UNIVERSITY of MARYLAND
Health Sciences and
Human Services Library

Best Practices for Research Data Management

Jean-Paul Courneya, Bioinformationist
jpcourneya@hshsl.umaryland.edu

Amy Yarnell, Data Services Librarian
ayarnell@hshsl.umaryland.edu

April 16, 2020

Learning Objectives

- Recognize the benefits and requirements related to the management and sharing of research data
- Apply best practices for data planning and management
- Understand options for storing and preserving research data
- Identify repositories and determine best sharing option for data

Why Data Management?

- ✓ Funding agency data management and sharing requirements
- ✓ Publisher data sharing policies
- ✓ NIH rigor and reproducibility

Publisher requirements

PLOS

*…**must specify that data are deposited publicly** and list the name(s) of repositories along with **digital object identifiers or accession numbers**”*

nature.com

CellPress

Science

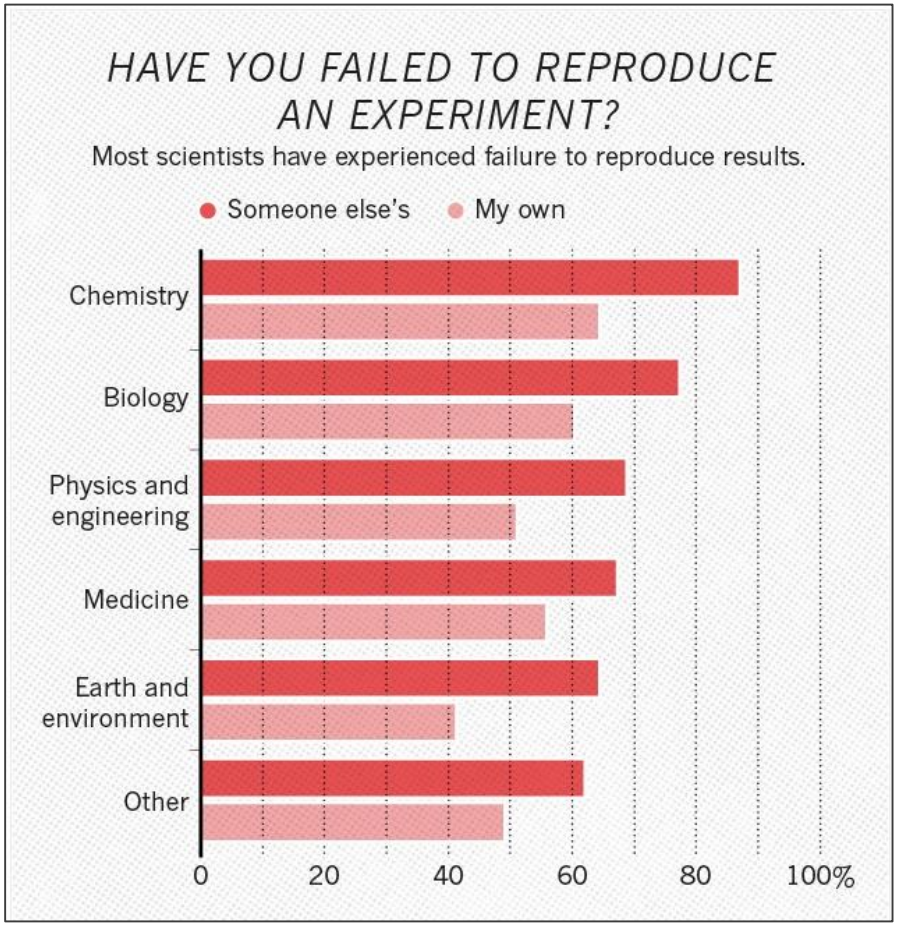
AAAS

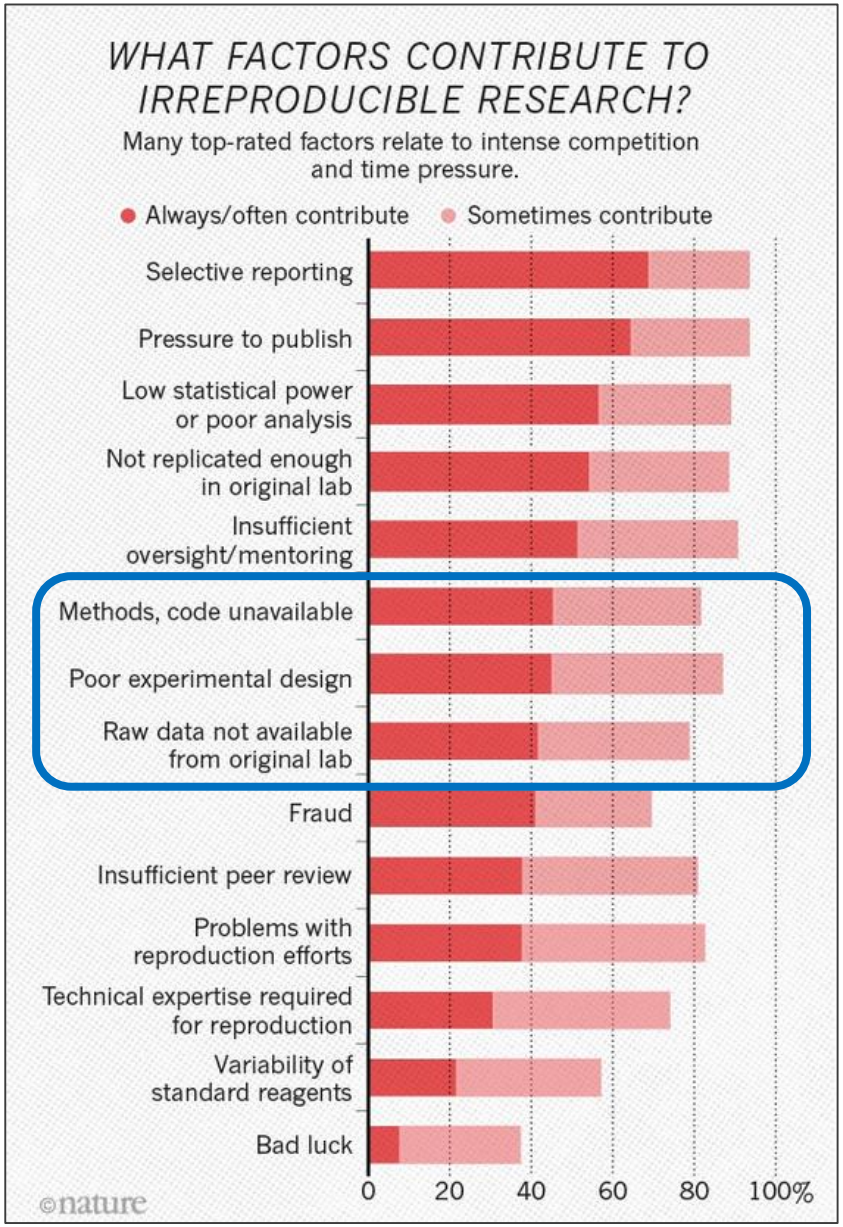
*“All data necessary to **understand**, **assess**, and **extend** the conclusions of the manuscript must be available*

http://www.sciencemag.org/site/feature/contribinfo/prep/gen_info.xhtml

Why Data Management?

- Transparency
- Re-use and innovation
- Reproducibility and Replicability
- Open Science





https://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970

Why Data Management? – What's in it for me?

Have you ever. . . ?

- Conducted research with a team?
- Put data on a flash drive that got lost or broken?
- Collected data that you had trouble understanding later?

Why Data Management?- What's in it for me?

- Organization
- Comprehensibility
- Efficiency
- Quality
- Access

Giulia Forsythe. "Who owns your education data?" 2013
https://www.flickr.com/photos/gforsythe/8508041553/

Don’t end up here!

Multiple errors in table

Did not alter conclusions in article

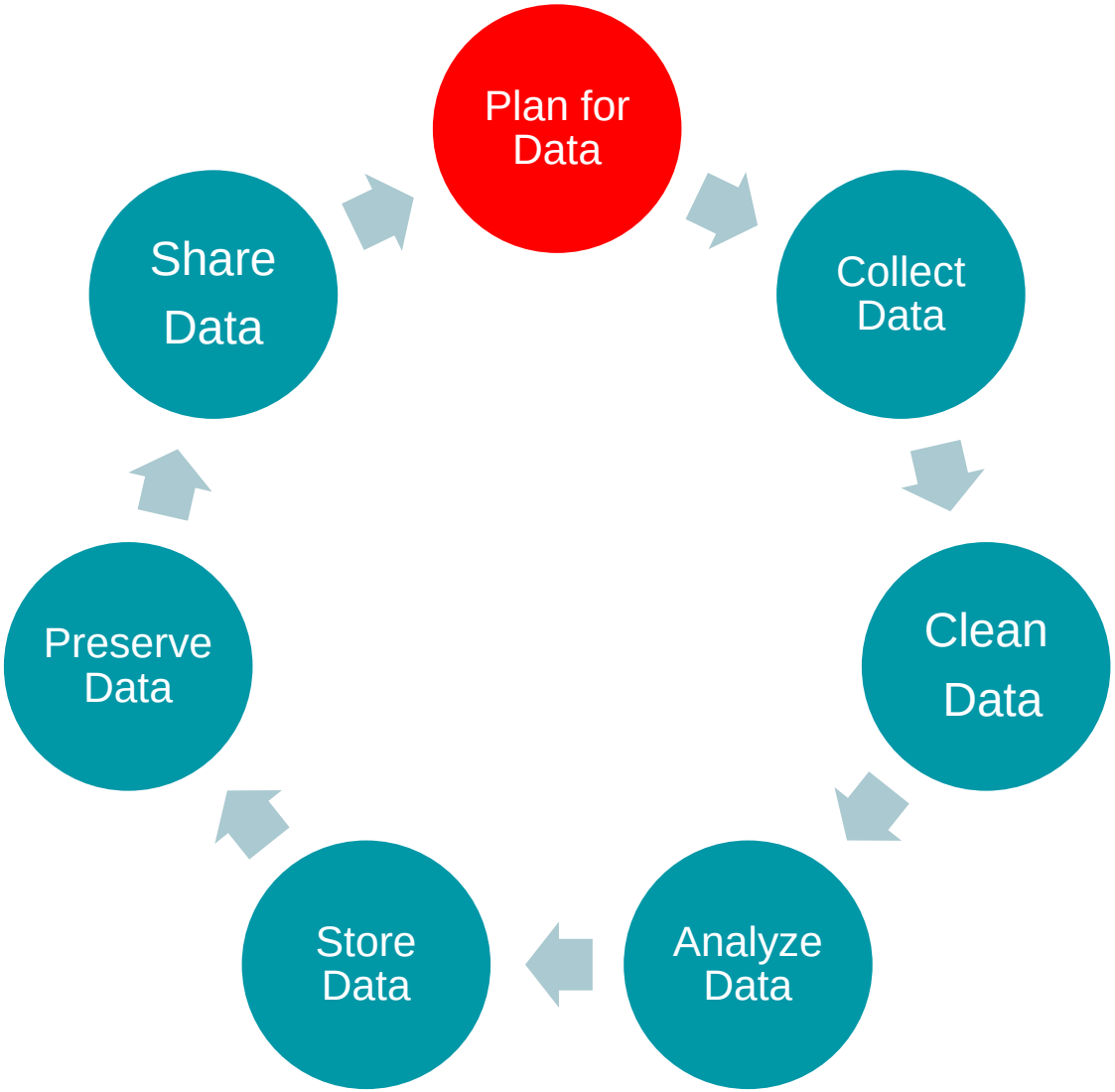
BUT, could not locate primary data

http://retractionwatch.com/2013/10/30/nejm-paper-on-sleep-apnea-retracted-when-original-data-cant-be-found/


Data management best practices

Data Management Planning

Data Lifecycle



Planning!

