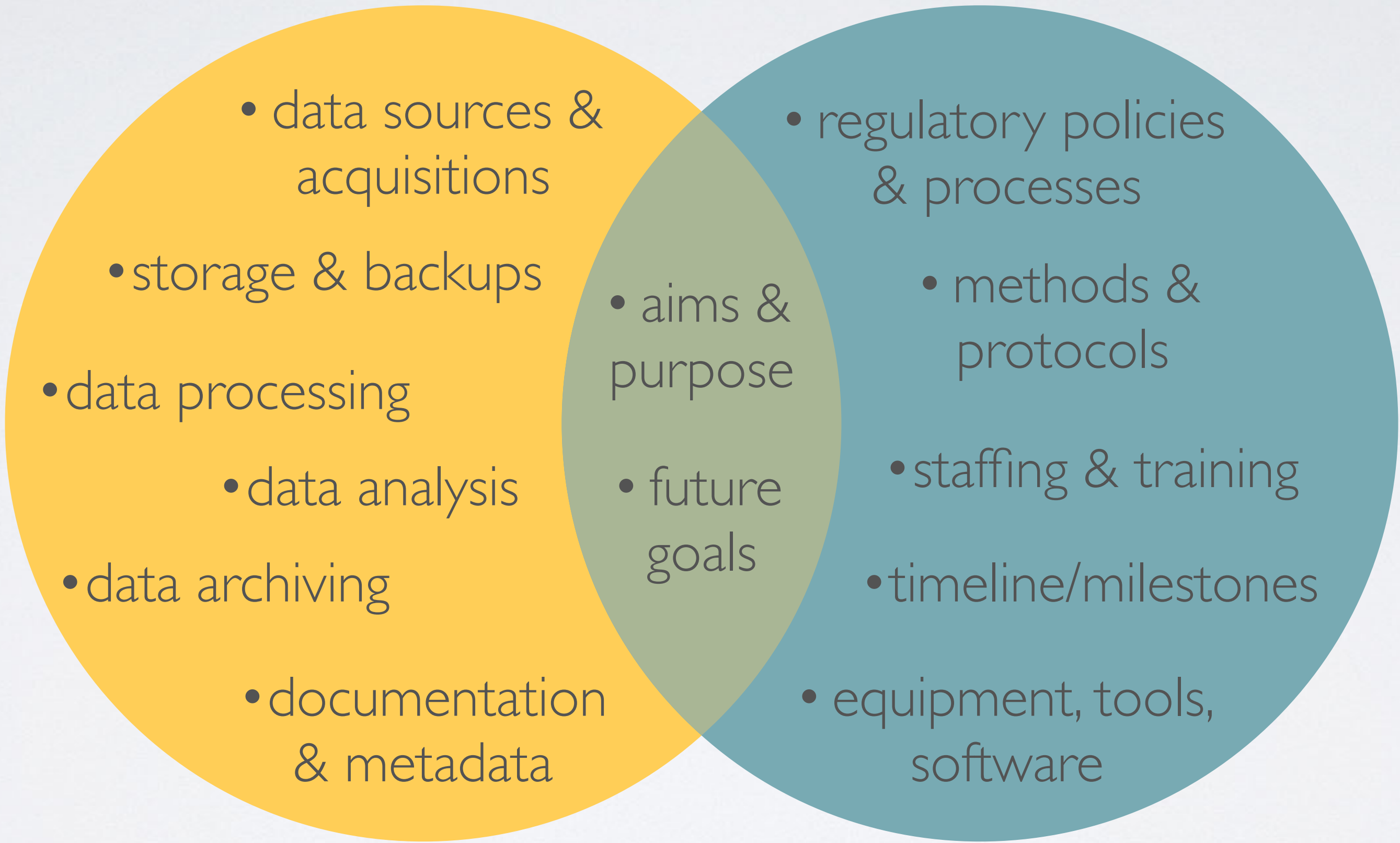
Good Enough Practices for Data and Project Management

