SECRETS OF THE DATA WHISPERER

How You Can Engage Patrons with Data (and Learn to Love Data Yourself)

ABOUT ME

- I'm one of two Research & Data Coordinators at the NNLM-PNR*
- I've worked as:
  - a **public health epidemiologist** (for Public Health – Seattle & King County)
  - the **medical librarian** for Group Health (now Kaiser Permanente – Washington)
  - a **public library consumer health librarian** (at The Seattle Public Library)

*National Network of Libraries of Medicine, Pacific Northwest Region (one of 8 outreach arms of the National Library of Medicine)

WHAT'S TODAY'S AGENDA? *

- How data are created and maintained
- How data are analyzed
- How data are visualized
- Crossover skills from librarianship to data wizardry
- How to be a critical data consumer (data's pitfalls for the unwary)
- Tricks for finding data (or at least answers)
- Best practices around data literacy
- Learning opportunities

*I promise it will be more fun than it looks!!!

BUT FIRST, WHY DATA, WHY NOW?

- Increasingly, we encounter **data in everyday life** (we need it for understanding the news, engaging in public discourse, assessing information about weather patterns, etc.)
- Many data publishers, governments in particular, are making their **data accessible to the public**
- With more accessibility and more encounters come **more patron requests for help** in understanding and using data for a wide range of purposes

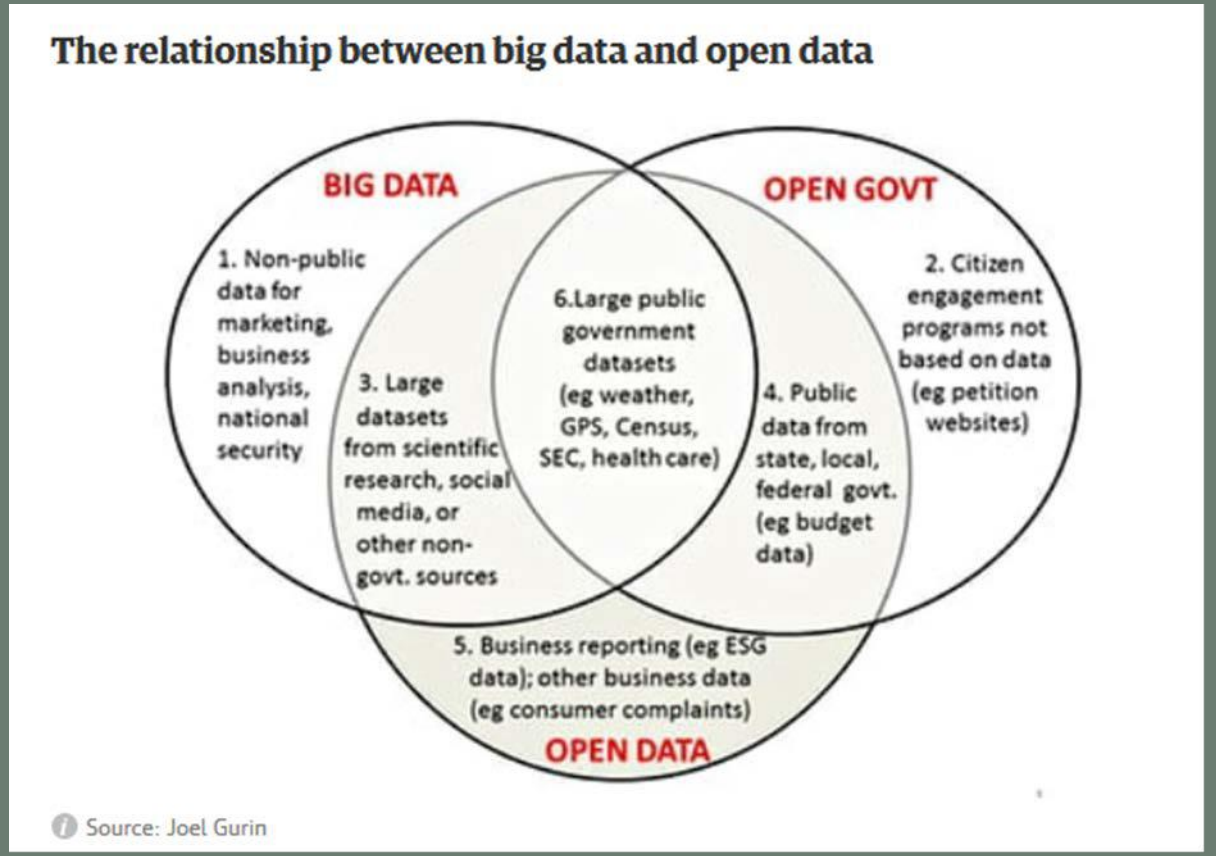
TODAY'S FOCUS: GOVERNMENT AND PUBLIC DATA