Begin with a clear, well-thought out hypothesis. Your research question will guide your data collection plan.

What data will you need to collect?

What do you plan to do with the data? Why are you collecting it? What do you need to measure?

How will you collect the data? Who will enter the data?

Are there ethical considerations that will complicate data collection?

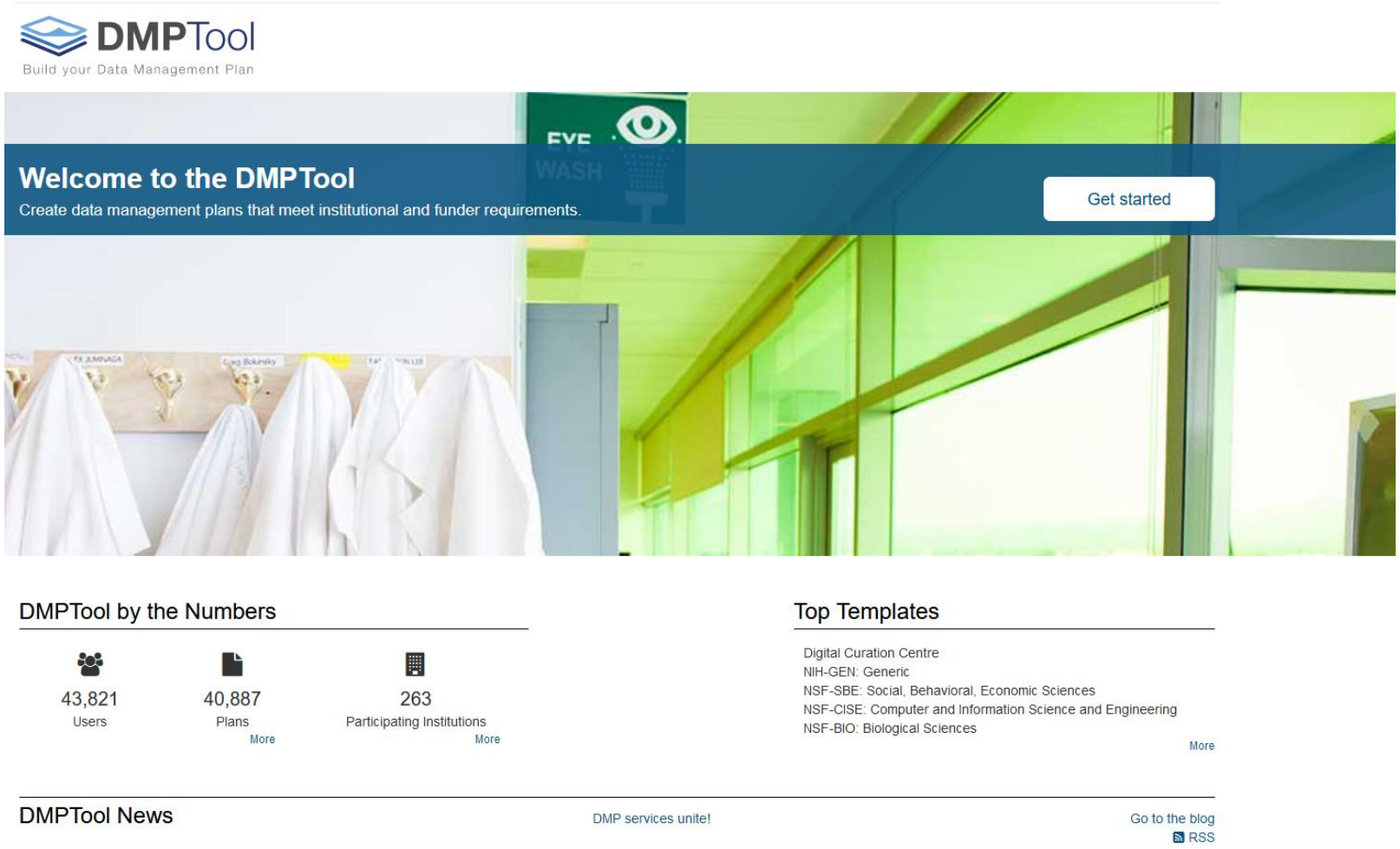
Data Management Plans (DMPs)

- **A formal plan that:**

  - describes the data your research will produce
  - describes how your data will be handled during and after your project
  - is being required by more and more funders
  - is typically less than three pages

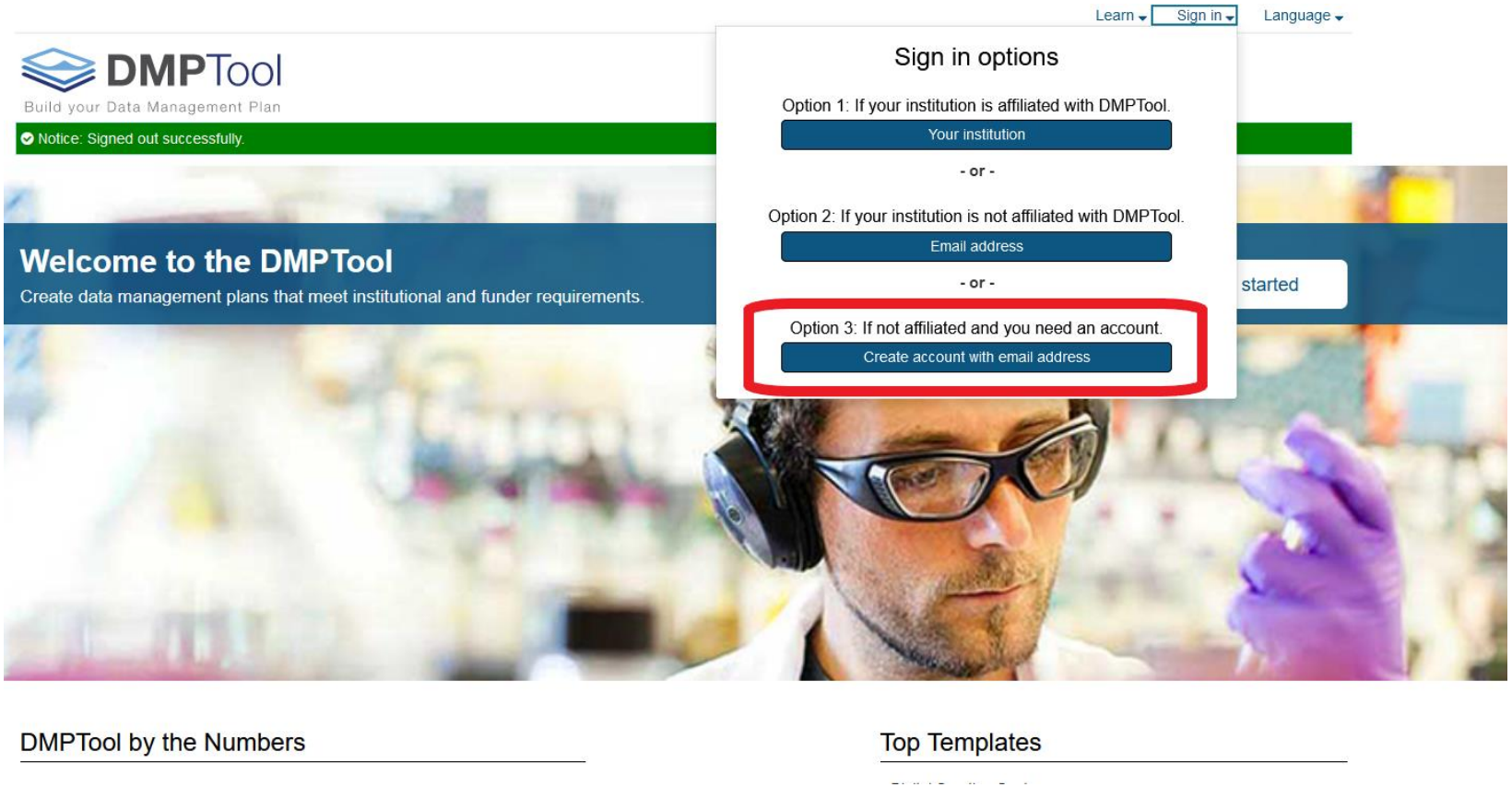
Data Management Plans

https://dmptool.org



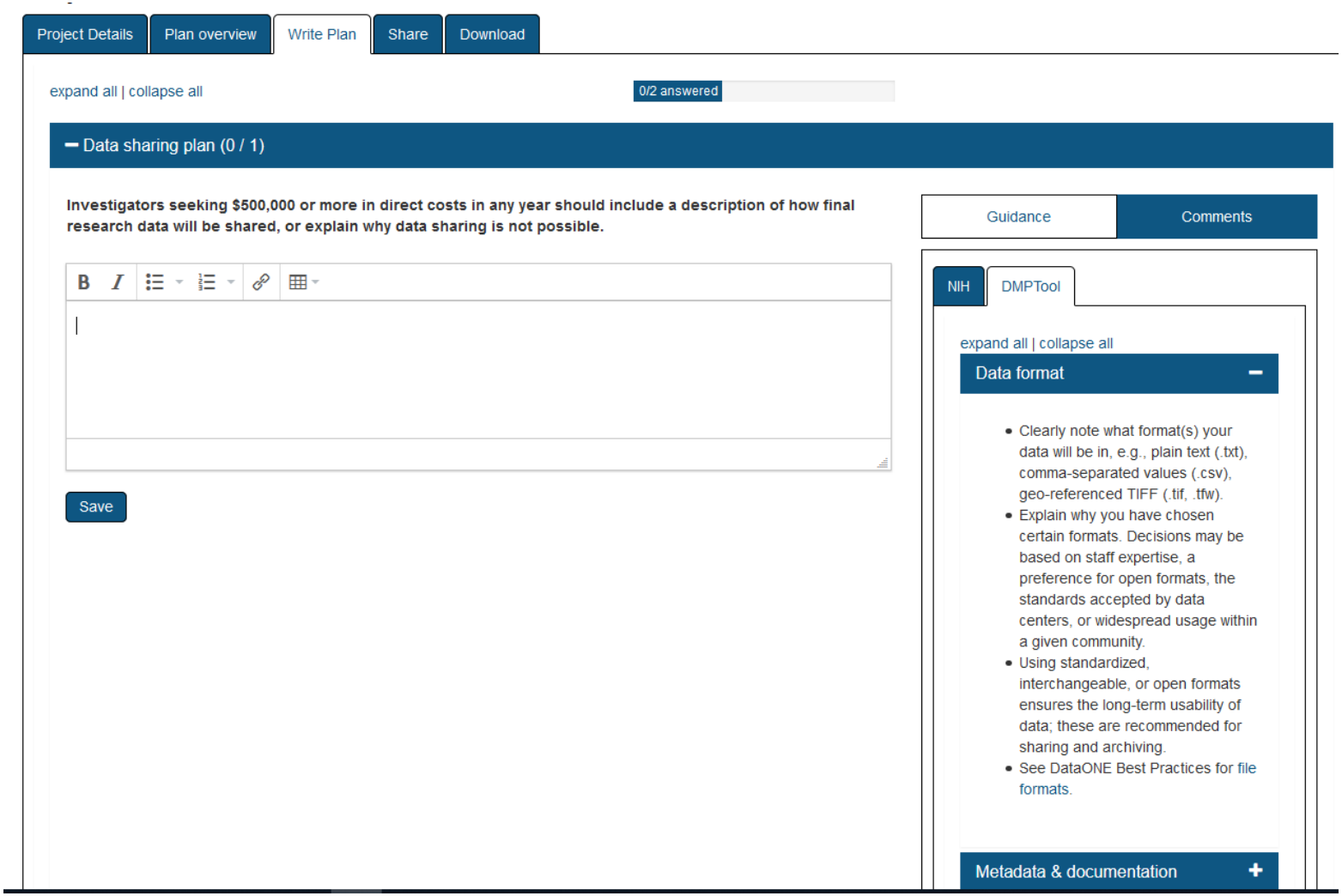
Data Management Plans

https://dmptool.org



Data Management Plans

https://dmptool.org



Data Management Workflows

Who is responsible for data management?