Alaina Pearce

Project vs Data Management

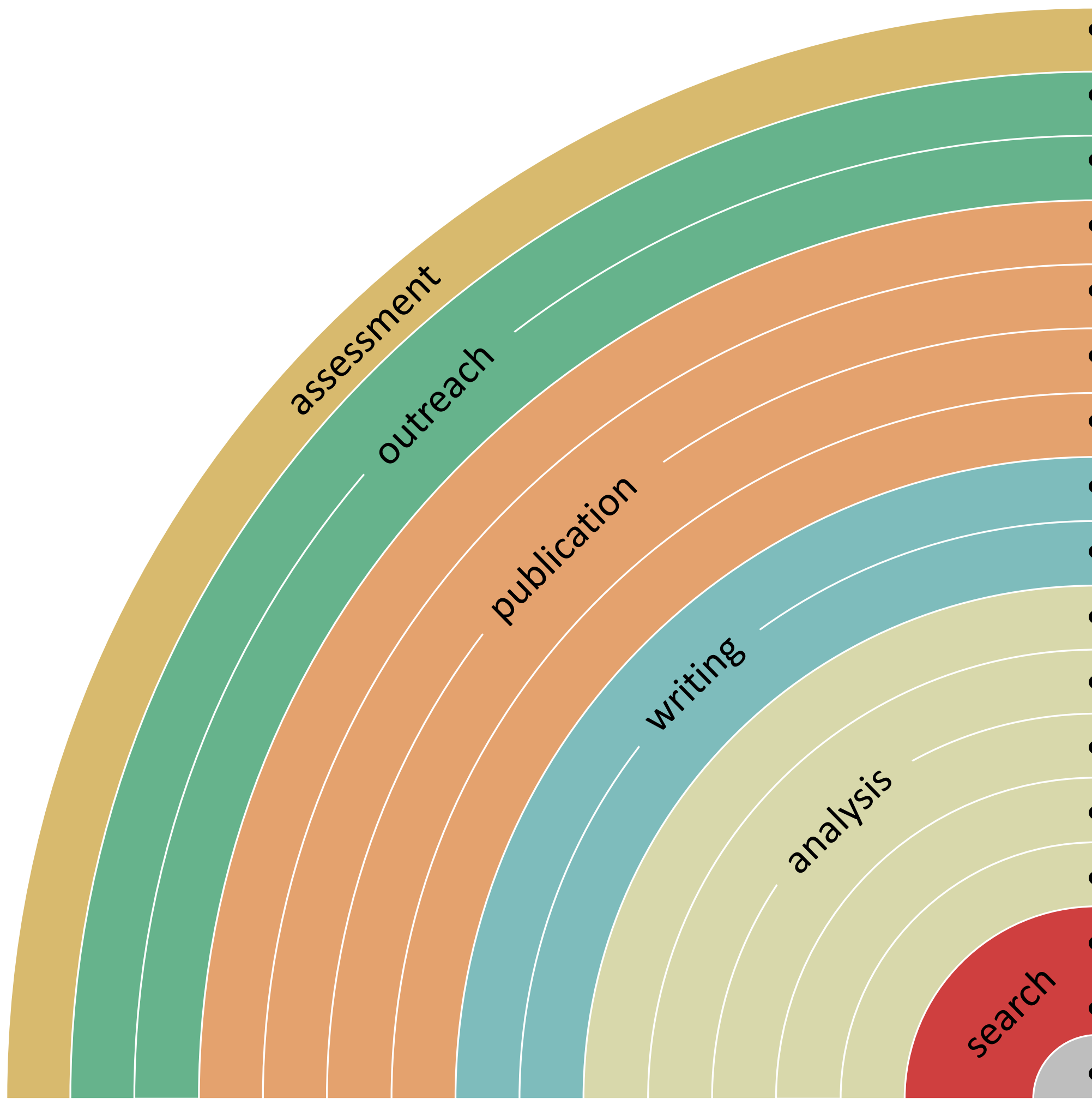
Data Management

Project Management

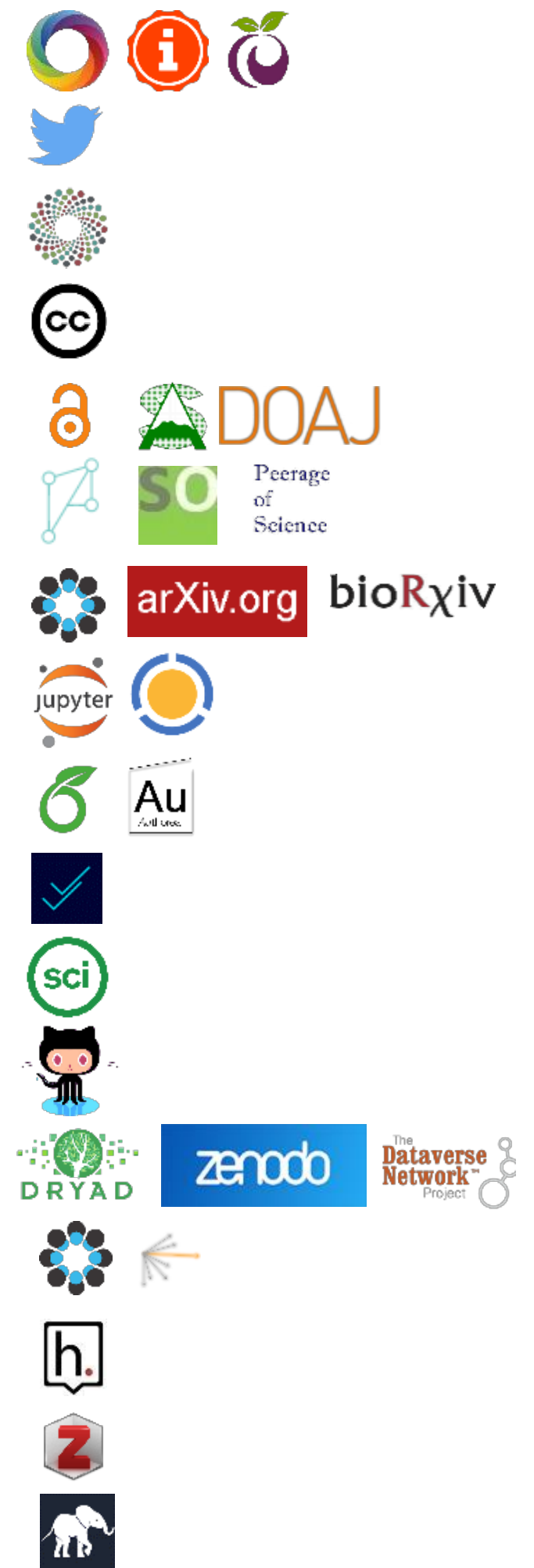


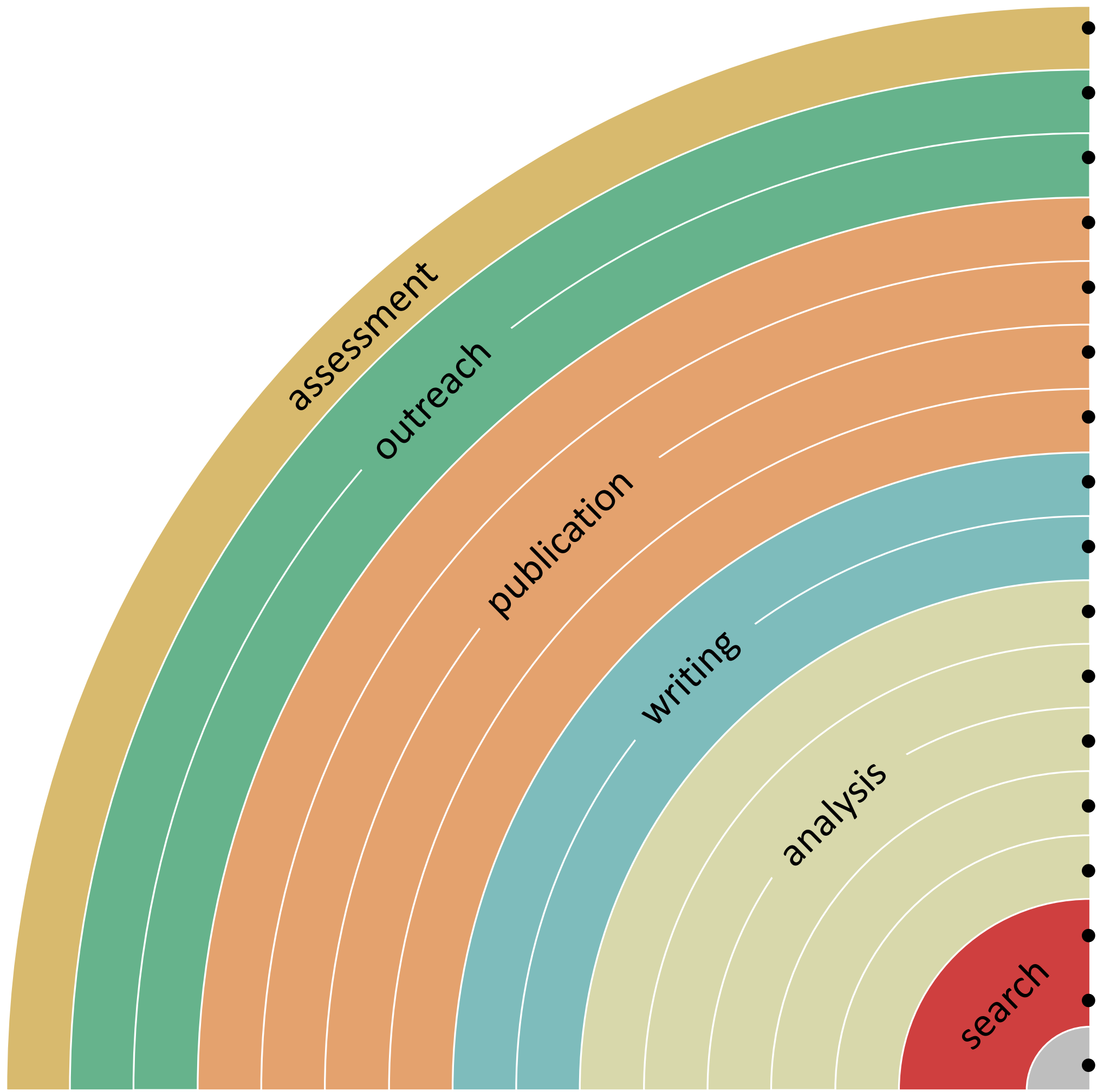
Goal: extract meaningful insight and information

Goal: meet project goals within set timelines



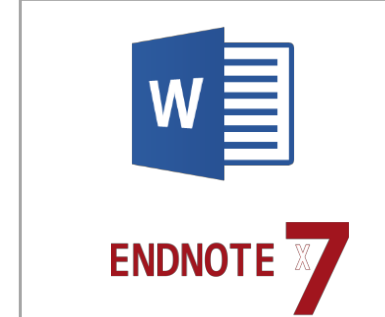



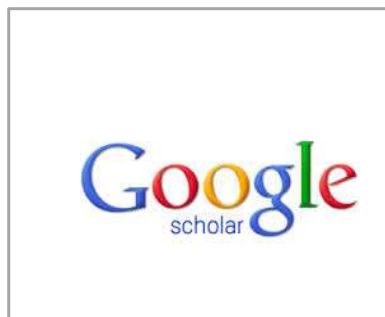



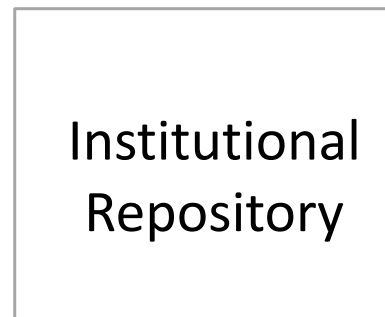

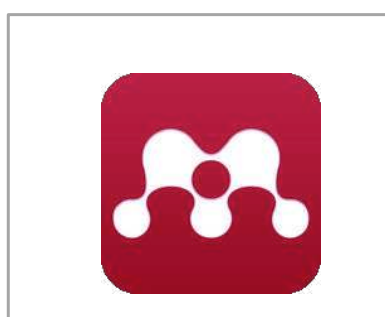
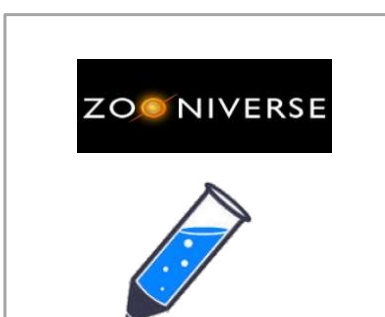




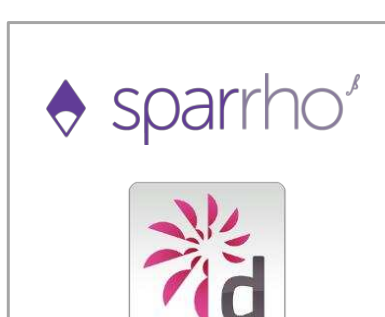

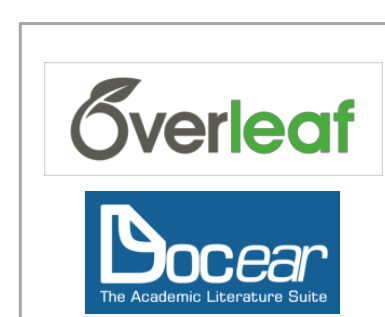

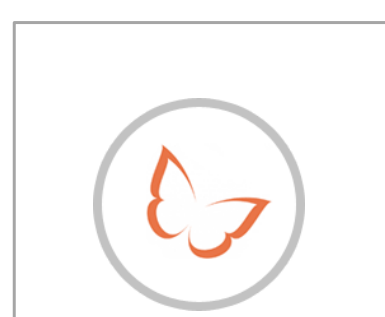



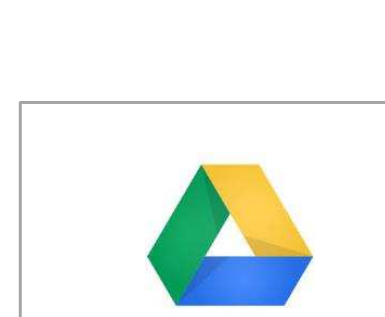


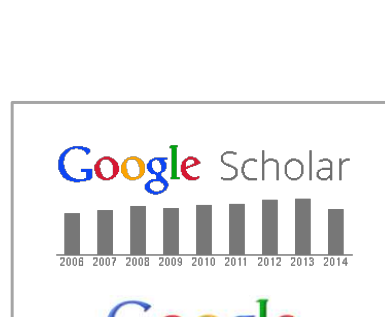
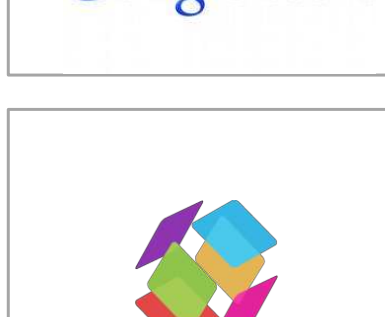