Small vs big data

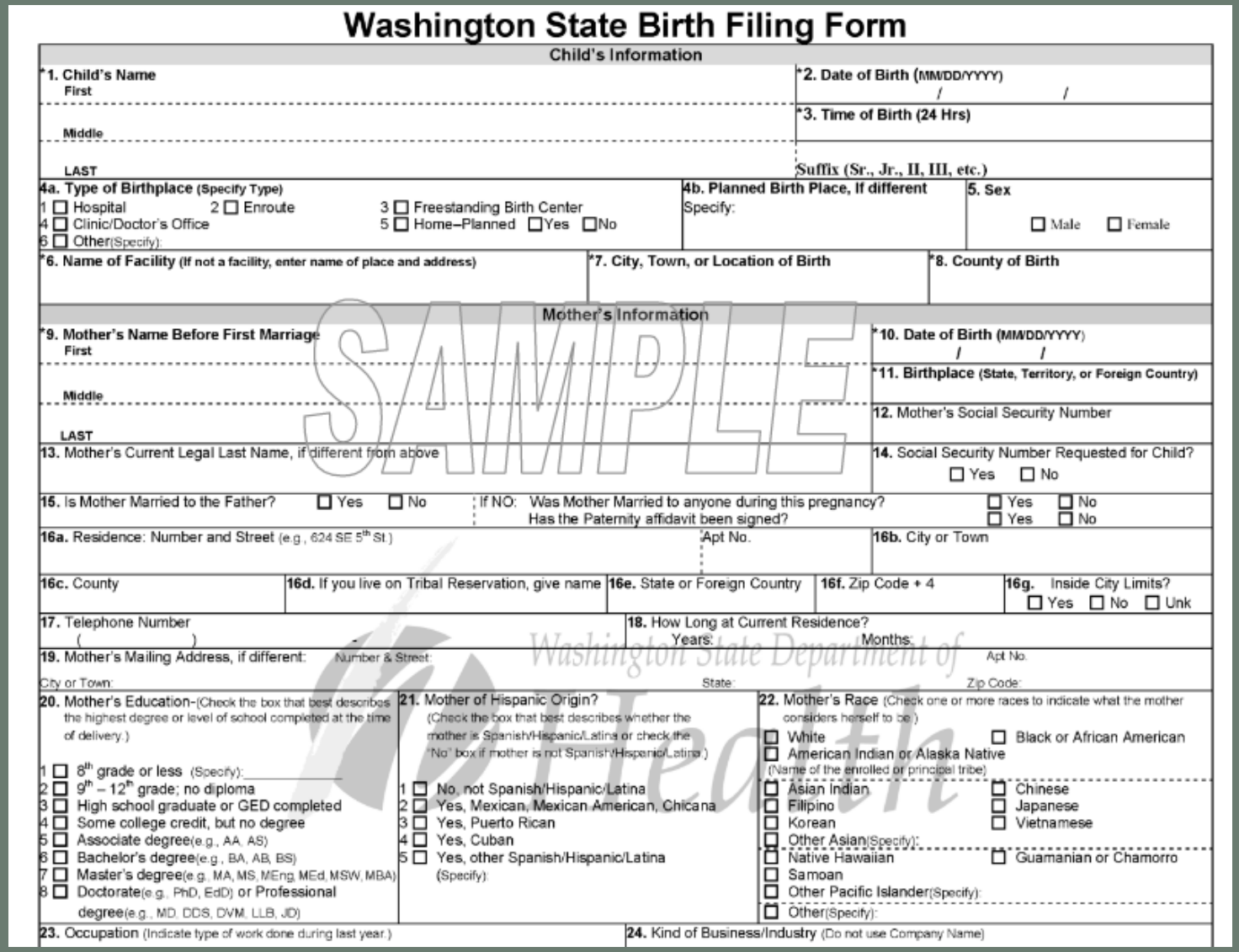
Open vs closed data

TODAY WE WILL TALK ABOUT SMALLER DATA, LIKELY TO BE OPEN

(but feel free to ask about other types!)



HOW ARE DATA CREATED? CASE STUDY: WASHINGTON STATE BIRTH CERTIFICATE



Washington State Birth Filing Form

Child's Information

*1. Child's Name
First
Middle
LAST

*2. Date of Birth (MM/DD/YYYY) / /

*3. Time of Birth (24 Hrs)

Suffix (Sr., Jr., II, III, etc.)

4a. Type of Birthplace (Specify Type)
1 ☐ Hospital 2 ☐ Enroute 3 ☐ Freestanding Birth Center
4 ☐ Clinic/Doctor's Office 5 ☐ Home–Planned ☐ Yes ☐ No
6 ☐ Other (Specify):

4b. Planned Birth Place, If different
Specify:

5. Sex ☐ Male ☐ Female

*6. Name of Facility (If not a facility, enter name of place and address)

*7. City, Town, or Location of Birth

*8. County of Birth

Mother's Information

*9. Mother's Name Before First Marriage
First
Middle
LAST

*10. Date of Birth (MM/DD/YYYY) / /

*11. Birthplace (State, Territory, or Foreign Country)

12. Mother's Social Security Number

13. Mother's Current Legal Last Name, if different from above

14. Social Security Number Requested for Child? ☐ Yes ☐ No

15. Is Mother Married to the Father? ☐ Yes ☐ No | If NO: Was Mother Married to anyone during this pregnancy? ☐ Yes ☐ No | Has the Paternity affidavit been signed? ☐ Yes ☐ No

16a. Residence: Number and Street (e.g., 624 SE 5th St.)