Everyone!

(but everyone means **no one**
without assigning responsibility)

Data Management Workflows

Assign a person to be responsible for ensuring quality control:

- ✓ File naming conventions adhered to
- ✓ Minimum documentation
- ✓ Version controls followed
- ✓ Data backed up

Data Collection

Your variables

	A	B	C	D	E
1	SID	wgt	smoking	name	sam
2	1	49	Y	Smith	13
3	2	252	2 packs	Sam Jones	37
4	3	28	N	Read, Kevin	A21
5	4	157	Never	Emma Banks	January
6					

Variables – Best Practices

Coding data will reduce inconsistency in data entry

0 = no high school

1 = some high school

2 = graduated high school

3 = some college

4 = graduated college

Code missing data! Participants might not remember exact dates or might not want to disclose information.

8888 = participant cannot remember (date of appendectomy)

9999 = participant will not disclose (past drug use)

Variables – Best Practices

Do not calculate variables

USE THESE	NOT THIS
Systolic BP, Diastolic BP	Hypertension– yes/no
Height, weight	BMI
Temperature	Fever– yes/no

Avoid oversimplification

Medication – yes/no; dose; duration of treatment

Data Dictionaries

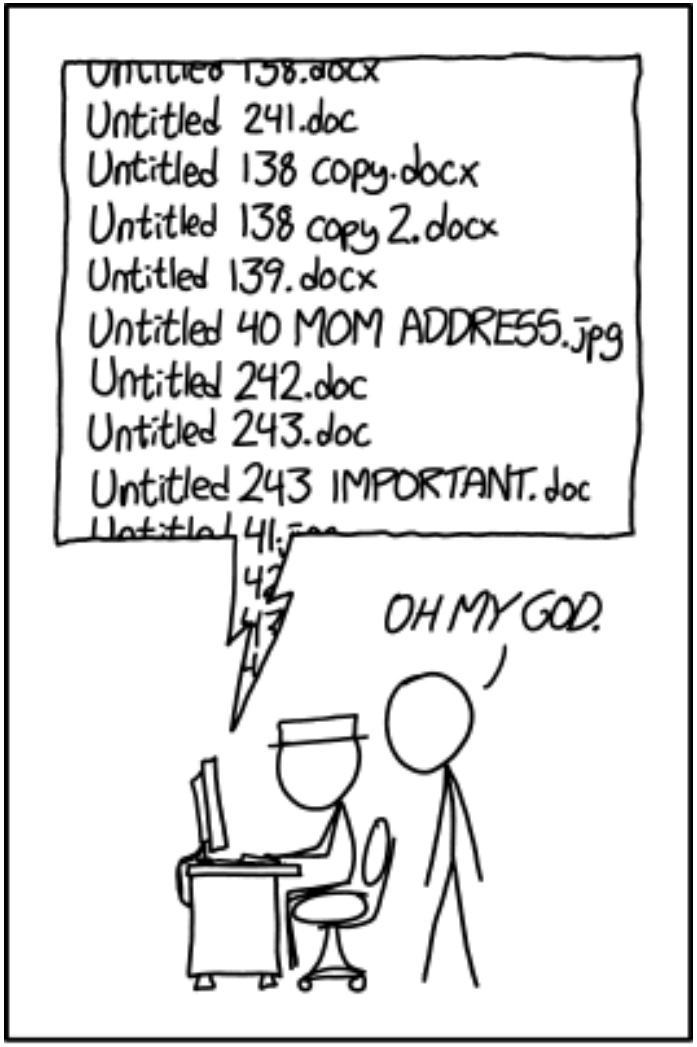
	A	B	C	D	E	F	G
1	**Variable / Field Name**	**Form Name**	**Field Type**	**Field Label**	**Choices, Calculations, OR Slider Labels**	**Text Validation Min**	**Text Validation Max**
2	record_id	demographics	text	Record ID			
3	mrn	demographics	text	MRN			
4	last_name	demographics	text	Last name			
5	first_name	demographics	text	First name			
6	age	demographics	text	Age	1, <55 | 2, between 55 and 75 | 3, >75	21	105
7	gender	demographics	radio	Gender	1, Male | 2, Female		
8	race	demographics	radio	Race/Ethnicity	1, White | 2, Black | 3, Asian | 4, Hispanic/Latino | 5, Other		
9	describe_other	demographics	text	Describe			
10	education	demographics	radio	Highest Level of Education Complete	1, < highschool diploma | 2, highschool diploma | 3, associate degree | 4, bachelors degree | 5, masters degree | 6, graduate school or advanced degree		
11	yes	demographics	radio	Working	1, Yes | 2, No		
12	occupation	demographics	text	Occupation			
13	income	demographics	radio	Household Income	1, Household Income <30,000/year | 2, Household income between 30-50,000/year | 3, Household income 50-75,000/year | 4, Household income 75-100,000/year | 5, Household income 100-150,000/year | 6, Household income 150-250,000/year | 7, Household income >250,000/year		
14	htn	medical_history	radio	Hypertension	1, Yes | 2, No | 3, Unkown		
15	hld	medical_history	radio	Hyperlipidemia	1, Yes | 2, No | 3, Unkown		
16	dm	medical_history	radio	Diabetes	1, Yes | 2, No | 3, Unkown		
17	current_smoker	medical_history	radio	Current Smoker	1, Yes | 2, No | 3, Unkown		
18	former_smoker	medical_history	radio	Former Smoker	1, Yes | 2, No | 3, Unkown		
19	smoking_start_date	medical_history	text	Smoking start date			
20	smoking_quit_date	medical_history	text	Smoking Quit Date			
21	depression	medical_history	radio	Depression	1, Yes | 2, No | 3, Unknown		
22	anxiety	medical_history	radio	Anxiety	1, Yes | 2, No | 3, Unknown		
23	stress_cardiomyopathy	medical_history	radio	Stress Cardiomyopathy (TakoTsubo)	1, Yes | 2, No | 3, Unknown		
24	prior_mi	medical_history	radio	Prior MI	1, Yes | 2, No | 3, Unknown		
25	prior_stroke	medical_history	radio	Prior Stroke	1, Yes | 2, No | 3, Unknown		
26	prior_tia	medical_history	radio	Prior TIA	1, Yes | 2, No | 3, Unknown		
27	prior_hf	medical_history	radio	Prior HF	1, Yes | 2, No | 3, Unknown		
28	etoh_use	medical_history	radio	Alcohol Use	1, Yes | 2, No | 3, Unknown		
29	etoh_use_quantity	medical_history	radio	How much alcohol do you drink in a ty	1, 1-3 drinks | 2, 4-7 drinks | 3, 7-15 drinks | 4, greater than 15 drinks		
30	mj_use	medical_history	radio	Marijuana Use	1, Yes | 2, No | 3, Unknown		
31	age_at_menopause	medical_history	text	Age at Menopause			

Document your variables

- Intuitive / meaningful variable names e.g. study_id
- What do variable names mean?
- What does each variable contain?
- Are there a limited set of possible values?

Name	Field Type	Description	Possible values	Units
study_id	text	Unique ID of study	8-digit number	
date_enrolled	date	Initial subject enrollment date	Date in format YYYY-MM-DD; All dates later than 2011-09-01	
weight	integer	Weight of subject		lbs

File Organization



PROTIP: NEVER LOOK IN SOMEONE ELSE'S DOCUMENTS FOLDER.

File Names

sam_1262011.tif

File Names

sam_1262011.tif

12 June, 2011?
December 6, 2011?
January 26, 2011?

File Names

sam_1262011.tif

12 June, 2011?
December 6, 2011?
January 26, 2011?

Unambiguous dates, the **ISO standard**:

- YYYYMMDD *or* YYYY-MM-DD
  - *e.g. 20120612 = June 6, 2012*
- YYYYMMDDTHH:MM:SS
  - *e.g. 20120612T14-03-12 = June 6, 2012 2:03:12 pm*

File Names

sam_1262011.tif

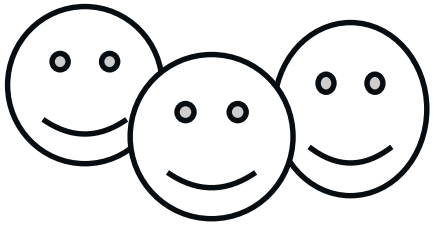
Scanning acoustic microscope?	12 June, 2011?
Systolic anterior motion?	December 6, 2011?
Sam the postdoc?	January 26, 2011?

Unambiguous dates, the **ISO standard**:

- YYYYMMDD *or* YYYY-MM-DD
  - *e.g. 20120612 = June 6, 2012*
- YYYYMMDDTHH:MM:SS
  - *e.g. 20120612T14-03-12 = June 6, 2012 2:03:12 pm*