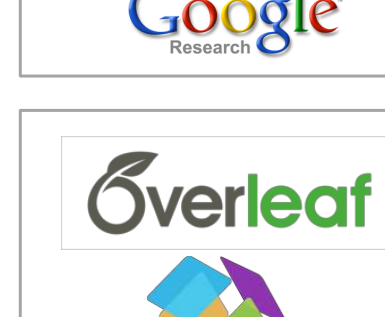
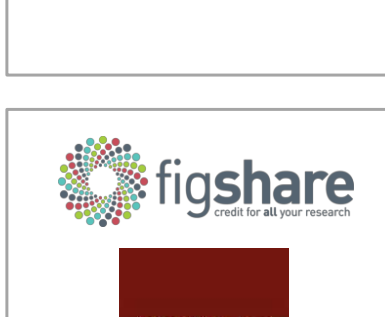
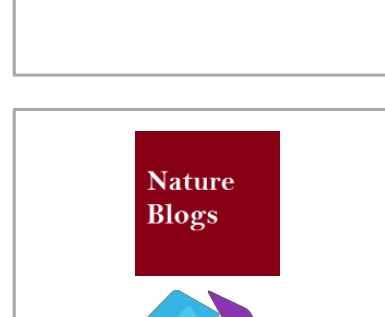



- adding alternative evaluation, e.g. with altmetrics
- communicating through social media, e.g. Twitter
- sharing posters & presentations, e.g. at FigShare
- using open licenses, e.g. CC0 or CC-BY
- publishing open access, 'green' or 'gold'
- using open peer review, e.g. at journals or PubPeer
- sharing preprints, e.g. at OSF, arXiv or bioRxiv
- using actionable formats, e.g. with Jupyter or CoCalc
- open XML-drafting, e.g. at Overleaf or Authorea
- sharing protocols & workfl., e.g. at Protocols.io
- sharing notebooks, e.g. at OpenNotebookScience
- sharing code, e.g. at GitHub with GNU/MIT license
- sharing data, e.g. at Dryad, Zenodo or Dataverse
- pre-registering, e.g. at OSF or AsPredicted
- commenting openly, e.g. with Hypothes.is
- using shared reference libraries, e.g. with Zotero
- sharing (grant) proposals, e.g. at RIO





Discovery → Analysis → Writing → Publication → Outreach → Assessment

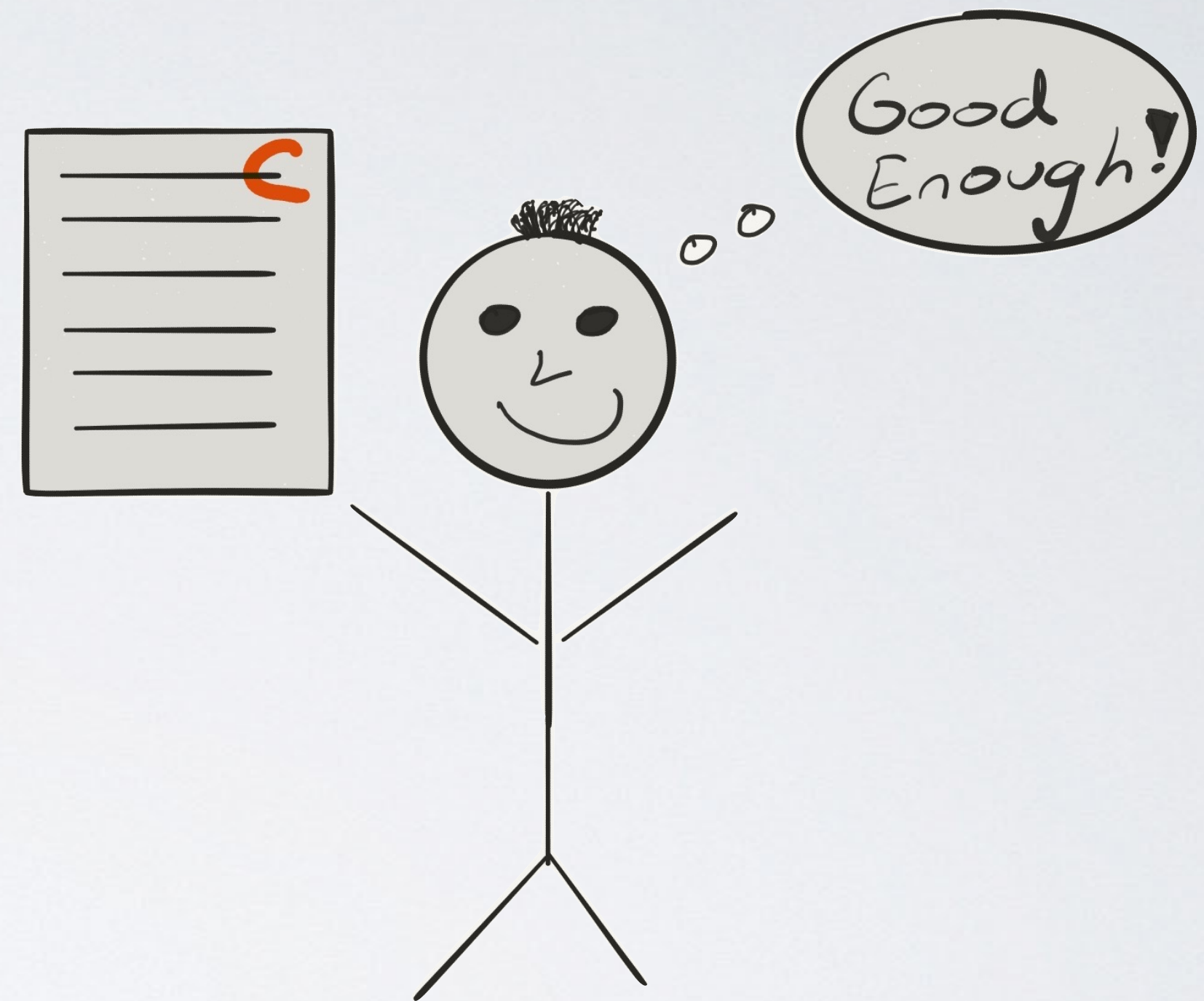
Traditional		→		→		→		→		→	
Modern		→		→		→		→		→	
Innovative		→		→		→		→		→	
Experimental		→		→		→		→		→	
Google		→		→		→		→		→	
NPG/Macmillan		→		→		→		→		→	

With What
Time???