1 rat heart

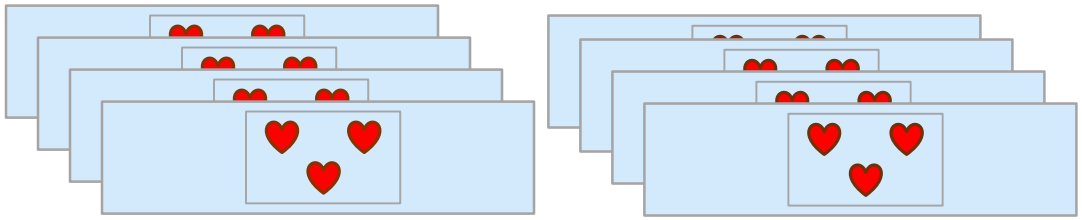
100s of slices



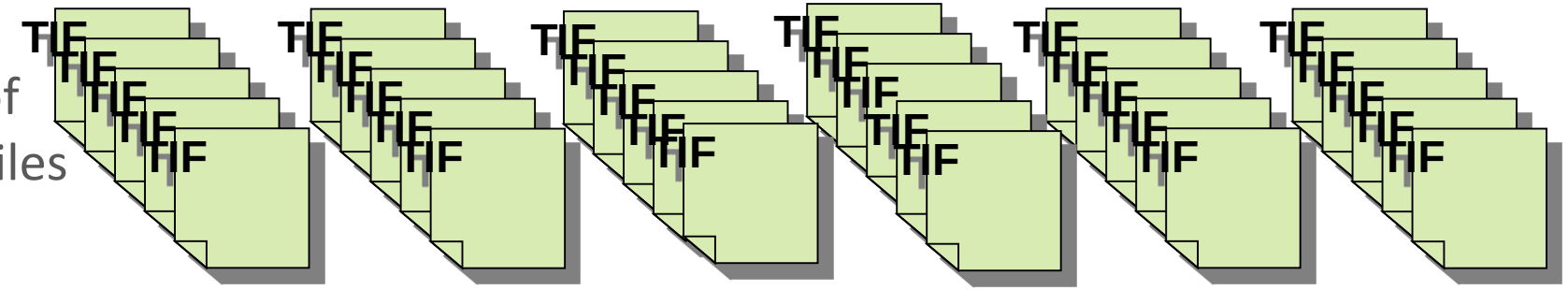
3 post docs

5-7 experiments a week…

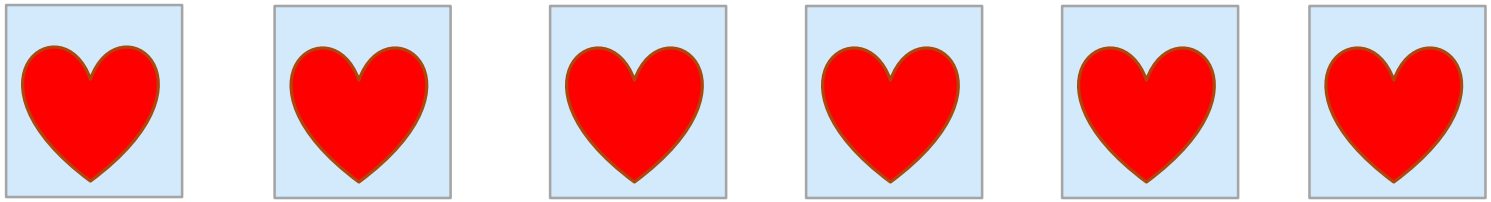
100s of slides



1000s of image files



100s of *huge* images



File names should…

1. Embody their content, including major parameters

AtherRat_ex012_ather_lipitor_128.tif

File names should…

1. Embody their content, including major parameters

   AtherRat_ex012_ather_lipitor_128.tif

2. Have non-cryptic/intuitive names where possible

   AtherRat_SOP_DataValidation_v01.docx

File names should…

3. Be extensible. “ex001” not “ex1”

X

RawData1.xlsx
RawData10.xlsx
RawData2.xlsx
*
*
*

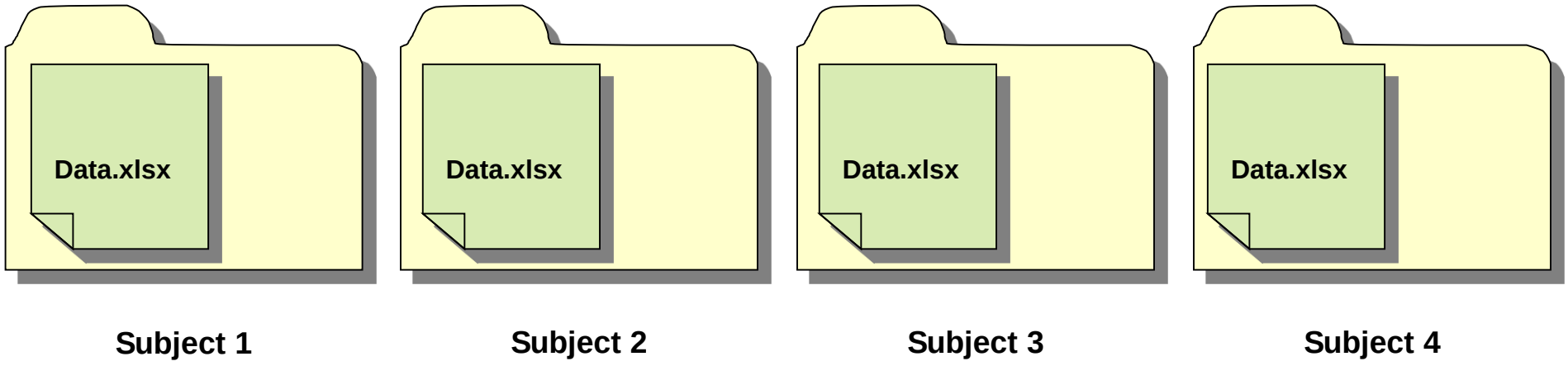
✓

RawData01.xlsx
RawData02.xlsx
*
*
*
RawData10.xlsx

File names should…

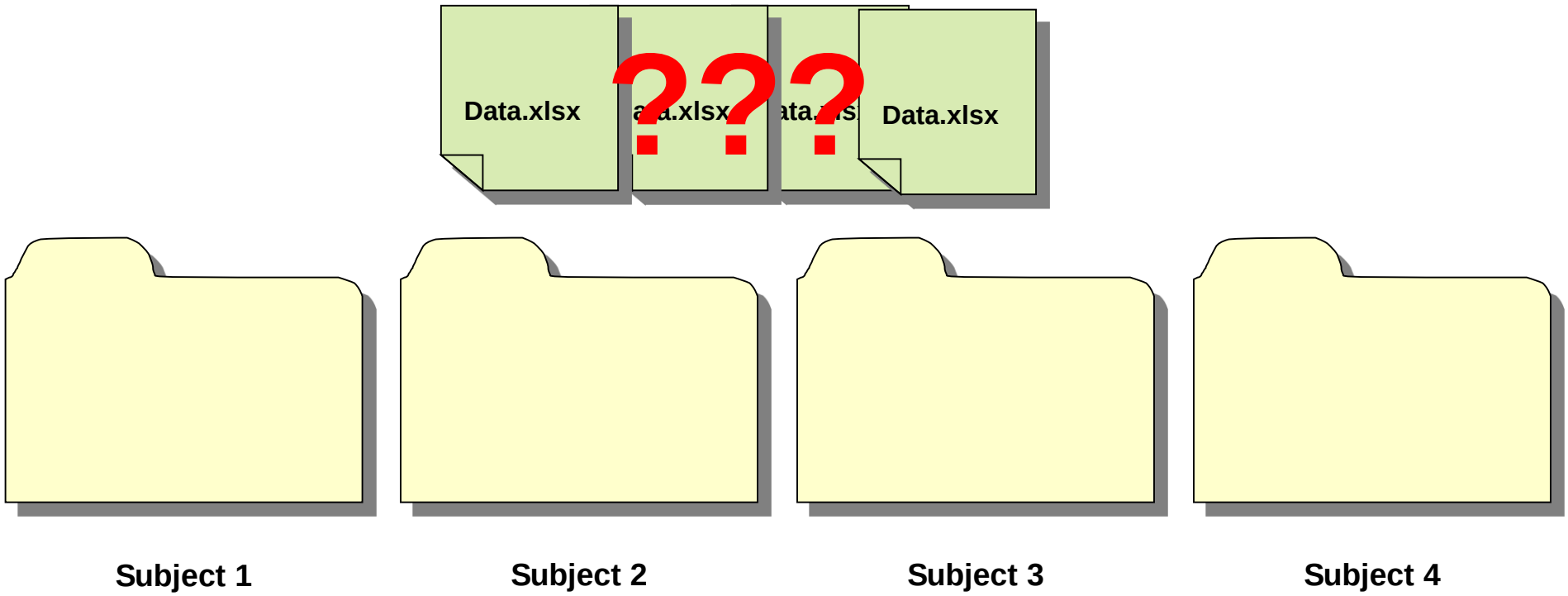
4. Be unique, where possible and practical.

   Avoid 20 files named “data.xlsx” in different folders



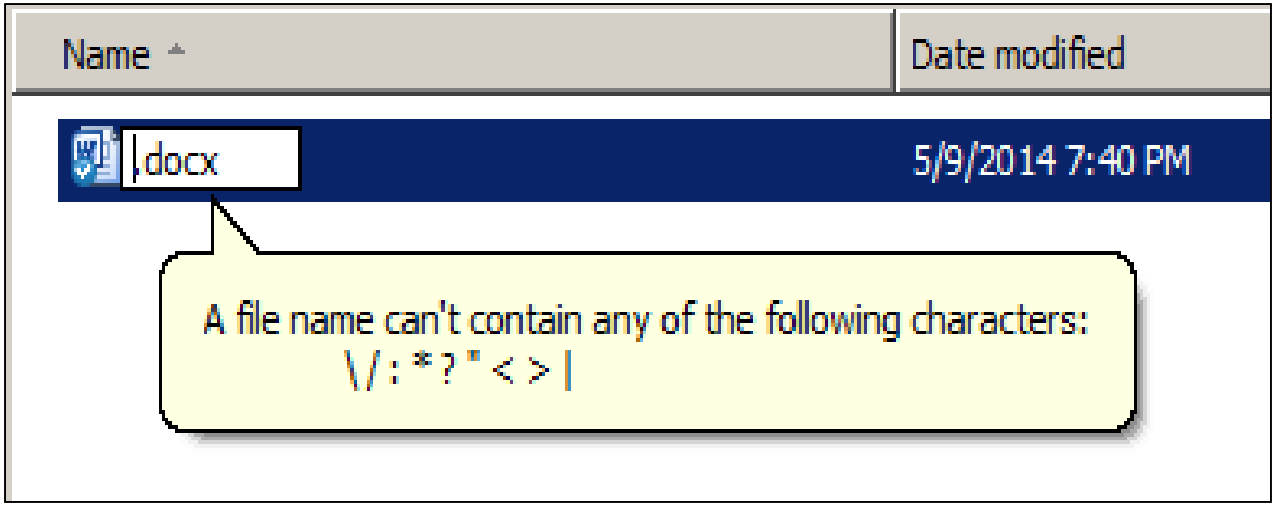
File names should…

4. Be unique, where possible and practical. Avoid 20 files called “data.xlsx” in different folders



File names should…

5. Do not use special characters – restrict file names to numbers, letters, and underscores



File names should…

6. Use consistent, documentable rules for naming files

AtherRat_012_056_mb_0423_raw.csv

AtherRat = experiment name

012 = experiment number

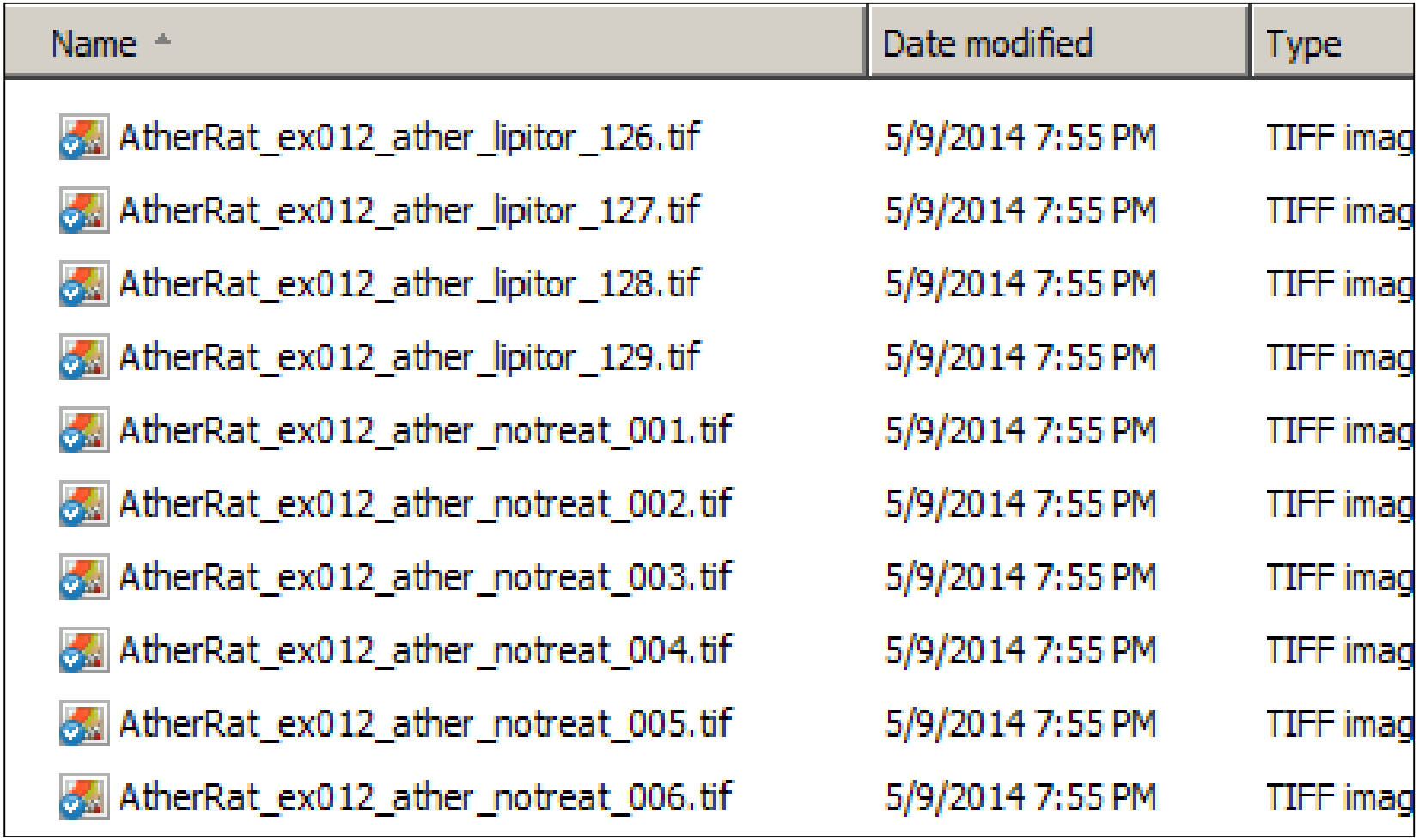
056 = sample number

mb = stain used, methylene blue

0423 = 2-digit coordinates of image (4 across, 23 down)

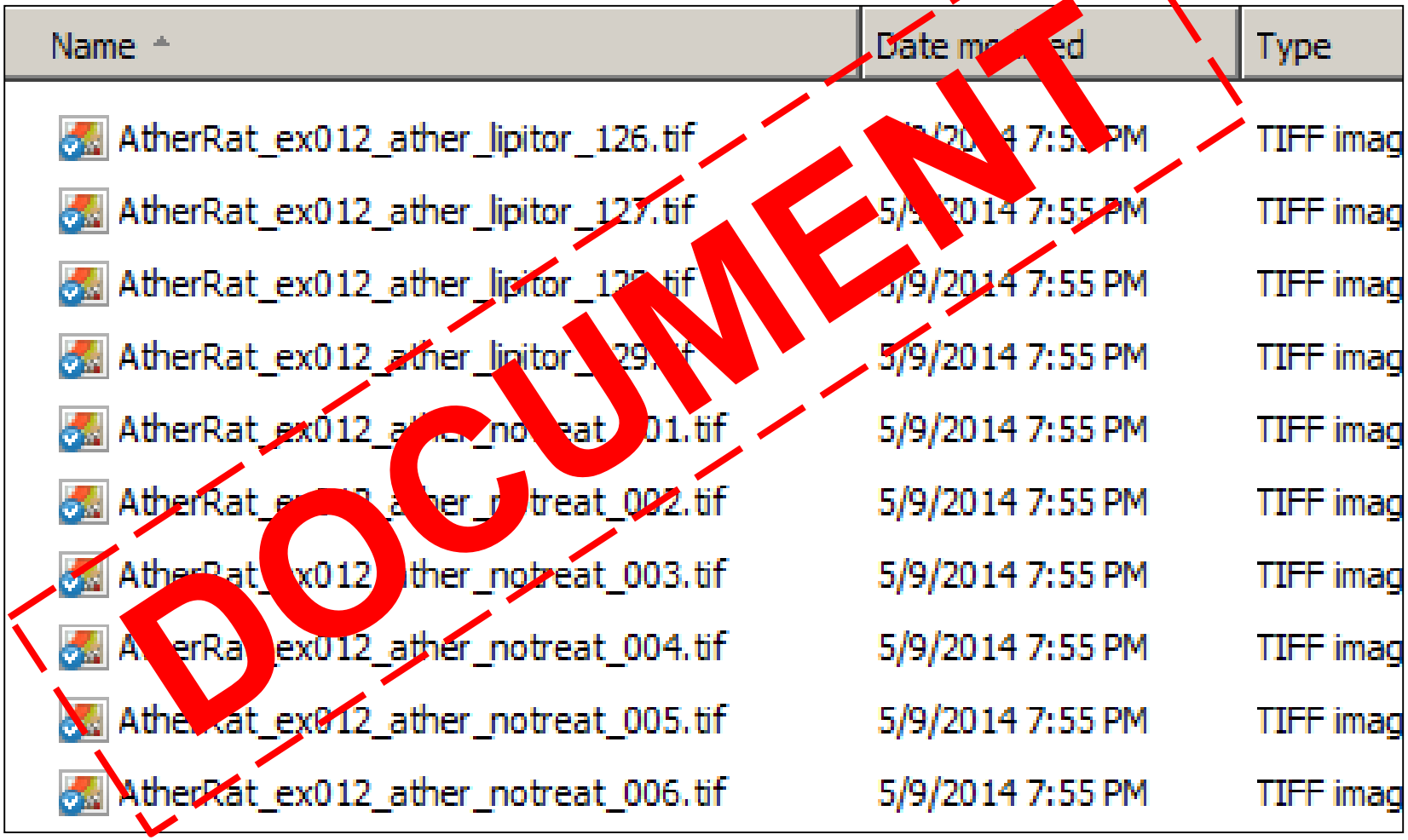
Raw = data stage

In the folder…



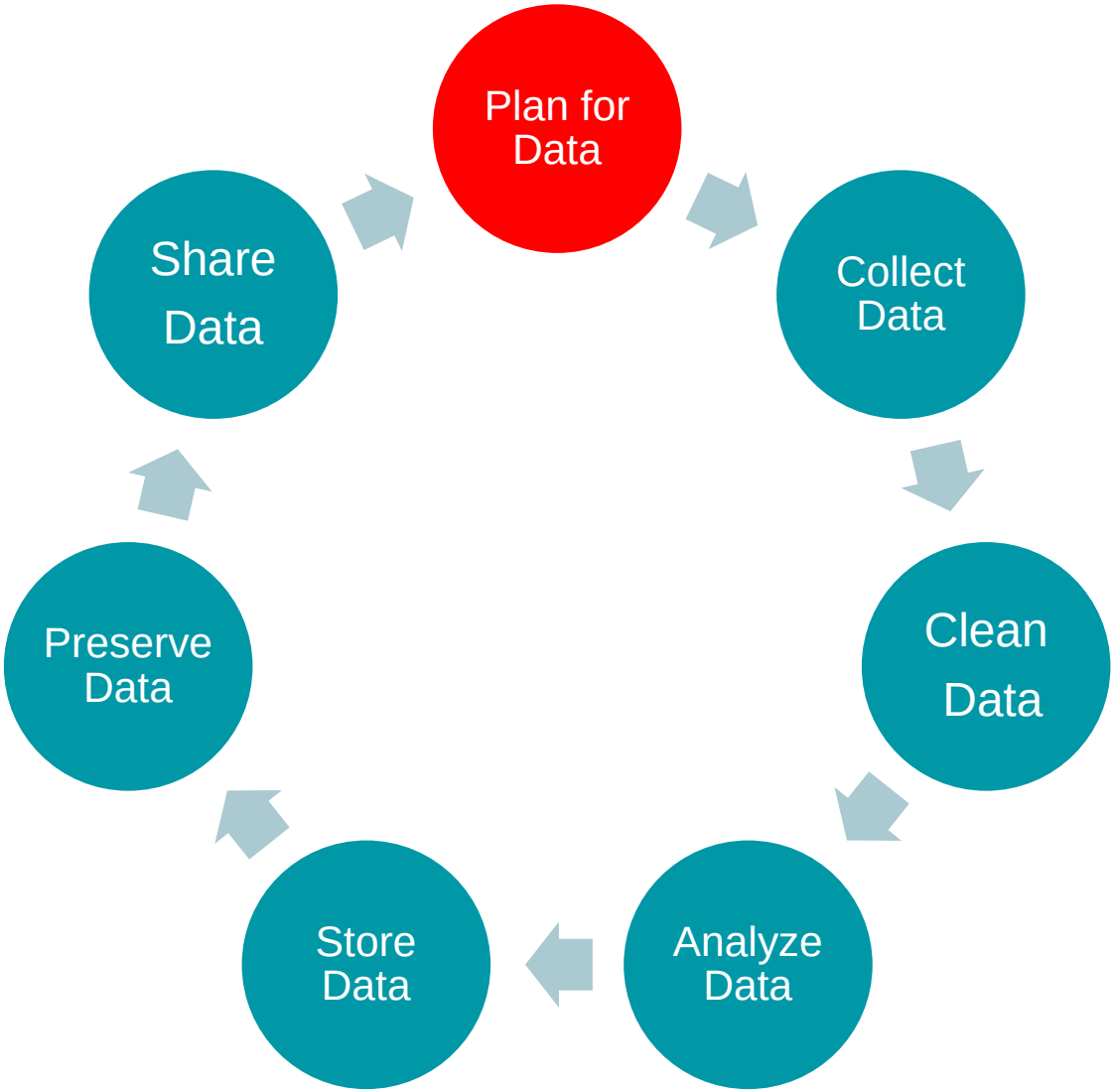
Name	Date modified	Type
AtherRat_ex012_ather_lipitor_126.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_lipitor_127.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_lipitor_128.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_lipitor_129.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_001.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_002.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_003.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_004.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_005.tif	5/9/2014 7:55 PM	TIFF imag
AtherRat_ex012_ather_notreat_006.tif	5/9/2014 7:55 PM	TIFF imag

In the folder…



Storage

Data Lifecycle



Storage Solutions at UMB

Office 365 – One Drive

SOMFiles – Backup data storage for PIs

Discuss storage options with IT at your school

Storage Options

If you are going to use cloud storage:

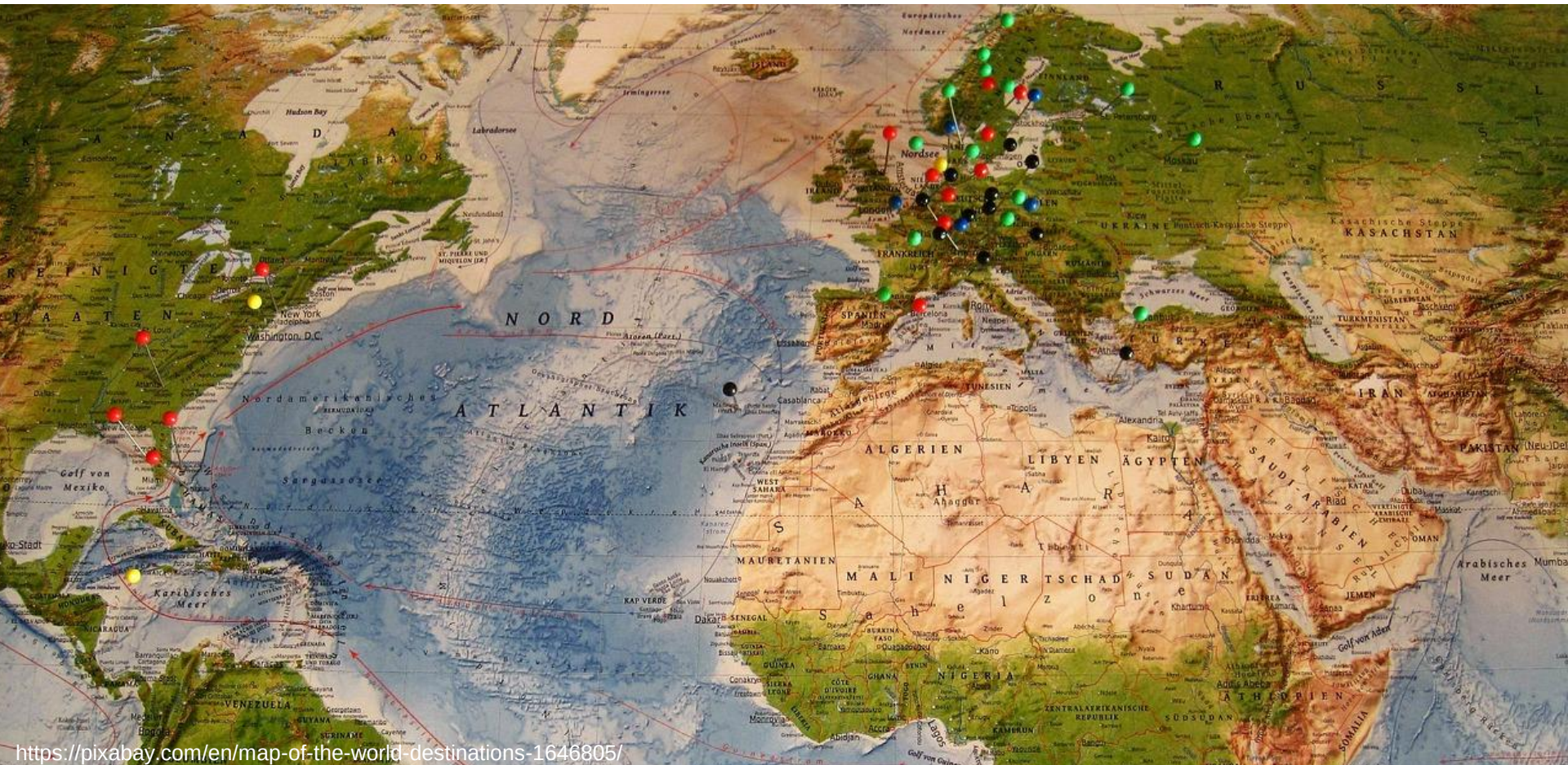
- Talk to IT at your school.
- On campus: SharePoint, OneDrive
- Others: Google Cloud Drive, Amazon, Box.

Backup Considerations

- How will you back up your data?
- How frequently will data be backed up?
- How long will backups be stored?
- How much storage space will be needed?
- And how can you keep track of different versions of data, especially when backing up to multiple devices?

Save multiple copies…

…and disperse them geographically



https://pixabay.com/en/map-of-the-world-destinations-1646805/

Security Considerations

Certain data requires special protection:

- **Protected Health Information**
- **Patents or commercial data**
- **Data as intellectual property**

Security Extra Steps

- Password protect files or folders.
- Lock computers when not in use.
- Have others sign data use agreements.
- At UMB, use **Accellion** for transfer of secure files

http://pixabay.com/p-538722/?no_redirect

Preservation

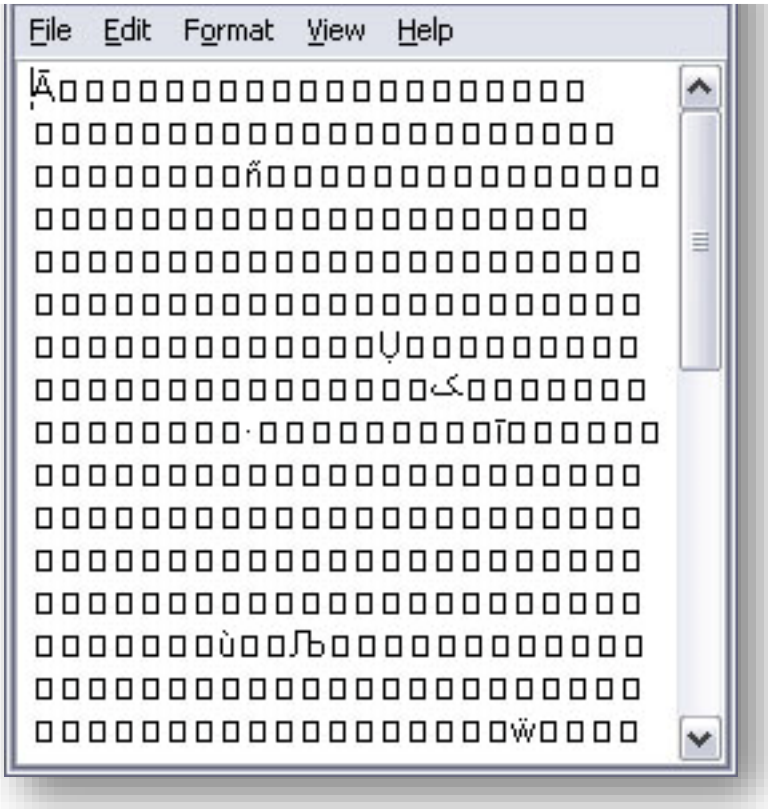
storage ≠ preservation

Preservation

Protects from: Hardware obsolescence

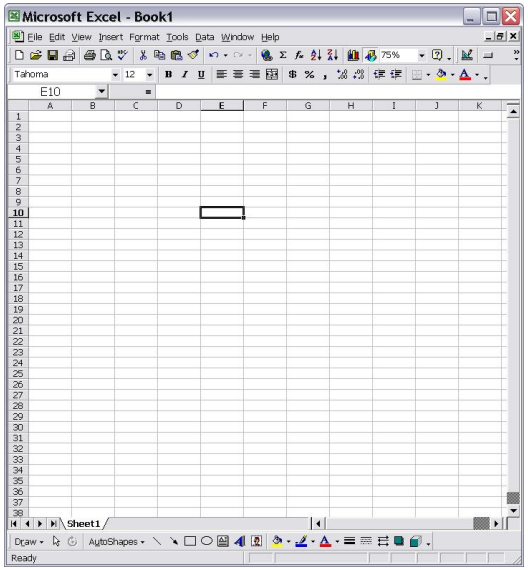
Preservation

Protects from: Software obsolescence



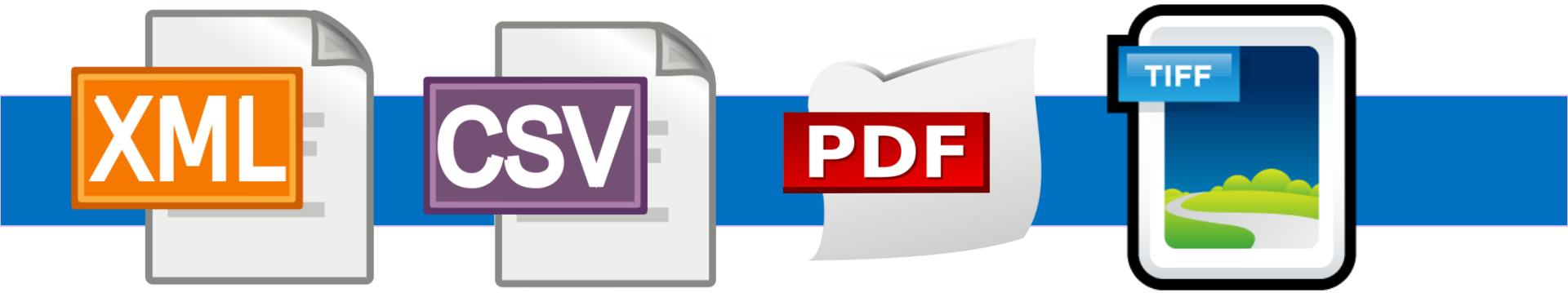
Preservation

Collecting data



Disseminating data

Trusted Open Formats



However…

Microsoft Excel

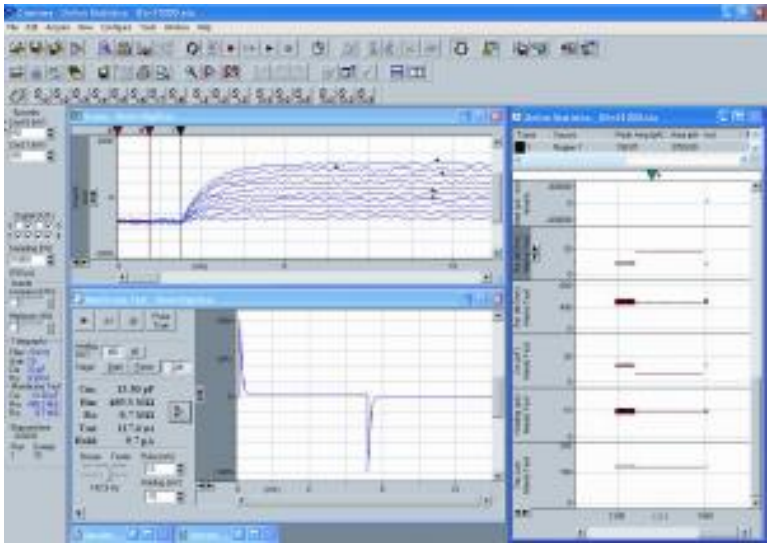
on=to do, other colors by person)

AF	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
# gene	c-myc int2-ex3	RAG1-1	RAG1-2	RAG1-3	GHR	BRCA1	AP5	cyt-b	COI-ATP	BDR	IRBP	vWf	Total
		1300	550				468				766		3084
		1300	680				462				773		3215
		1364					457				781		2602
3		1047			800	1507	460	1215	1050				6079
7	898	1219	941		900	1576	387	1212	1122	473	524		9252
11	873	1304	585	1105	904	1535	440	1180	1131	940	797		11520
1							453	1158		881			2492
7		1361	630	1000	840	1506	417	1215	1134	577			8680
2							392	1180					1572
3					800	1556		1180	1050				4586
8	882	1318	583	1122	904	1640	364	1180		843			8836
7		1300	700	950	941		387	1180		1070			6528
8	1004	1300	700	900	800	1569	416	1180	1050	370	608		9897
1		1000	1191				439	1166			793		4589
6	910	1227	677	1086			375	1215		881	737		7108
1			1191					1158					2349
8	915	1500	519	1088	844	917	318	1215	1134	1020			9470
2		1300	700	1106			344	1215					4665
6	800	1300	1113	1000	820	1572	396	1217	1146	1000			10364
1							396	1216					1612
													0
4	1005	1300	884		850		423	1215	1083				6760
7		1300	700	700	819		390	1125	1116				6150
2					800	1641			1050				3491
2					800	993		440	1050				3283
		1300	435				484						2219
4	987	1300	1105	1000			394	1217		970			6973
4		1300	1106	1000	890	1570	397	1218	1137	704			9322
		828					478				676		1982
1		1433					444	1222			710		3809
10	814	1308	300	1108	913	3092	419	1217	1143				11004
1		1305					449	1218		383	710		4065
							436	409			706		1551
1108	101362	318048	161521	71275	172759	256527	94354	286035	155493	69600	62315		1750705
312	116	254	198	73	200	169	223	289	144	84	85		367
11	1478	2120	1442	1390	941	3352	1094	1238	1217	1080	1259		11892
3.55	102778		sum RAG	550844				sum mt[	441528				

	int2-ex3	RAG1-1	RAG1-2	RAG1-3	GHR	BRCA1	AP5	cyt-b	COI-ATP	BDR			Total

≠

Molecular Devices pClamp Software



Data Formats

Encryption and Compression

https://pixabay.com/en/key-tool-open-lock-security-2114459/

Data Formats

You can’t assume you own your data
Check for:

- Funder policies on data ownership
- Institution policies on data ownership

Providing Access

Why share data?