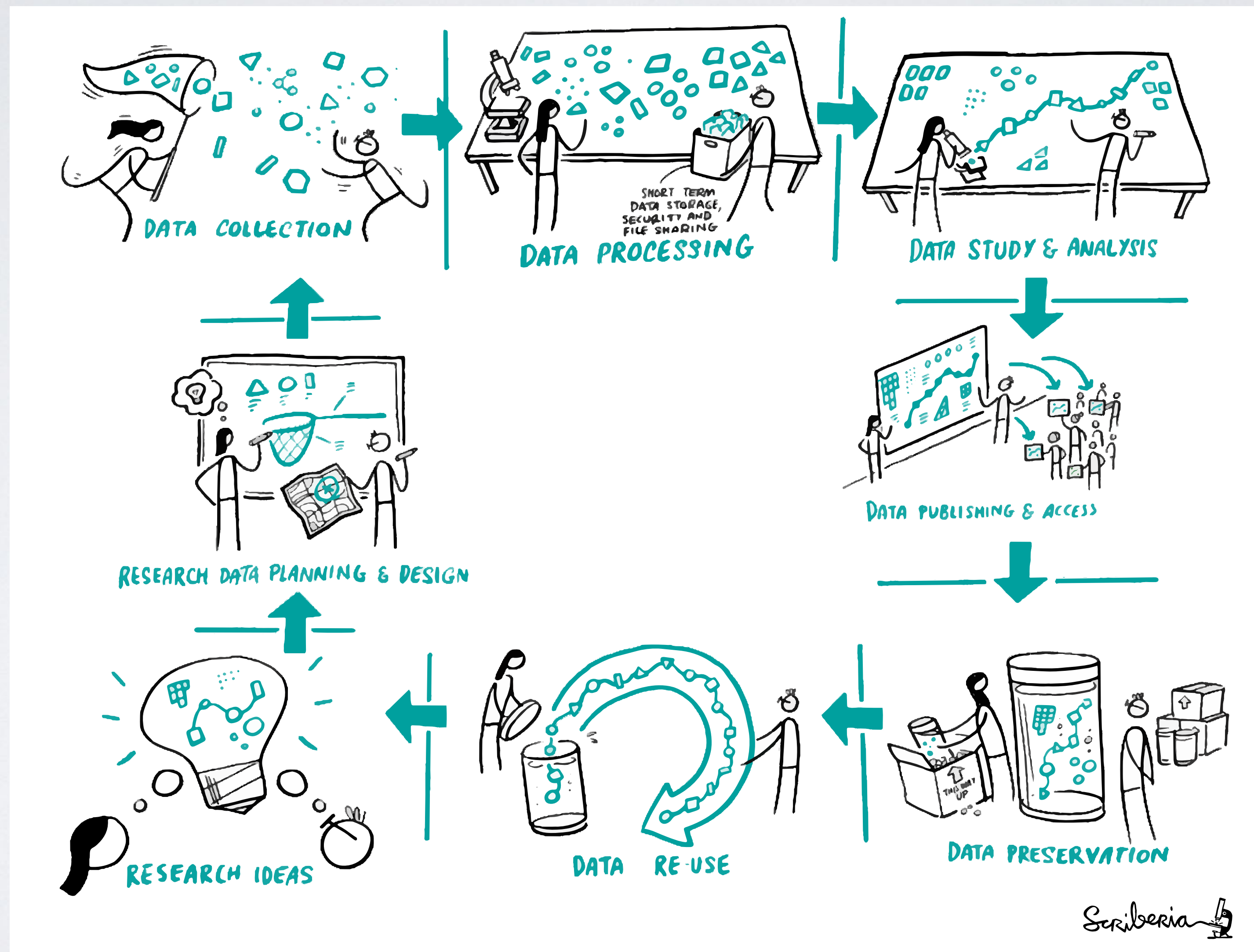


'Good Enough'

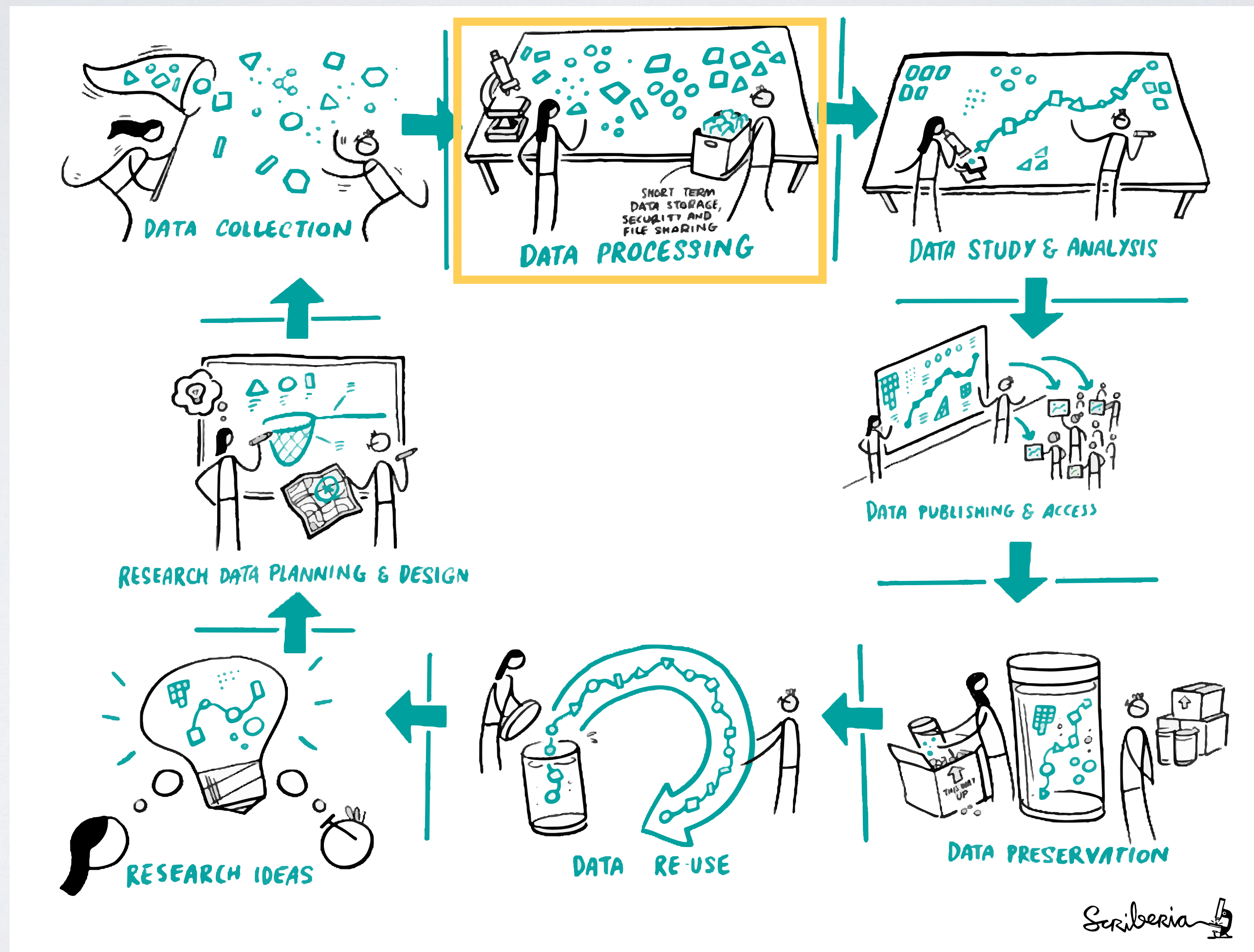
- (relatively) low effort
- shallow learning curve
- beneficial to current and future you
- increases 'openness' of research



Project Lifecycle



Project Lifecycle

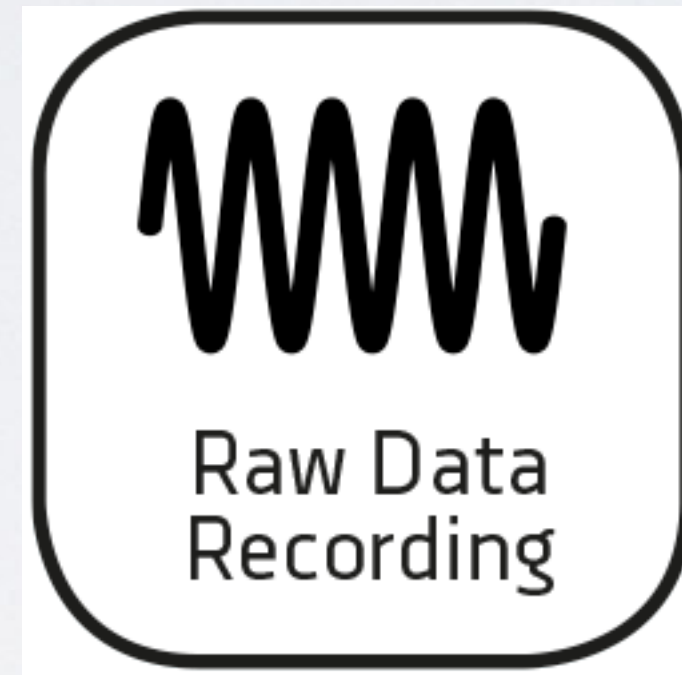


Data Processing Pipelines



1. Preserve Raw Data

Raw Data: data as it was originally collected



Save in data in its original form and DO NOT alter or 'improve' it

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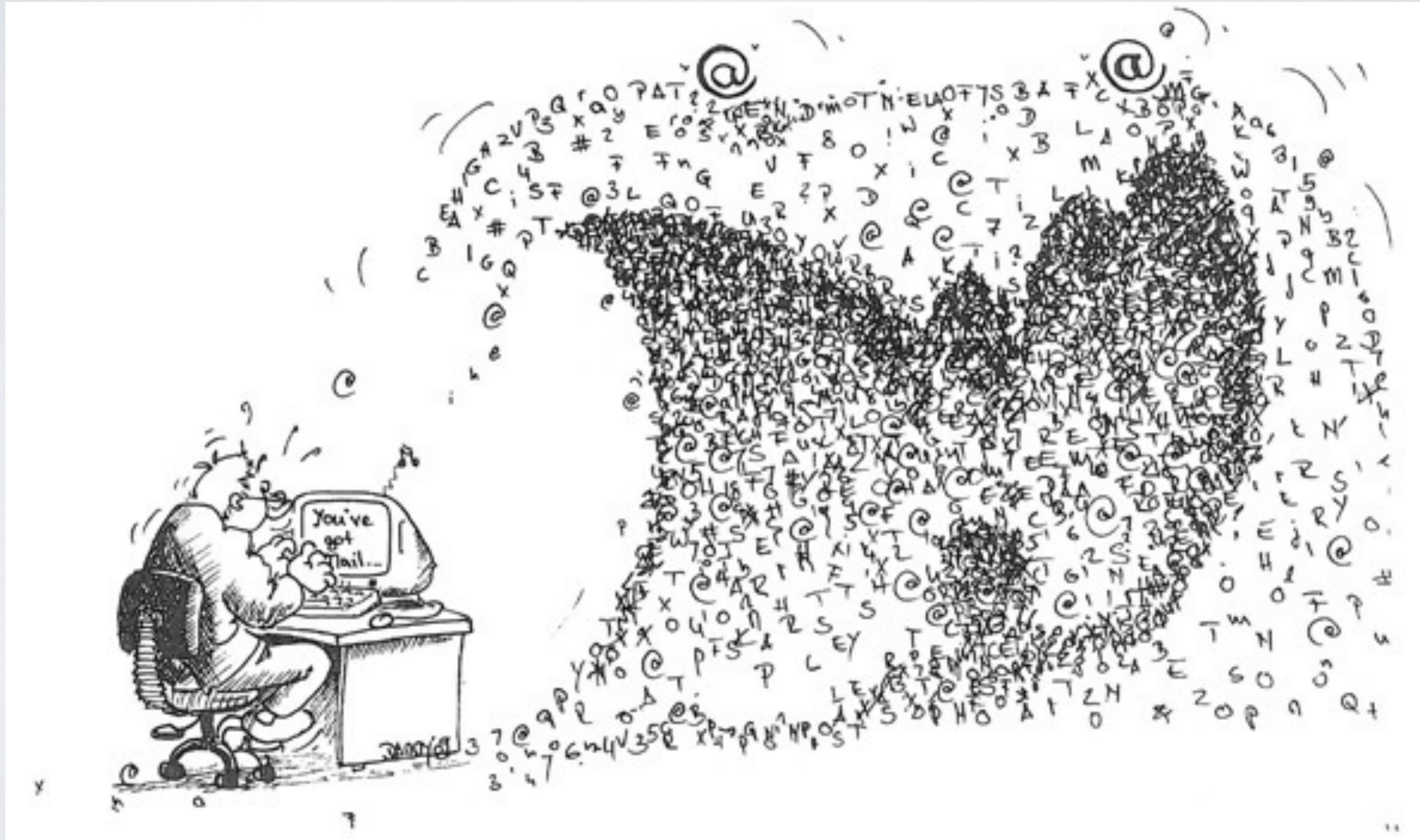


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What makes this 'Open'?

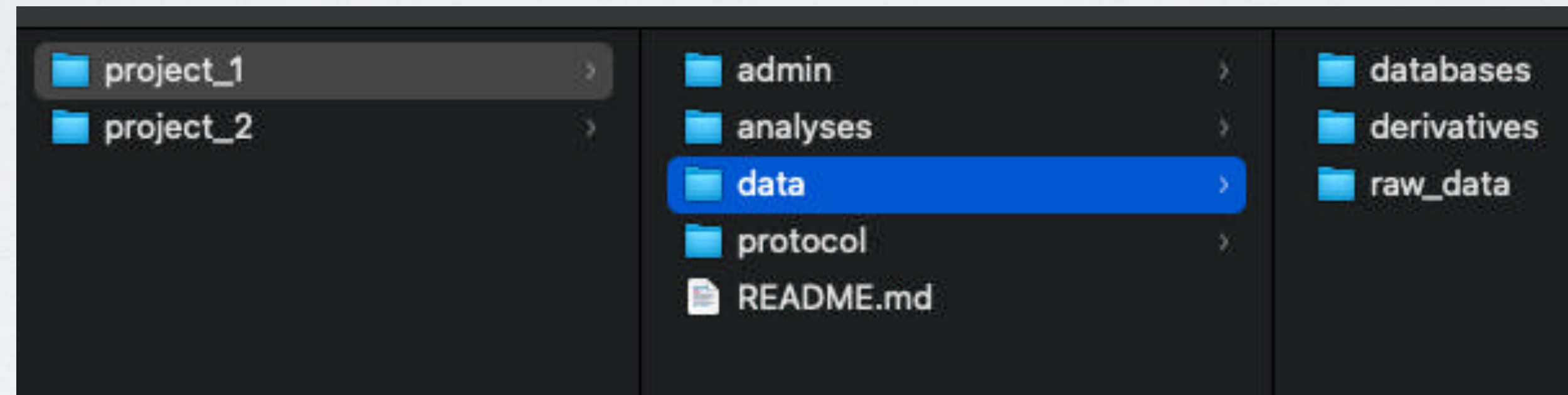
- Stable starting point
- Test reproducibility of pipeline
- Recover from mishaps
- Experiment without fear

Data Tsunami



2. Create a Central Hub

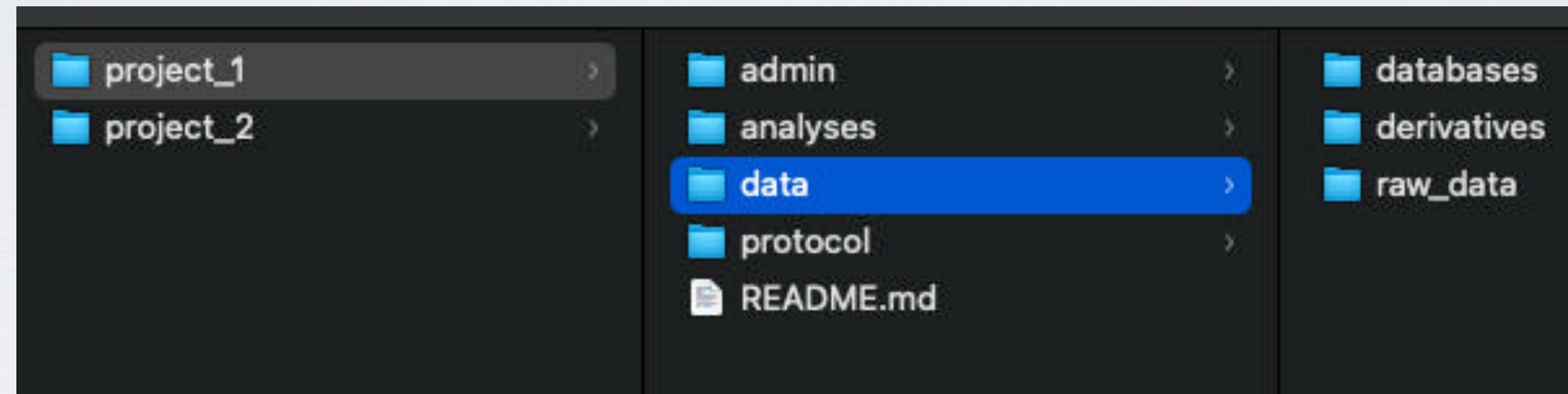
Directory Structures: organization of files into a hierarchical structure



- Create a directory for each project
- Use a consistent structure
- Separate data management from project management

2. Create a Central Hub

Directory Structures: organization of files into a hierarchical structure



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- Use a consistent structure
- Separate data management from project management

What makes this 'Open'?

- Easy to find data, code, protocol
- Consistent (at least within lab)
- Bigger Lift: match field standards (e.g., BIDS, MlxS)