Increase visibility and impact

Open scientific inquiry

Prevents faulty or fraudulent research

Verification and reproducibility

Reduces duplication

Promotes new research

Encourage collaboration

Creates teaching resources

Data sharing challenges

Time and effort

Fear of losing control of data

Confidential and sensitive information

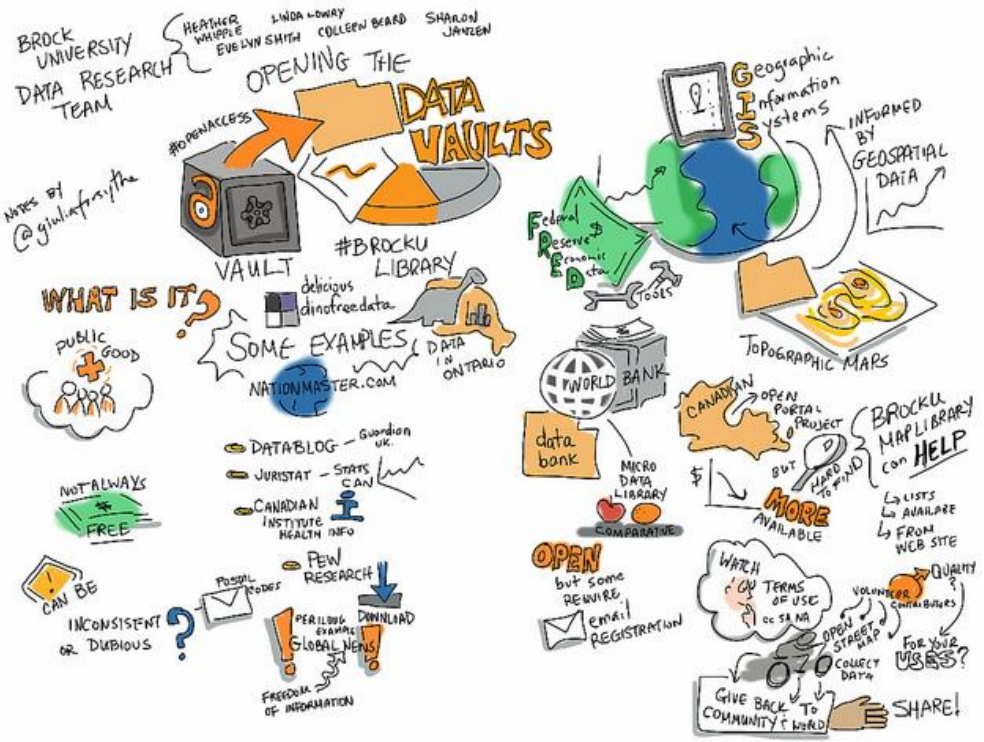
Ownership of data

Lack of incentives

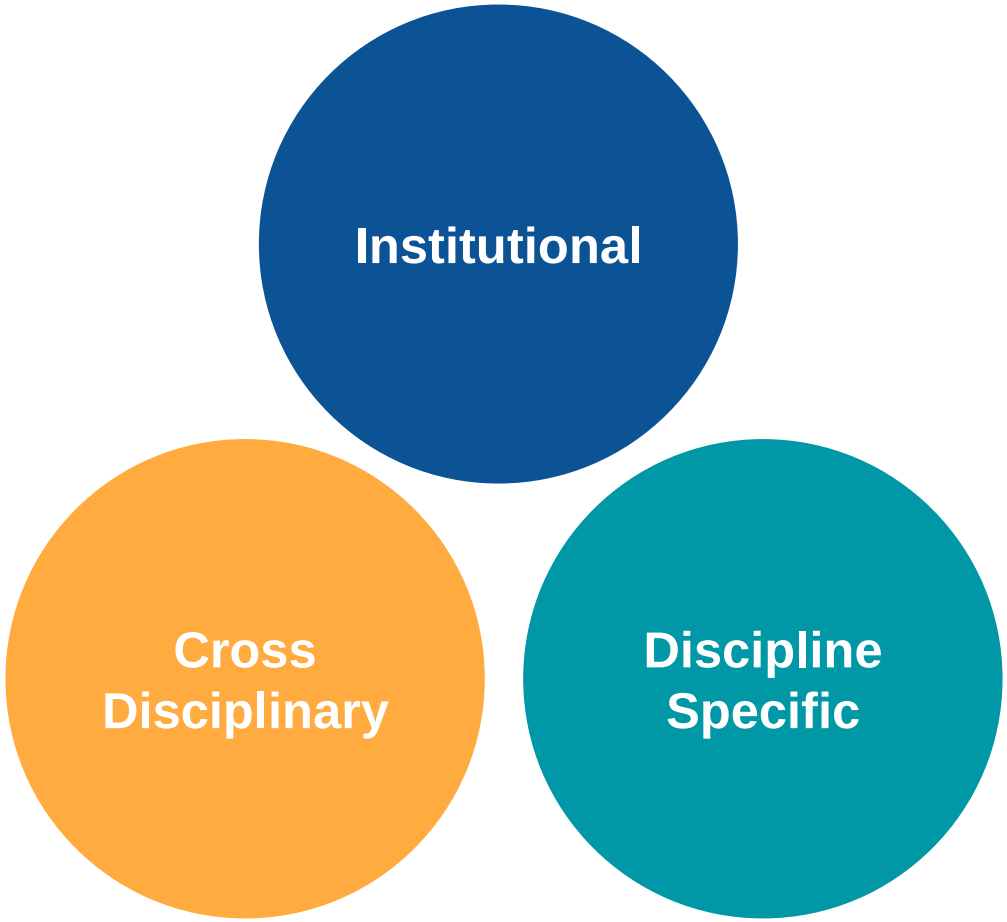
Inexperience with data management

Providing access to your data

- Access vs. **meaningful** access
- Well-documented data



Repository Types



Discipline Specific

NIH Data Sharing Repositories

NIH Data Sharing Repositories

This table lists NIH-supported data repositories that accept submissions of appropriate data from NIH-funded investigators (and others). Also included are resources that aggregate information about biomedical data and information sharing systems. The table can be sorted according by name and by NIH Institute or Center and may be searched using keywords so that you can find repositories more relevant to your data. Links are provided to information about submitting data to and accessing data from the listed repositories. Additional information about the repositories and points-of-contact for further information or inquiries can be found on the websites of the individual repositories.

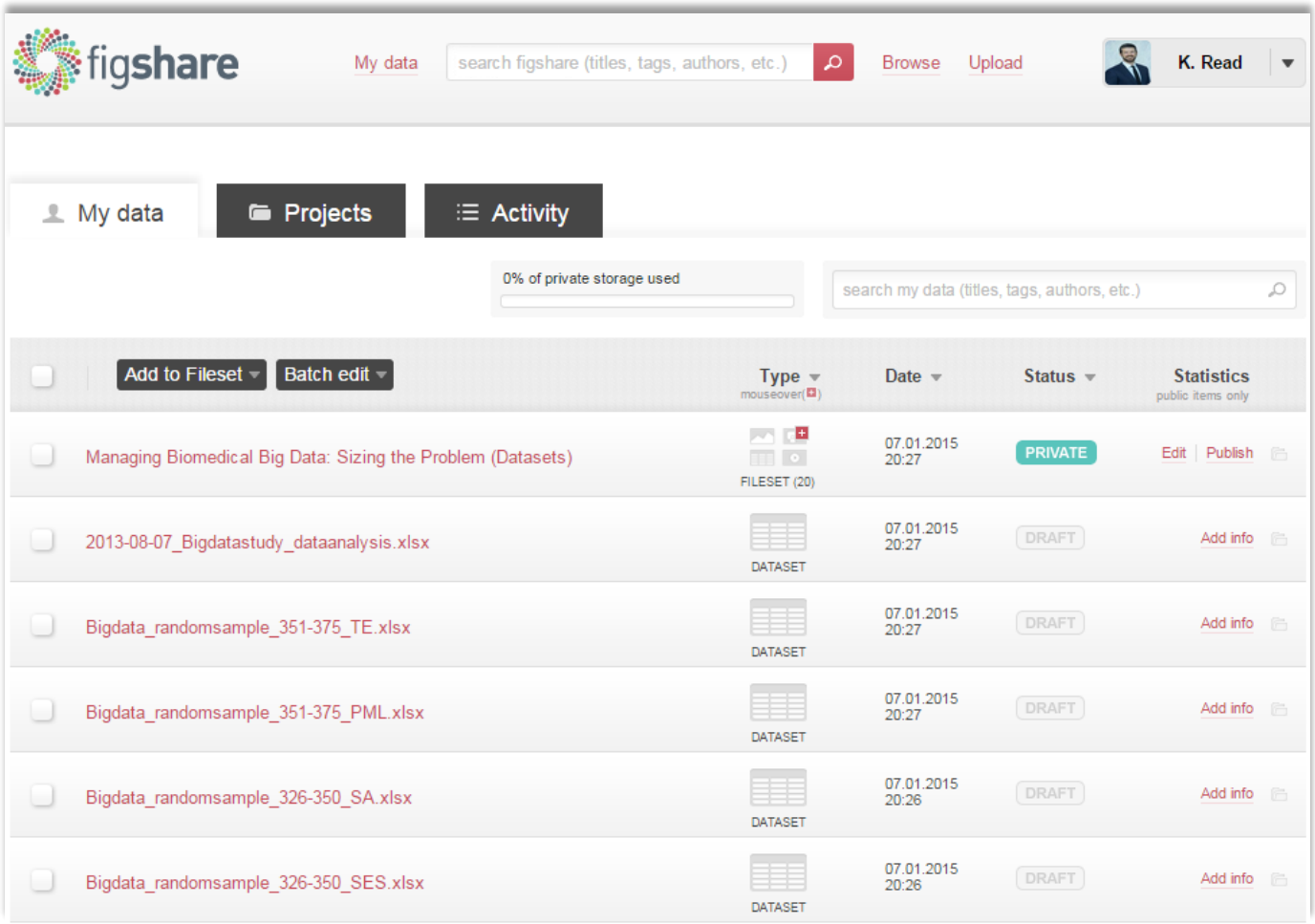
Show 50 entries Search:

IC	Repository Name	Repository Description	Data Submission Policy	Access to Data
NCI	The Cancer Imaging Archive (TCIA)	The Cancer Imaging Archive (TCIA) is a large archive of medical images of cancer accessible for public download. All images are stored in DICOM file format. The images are organized as "Collections", typically patients related by a common disease (e.g. lung cancer), image modality (MRI, CT, etc) or research focus.	How to Submit Data to TCIA	How to Access TCIA Data
NCI (NHGRI, NIGMS)	PeptideAtlas	PeptideAtlas is a multi-organism, publicly accessible compendium of peptides identified in a large set of tandem mass spectrometry proteomics experiments. Mass spectrometer output files are collected for human, mouse, yeast, and several other organisms, and searched using the latest search engines and protein sequences.	How to Submit Data to PeptideAtlas	How to Access PeptideAtlas Data
NHGRI	FlyBase: A Drosophila Genomic and Genetic Database	Drosophila Genomic and Genetic database that includes proteomics data, microarrays and Tiling BAC's.	How to Submit Data to FlyBase	How to Access FlyBase Data
NHGRI	The Zebrafish Model Organism Database (ZFIN)	ZFIN serves as the zebrafish model organism database. It aims to: a) be the community database resource for the laboratory use of zebrafish, b) develop and support integrated zebrafish genetic, genomic and developmental information, c) maintain the definitive reference data sets of zebrafish research information, d) to link this information extensively to corresponding data in other model organism and human databases, e) facilitate the use of zebrafish as a model for human biology, and f) serve the needs of the research community.	How to Submit Data to ZFIN	How to Access ZFIN Data
NHGRI	WormBase	WormBase is an international consortium of biologists and computer scientists dedicated to providing the research community with accurate, current, accessible information concerning the genetics, genomics and biology of C. elegans and related nematodes.	How to Submit Data to WormBase	How to Access WormBase Data