3. Use Meaningful Names

Leverage filenames to help you manage complex projects



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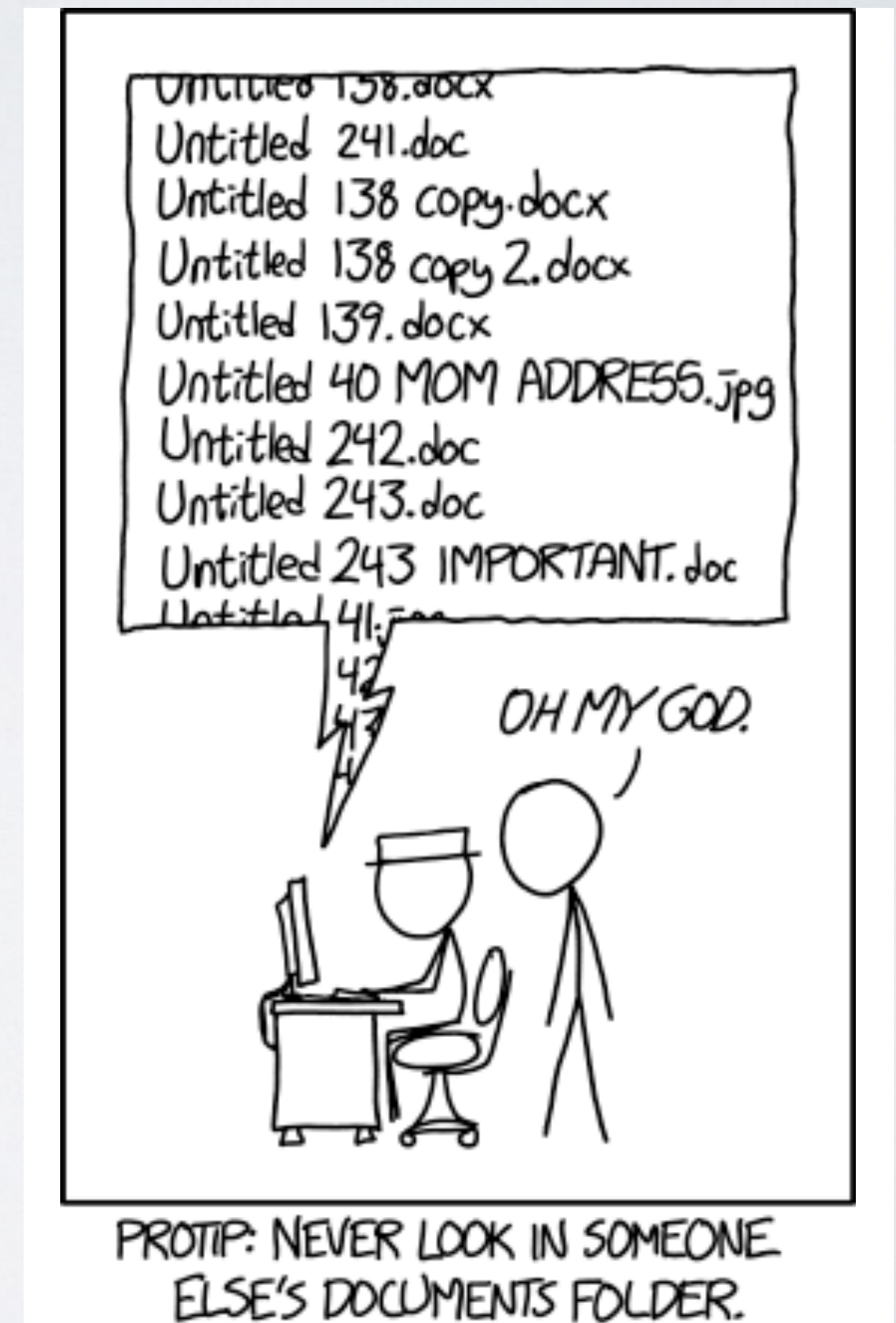
- Human Readable: names should clearly describe content in the simplest way possible (e.g., 'code', 'data')



3. Use Meaningful Names

Leverage filenames to help you manage complex project

- Human Readable: names should clearly describe content in the simplest way possible (e.g., 'code', 'data')
- Computer Readable: ability of a computer to parse a name
 - Use '-' or '_' in place of spaces
 - No special characters (e.g., '&', '#', '^', etc)

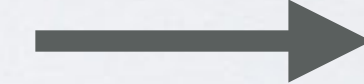


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- Sortable: help you find what you need in the future
 - Dates: YYYY-MM-DD
 - Pad with zeros (subject IDs, versions, etc)

```
fig_1.pdf
fig_10.pdf
fig_11.pdf
fig_12.pdf
fig_2.pdf
fig_3.pdf
fig_4.pdf
fig_5.pdf
fig_6.pdf
fig_7.pdf
fig_8.pdf
fig_9.pdf
```



```
fig_01.pdf
fig_02.pdf
fig_03.pdf
fig_04.pdf
fig_05.pdf
fig_06.pdf
fig_07.pdf
fig_08.pdf
fig_09.pdf
fig_10.pdf
fig_11.pdf
fig_12.pdf
```


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- Sortable: help you find what you need in the future
 - Dates: YYYY-MM-DD
 - Study IDs: Pad with zeros

What makes this 'Open'?

- Makes data more findable
- Can be a form of metadata
- Bigger Lift: adopt field standards

4. Preserve the Journey

Version control: tracking and managing changes to documents or code



4. Preserve the Journey

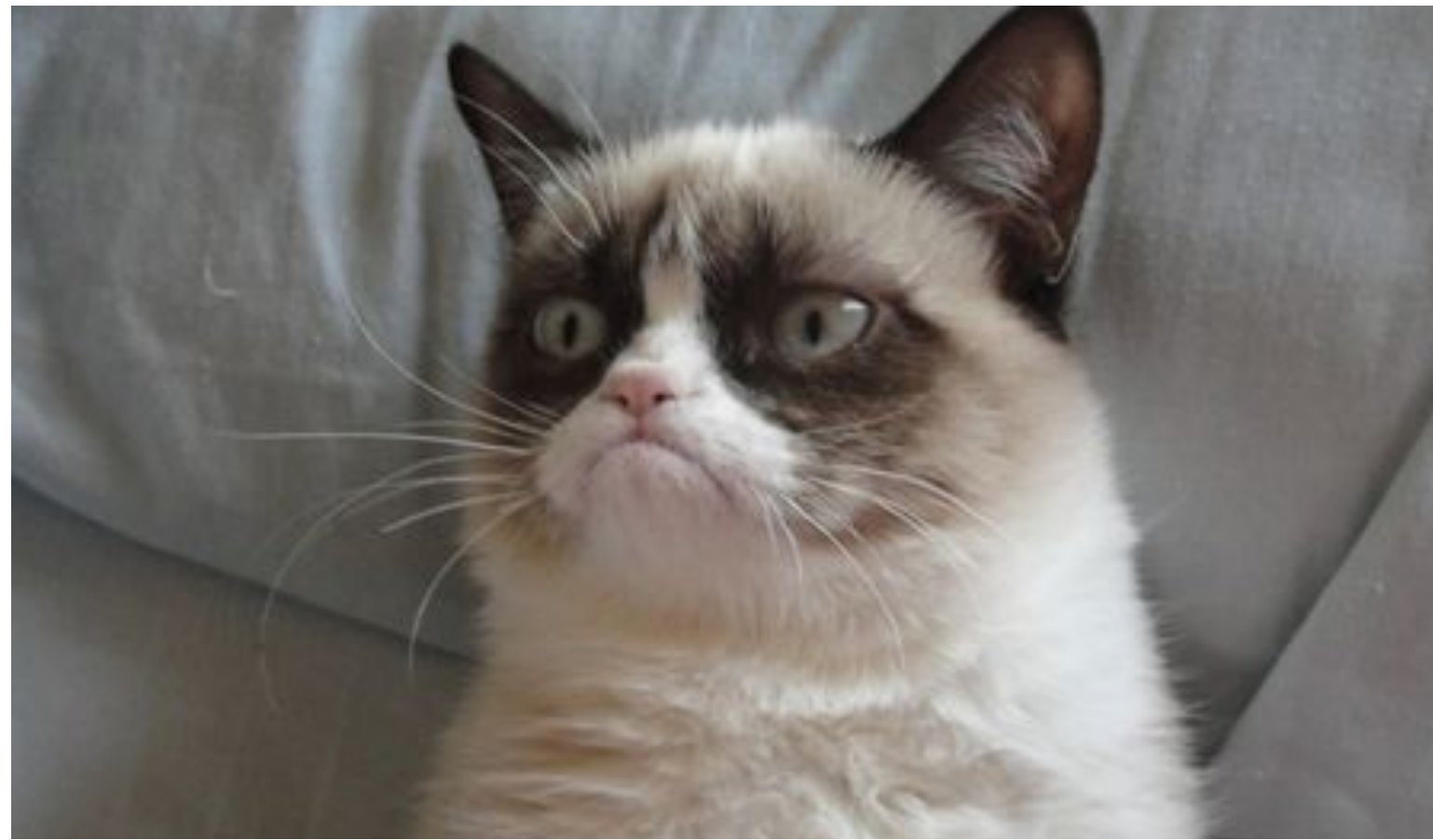
Version control: tracking and managing changes to documents or code



- Manual: use file naming to document drafts (e.g., dates, version numbers)
- Software: git, GitHub, subversion
- Allows you to trace your steps

4. Preserve the Journey

Version control: tracking and managing changes to documents or code



99 little bugs in the code
99 little bugs
Take one down and compile it
117 little bugs in the code...

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- Software: git, GitHub, subversion
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4. Preserve the Journey

Version control: tracking and managing changes to documents or code

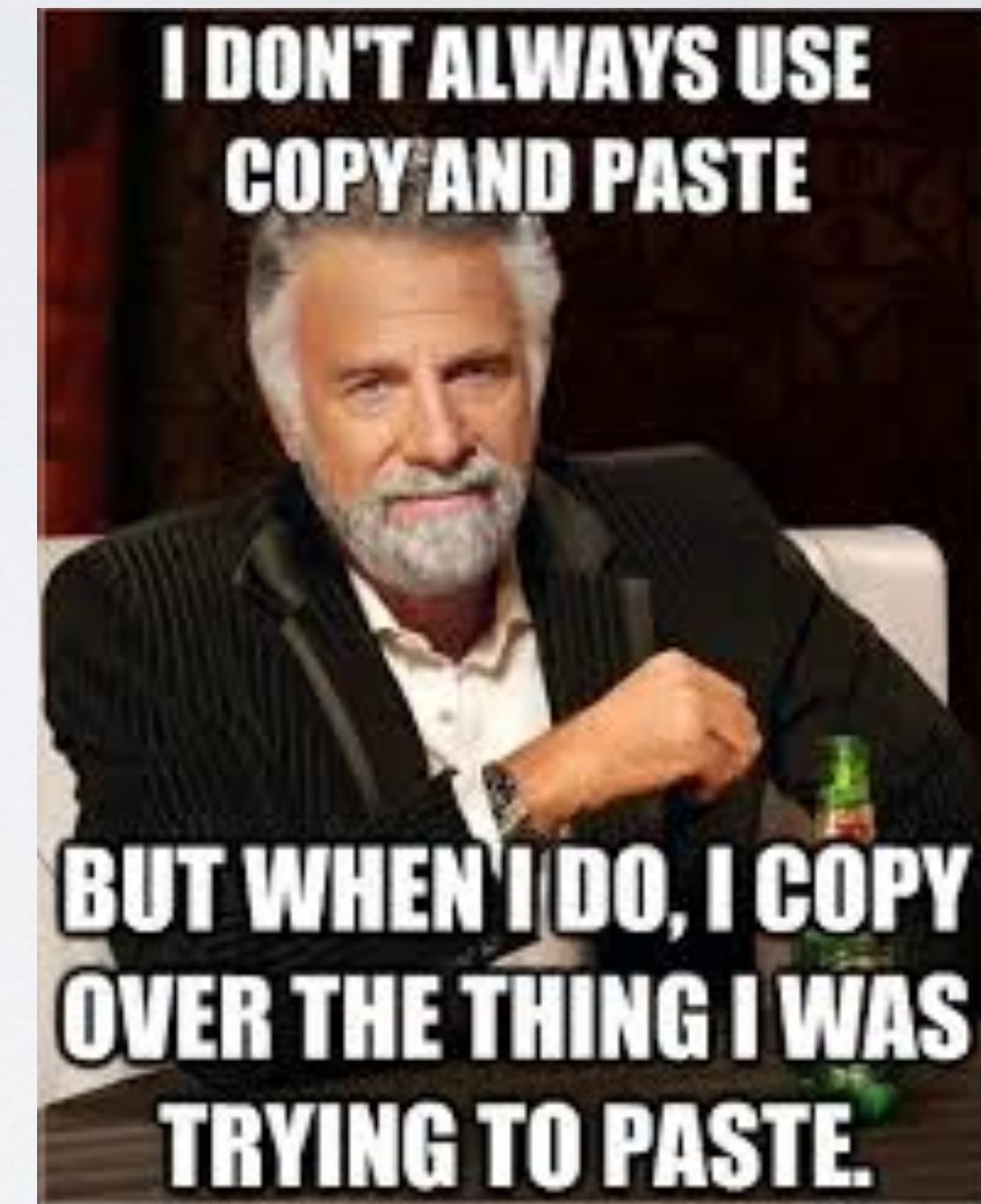
What makes this 'Open'?

- Documents project and data history
- Can reproduce process if needed
- Bigger Lift: use a version control software (e.g., git)

- Manual: use file naming to document drafts (e.g., dates, version numbers)
- Software: git, GitHub, subversion
- Allows you to trace your steps

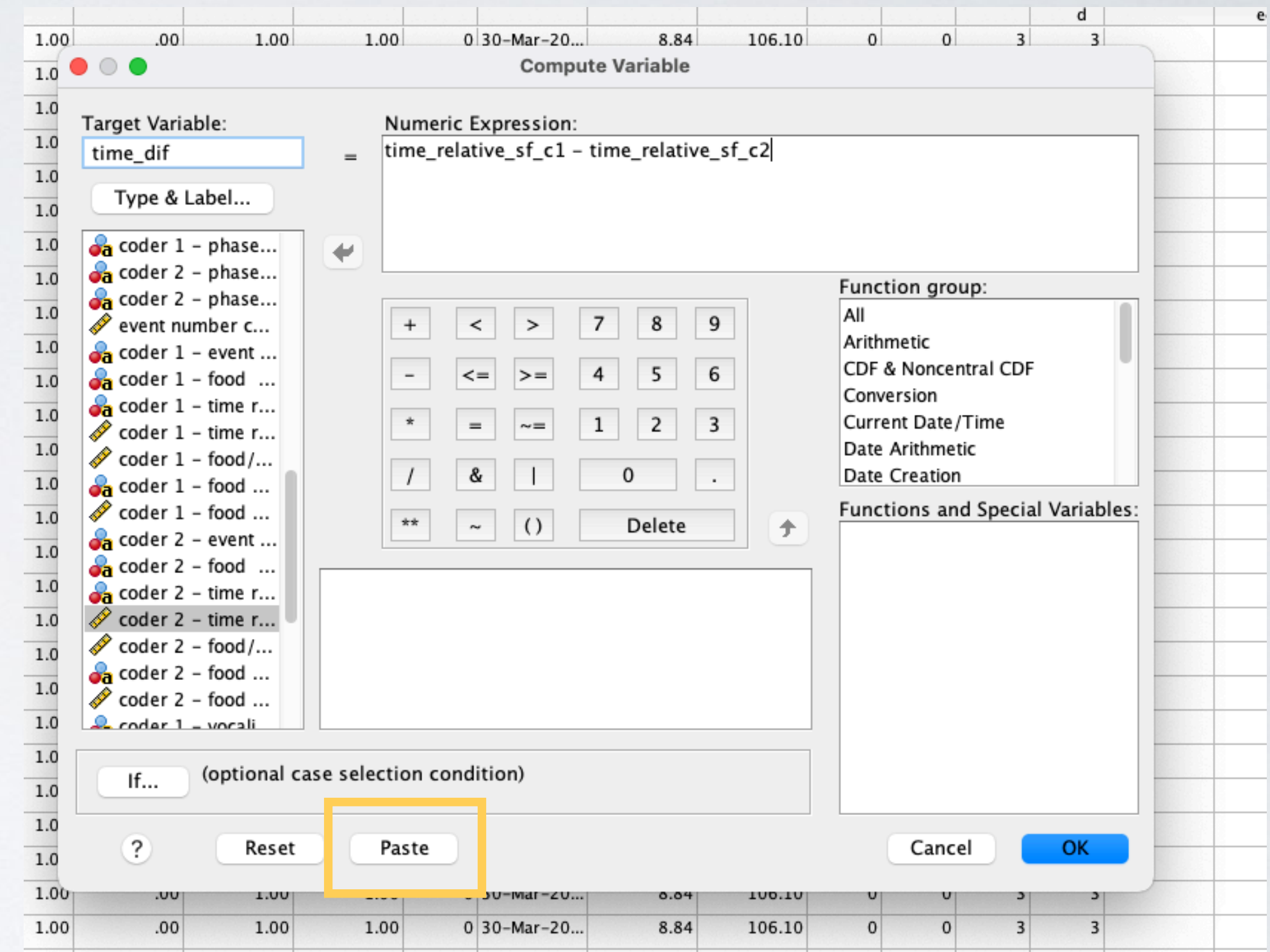
5. Avoid Manual Manipulations

- Manual data manipulations leave no trace
 - Hard to reproduce
 - Error prone
- Alternatives:
 - Save Syntax in SPSS
 - Include calculations in variable descriptions
 - Script data cleaning



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What makes this 'Open'?

- Data processing will be reproducible
- Can reverse to original data if needed
- Bigger Lift: move away from GUI-based analysis software to open code/syntax based programs (e.g., R, python)

6. 'Tidy' Your Data

The diagram illustrates the three principles of tidy data using a table with columns: country, year, cases, and population. The rows represent data for Afghanistan, Brazil, and China in the years 1999 and 2000.

country	year	cases	population
Afghanistan	1999	7745	19987071
Afghanistan	2000	8666	20095360
Brazil	1999	37737	172006362
Brazil	2000	80488	174004898
China	1999	212258	1272015272
China	2000	218766	1280425583

variables: Vertical double-headed arrows indicate that each variable (country, year, cases, population) is contained within its own column.

observations: Horizontal double-headed arrows indicate that each participant/sample (each row) is contained within its own row.

values: Circles around individual data points indicate that each value is contained within its own cell.