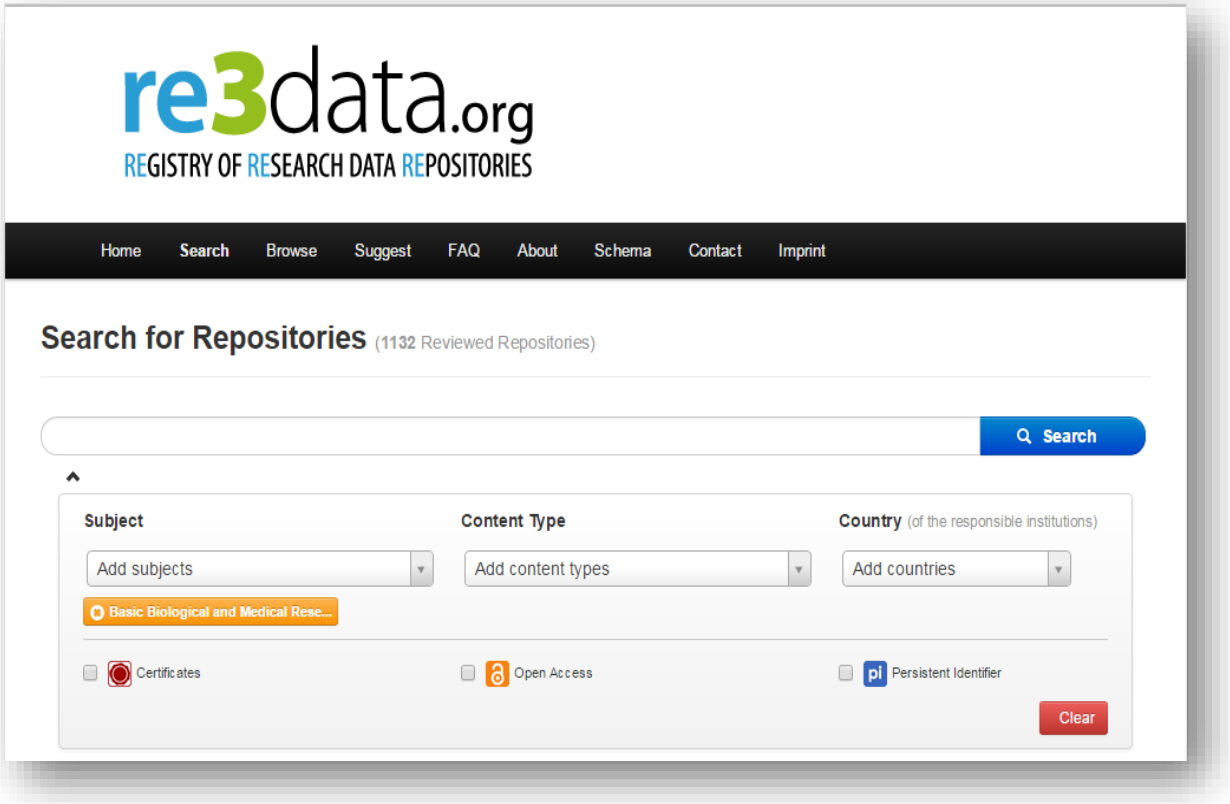
http://www.nlm.nih.gov/NIHbmic/nih_data_sharing_repositories.html

Cross Disciplinary

Figshare



Research Data Repositories



http://www.re3data.org/

UMB Data Catalog

Dataset of an Exploratory Review of Clinical Study Reports of Randomised Controlled Trials Internal Dataset [unpublished]

UID: 7

Author(s): Peter Doshi*
* Corresponding Author

Description

This dataset is associated with an exploratory evaluation of pharmaceutical industry clinical study reports (CSR) for possible use in evidence synthesis and systematic reviews. 78 CSRs from public sources were selected for data extraction. The report dates ranged from 1991 through 2011, inclusive, and represented 90 randomized controlled trials of 14 pharmaceuticals. The primary outcome measures included presence and length of essential elements of trial design and reporting and compression factor (ratio of page length for CSRs compared to its published counterpart in a scientific journal). The dataset is comprised of an audited table of extracted and derived variables. Data were extracted on MS Word extraction tables, migrated to MS Excel, and audited (double-checked). The Excel file contains multiple "sheets" (worksheets) the contents of which are described in an accompanying readme file. The uncorrected (original) and corrected extraction sheets as well as audit records are available upon request from Peter Doshi, corresponding author (pdoshi@rx.umaryland.edu).

Subject Domain

Drug Industry
Randomized Controlled Clinical Trials as Topic

Keywords

clinical study reports/evaluation

Access via Dryad
Dataset and readme file

Access Restrictions

Free to All

Access Instructions

Available to download from the Dryad site

Associated Publications

Doshi P, Jefferson T (2013) Clinical study reports of randomised controlled trials: an exploratory review of previously confidential industry reports. BMJ Open 3(2): e002496. http://dx.doi.org/10.1136/bmjopen-2012-002496

Data Type

Administrative

Dataset Format(s)

Microsoft Excel

Dataset Size

95.98Kb

Data Publishing

Conclusion

How is the library supporting data management?

- Workshops, consultations, and assistance
  - Data management plan guidance
  - Storage and preservation recommendations
  - File naming and organization advice
  - Data citation
  - Locating secondary data for reuse
  - Recommending technology for specific needs
- Data catalog
- Referrals to other UMB experts

HS/HSL Data Management Services, http://guides.hshsl.umaryland.edu/data

- Research Data Management Services
- Develop a Data Management Plan (DMP)
- Describe Data
- Organize Data
- Share Data
- Store Data
- Cite Data
- Services & Workshops
- UMB Resources & Policies

Research Connection

The HS/HSL's Research Connection is a suite of programs and services designed to advance the success of UMB faculty, staff and students.

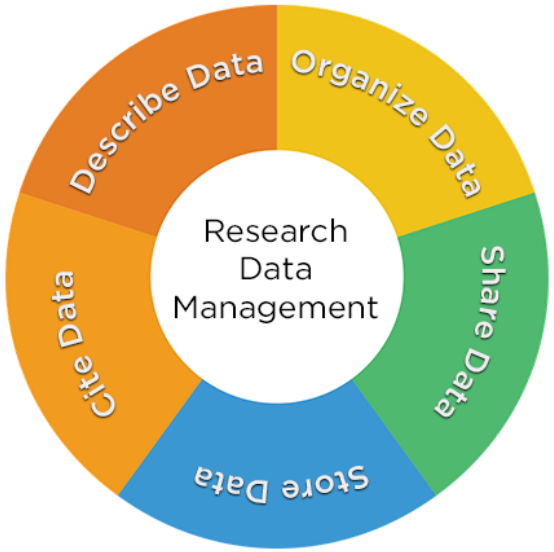
Request a Consult

Research Data Management Services Introduction

Consult with a member of our data management team for assistance with developing a data management plan, or in locating, describing, storing, or sharing data. Following best practices in research data management can help you, your lab, or center secure grant funding and create data output that becomes part of the scholarly record. The FAIR Data Principles provide a guideline for facilitating Findability, Accessibility, Interoperability, and Re-usability.

Given the importance of managing data, many funding agencies are requiring that plans for managing data be submitted with grant applications. An effective plan to collect, share, reproduce and preserve data may increase the impact of your research.

Read about HS/HSL's workshops, including **Data Management 101** and **Creating a Data Management Plan with the DMP Tool**.



Questions?

Workshop Attribution

Thanks to the NYU Health Sciences Library's Data Services Team for developing the template for this workshop

Kevin Read
Data Services Librarian and Lead, Data Discovery

Alisa Surkis
Assistant Director, Research Data and Metrics

Photo references

- Mike. “Padlock” 2005 https://www.flickr.com/photos/zebble/6080622/
- Theen Moy. “SAHMRI Lab” 2014 https://www.flickr.com/photos/theenmoy/13969480280/
- Kevin Dooley. “Future tense” 2009 https://www.flickr.com/photos/pagedooley/4114167117/
- Wikipedia.org. “To Share or Not to Share” 2013 http://upload.wikimedia.org/wikipedia/commons/6/65/To_deposit_or_not_to_deposit,_that_is_the_question_-_journal.pbio.1001779.g001.png
- Opensource.com “What open data means – and what it doesn’t” 2010 https://www.flickr.com/photos/opensourceway/5265955179/
- Pixabay. “Test” 2013 http://pixabay.com/static/uploads/photo/2013/11/25/17/27/test-218181_640.jpg
- Pixabay. “Research” 2012 http://pixabay.com/p-66365/?no_redirect
- Draw&Research. “Versioncontrol” 2013 https://www.flickr.com/photos/dibujoscccd/8659059842/
- Wikimedia. “Backup Backup Backup” 2011 http://upload.wikimedia.org/wikipedia/commons/e/ee/Backup_Backup_Backup_-_And_Test_Restores.jpg
- Wikimedia. “Modern warehouse pallent rack storage system” 2000 http://upload.wikimedia.org/wikipedia/commons/a/a2/Modern_warehouse_with_pallet_rack_storage_system.jpg
- Mcability. “Padlock Unlock” 2014 http://pixabay.com/en/padlock-lock-security-unlock-322494/
- Gadini. “Padlocks Locks for Bags” 2015 http://pixabay.com/en/padlocks-locks-for-bags-597815/
- Simonatova. “Egyptian museum mummy antiquity” 2015 http://pixabay.com/en/egyptian-museum-mummy-antiquity-630297/
- Sarah. “Metadata is a love note to the future” 2011 https://www.flickr.com/photos/sarahseverson/6245395188/
- Jonas Ahrentorp. “Clutter” 2007 https://www.flickr.com/photos/neofob/753826914/
- Alan Levine. “Life is sharing” 2012 https://www.flickr.com/photos/cogdog/8188824613/
- Niklas Wilkstrom. “Sharing is caring” 2010 https://www.flickr.com/photos/niklaswikstrom/5214708665/
- Github. “Repositories images” 2013 https://pages.github.com/images/ghfm@2x.png
- Futureatlas.com. “Citation needed” 2010 https://www.flickr.com/photos/87913776@N00/5129607997/
- Avlxyz. “Authentic 5.25 inch floppy disks” 2014 http://www.flickr.com/photos/avlxyz/5766413625/
- Mattlogein. “Floppy disk” 2014. http://www.flickr.com/photos/49503210657@N01/127984947
- Normann. “Computer Model 1981” 2014 http://www.flickr.com/photos/26009408@N00/8600423939
- Weiler, Aron.” Encrypted file” 2014. http://www.flickr.com/photos/57523780@N00/52632856
- Mccapdevila. “Current clamp recording of neuron” 2012. http://en.wikipedia.org/wiki/File:Current_Clamp_recording_of_Neuron.GIF