- Every variable is in its own column
- Each participant/sample is in its own row
- Each value is in its own cell

6. 'Tidy' Your Data

- Use open file formats — csv, html, txt, jpeg

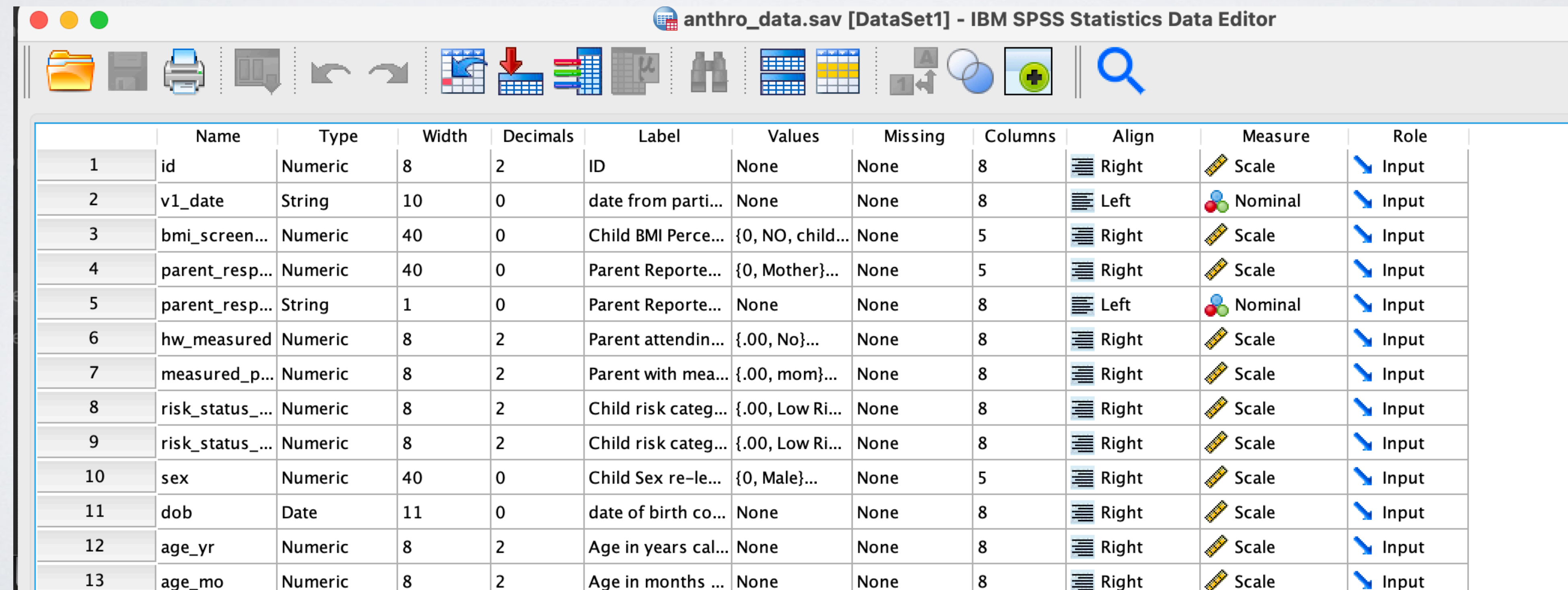
6. 'Tidy' Your Data

- Use open file formats — csv, html, txt, jpeg
- Create a data dictionary

column	variable	label	value_labels	type	n_na	range
1	id	ID	NULL	double	0	c(1, 133)
2	v1_date	date from participant contacts databases ('verified_visit_da	NULL	character	0	c("2018-01-31", "2022-05-07")
3	bmi_screenout	Child BMI Percentile Screen Out	c('YES, child is overweight, sc	double	0	c(0, 1)
4	parent_respondent	Parent Reported: Parent relationship to child re-leveled in R	c(Mother = 0, Father = 1, Oth	double	0	c(0, 1)
5	parent_respondent_o	Parent Reported: Parent specify relationship to child if other	NULL	character	0	c("", "")
6	hw_measured	Parent attending Visit 1 had measured height and weight	c(No = 0, Yes = 1)	double	0	c(1, 1)
7	measured_parent	Parent with measured BMI at Visit 1	c(mom = 0, dad = 1)	double	0	c(0, 1)
8	risk_status_mom	Child risk categor: Low risk: Mom BMI < 26, High Risk: Mom	c('Low Risk' = 0, 'High Risk' =	double	0	c(0, 1)
9	risk_status_both	Child risk category: Low Risk: Mom and Dad BMI < 25, High	c('Low Risk' = 0, 'High Risk' =	double	0	c(0, 2)
10	sex	Child Sex re-leveled in R to start with 0	c(Male = 0, Female = 1)	double	0	c(0, 1)
11	dob	date of birth converted to format yyyy-mm-dd in R	NULL	double	0	c(14333, 16391)
12	age_yr	Age in years calculated from dob and start_date	NULL	double	0	c(7, 8.99)
13	age_mo	Age in months calculated from dob and start_date	NULL	double	0	c(84, 107.9)
14	ethnicity	Parent Reported: Child ethnicity	c('NOT Hispanic or Latino' = 0	double	0	c(0, 0)
15	race	Parent Reported: Child race -- Note: prefer not to answer (p	c('White/Caucasian' = 0, 'Am	double	0	c(0, 2)
16	income	Parent Reported: Yearly household income -- Note: prefer n	c('Less than \$20,000' = 0, '\$20	double	3	c(0, 5)
17	parent_ed	Parent Reported: Parent education re-leveled in R to start w	c('High School or GED (12 yea	double	0	c(0, 5)

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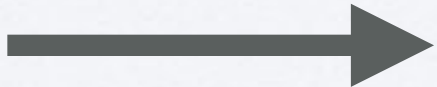
The screenshot shows the IBM SPSS Statistics Data Editor interface. The title bar reads "anthro_data.sav [DataSet1] - IBM SPSS Statistics Data Editor". The main window displays a data dictionary table with the following columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role. The table lists 13 variables with their respective properties.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	id	Numeric	8	2	ID	None	None	8	Right	Scale	Input
2	v1_date	String	10	0	date from parti...	None	None	8	Left	Nominal	Input
3	bmi_screen...	Numeric	40	0	Child BMI Perce...	{0, NO, child...	None	5	Right	Scale	Input
4	parent_resp...	Numeric	40	0	Parent Reporte...	{0, Mother}...	None	5	Right	Scale	Input
5	parent_resp...	String	1	0	Parent Reporte...	None	None	8	Left	Nominal	Input
6	hw_measured	Numeric	8	2	Parent attendin...	{.00, No}...	None	8	Right	Scale	Input
7	measured_p...	Numeric	8	2	Parent with mea...	{.00, mom}...	None	8	Right	Scale	Input
8	risk_status_...	Numeric	8	2	Child risk categ...	{.00, Low Ri...	None	8	Right	Scale	Input
9	risk_status_...	Numeric	8	2	Child risk categ...	{.00, Low Ri...	None	8	Right	Scale	Input
10	sex	Numeric	40	0	Child Sex re-le...	{0, Male}...	None	5	Right	Scale	Input
11	dob	Date	11	0	date of birth co...	None	None	8	Right	Scale	Input
12	age_yr	Numeric	8	2	Age in years cal...	None	None	8	Right	Scale	Input
13	age_mo	Numeric	8	2	Age in months ...	None	None	8	Right	Scale	Input

6. 'Tidy' Your Data

- Use open file formats — csv, html, txt, jpeg
- Create a data dictionary
- One piece of information per cell

height
5 ft 6 in
5 ft 2 in
7 ft
5 ft 11 in

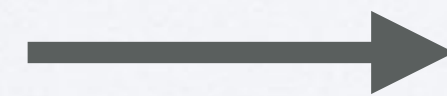


height_ft	height_in
5	6
5	2
7	0
5	11

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- Use open file formats — csv, html, txt, jpeg
- Create a data dictionary
- One piece of information per cell
- Do not use highlighting/font color as data

height
5 ft 6 in
5 ft 2 in
7 ft
5 ft 11 in



height_ft	height_in	check_height
5	6	0
5	2	0
7	0	1
5	11	0

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- Use open file formats — csv, html, txt, jpeg
- Create a data dictionary
- One piece of information per cell
- Do not use highlighting/font color as data

What makes this 'Open'?

- Open formats are accessible
- All data are computer readable
- Data are documented
- Makes data re-use and sharing easier

7. Metadata Magic

Metadata: the who, what, when, where, and why of your data

Easiest: when in doubt, document

- Data dictionaries
- Standard operating procedures manuals
- Lab notebooks
- changelog file (document versions)
- README
 - Description of folders/files
 - Can provide instructions on use of code/data
 - License information

METADATA IS A
LOVE NOTE TO
THE FUTURE!



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Medium Effort: Data Manual

- Larger
- More verbose and detailed
- Can include science/rational/citations
- Like a user manual for data

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7. Metadata Magic

Metadata: the who, what, when, where, and why of your data

Bigger Lift: Structured Metadata

- Often laid out in fields
- Can require use of shared vocabularies
- Often field/data type specific

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Bigger Lift: Structured Metadata

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- Can require use of shared vocabularies
- Often field/data type specific

What makes this 'Open'?

- Makes data more findable
- Helps others (and future you) understand the data
- Shared vocabularies help to harmonize data within a field

'Good Enough' Practices

1. Preserve Raw Data
2. Create a Central Hub
3. Use Meaningful Names
4. Preserve the Journey
5. Avoid Manual Manipulations
6. 'Tidy' Your Data
7. Metadata Magic