Apt No.

16b. City or Town

16c. County

16d. If you live on Tribal Reservation, give name

16e. State or Foreign Country

16f. Zip Code + 4

16g. Inside City Limits? ☐ Yes ☐ No ☐ Unk

17. Telephone Number ( ) -

18. How Long at Current Residence? Years: Months:

19. Mother's Mailing Address, if different: Number & Street: Apt No.
City or Town: State: Zip Code:

20. Mother's Education-(Check the box that best describes the highest degree or level of school completed at the time of delivery.)
1 ☐ 8th grade or less (Specify):
2 ☐ 9th – 12th grade; no diploma
3 ☐ High school graduate or GED completed
4 ☐ Some college credit, but no degree
5 ☐ Associate degree (e.g., AA, AS)
6 ☐ Bachelor's degree (e.g., BA, AB, BS)
7 ☐ Master's degree (e.g., MA, MS, MEng, MEd, MSW, MBA)
8 ☐ Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)

21. Mother of Hispanic Origin? (Check the box that best describes whether the mother is Spanish/Hispanic/Latina or check the 'No' box if mother is not Spanish/Hispanic/Latina.)
1 ☐ No, not Spanish/Hispanic/Latina
2 ☐ Yes, Mexican, Mexican American, Chicana
3 ☐ Yes, Puerto Rican
4 ☐ Yes, Cuban
5 ☐ Yes, other Spanish/Hispanic/Latina (Specify):

22. Mother's Race (Check one or more races to indicate what the mother considers herself to be.)
☐ White ☐ Black or African American
☐ American Indian or Alaska Native (Name of the enrolled or principal tribe)
☐ Asian Indian ☐ Chinese
☐ Filipino ☐ Japanese
☐ Korean ☐ Vietnamese
☐ Other Asian (Specify):
☐ Native Hawaiian ☐ Guamanian or Chamorro
☐ Samoan
☐ Other Pacific Islander (Specify):
☐ Other (Specify):

23. Occupation (Indicate type of work done during last year.)

24. Kind of Business/Industry (Do not use Company Name)

SAMPLE

Washington State Department of Health

In Washington State, almost every birth has a certificate filled out. So, this can be considered a data source that covers an entire population (newborns). However, the data aren't always the best quality… what can go wrong?

This and next slide:

http://www.doh.wa.gov/Portals/1/Documents/Pubs/422-078-AnnSum2006.pdf

Mother's Statistical Information

34. Mother's Medical Record Number

35. Mother's Prepregnancy Weight (Pounds)

36. Mother's Weight at Delivery (Pounds)

37. Mother's height
Feet: Inches:

38. Did Mother get WIC food for herself during pregnancy?
☐ Yes ☐ No

39. Cigarette Smoking Before and During Pregnancy
If none enter "0"
Average number of cigarettes or packs per day:

	# of cigarettes		# of packs
Three months before pregnancy		OR	
First three months of pregnancy		OR	
Second three months of pregnancy		OR	
Last three months of pregnancy		OR	

40a. Number of Previous Live Births
(Do not include this child)
Number Now Living _____ ☐ None
Number Now Dead _____ ☐ None

41a. Number of Other Pregnancy Outcomes
(Spontaneous or induced losses or ectopic pregnancies)
Number of Other Outcomes_____ ☐ None

40b. Date of Last Live Birth (MM/YYYY) (Do not include this child)
/

41b. Date of Last Other Pregnancy Outcome (MM/YYYY)
/

42a. Date of First Prenatal Care Visit (MM/DD/YYYY)
/ / ☐ No Prenatal Care

42b. Date of Last Prenatal Care Visit (MM/DD/YYYY)
/ /

43. Total Number of Prenatal Visits for this Pregnancy
(If none, enter '0') _____

44. Date Last Normal Menses Began
(MM/DD/YYYY)
/ /

45. Was mother transferred to higher level care for maternal medical or fetal indications for delivery?
☐ Yes ☐ No If yes, name of facility mother was transferred from:

46. Principal Source of Payment for this Delivery
☐ Medicaid ☐ Self Pay ☐ Private Insurance
☐ Indian Health ☐ CHAMPUS ☐ Other Gov't
☐ Other (Specify)

Newborn's Statistical Information

47. Newborn Medical Record Number

48. Birth Weight
lbs: ozs: **or** grams:

49. Infant Head Circumference (cm)

50. Obstetric Estimate of Gestation
(Completed weeks)

51. Apgar score at 5 minutes _____
If score is less than 6, score at 10 minutes _____

52. Plurality – Single, Twin, Triplet, etc. (Specify)

53. If not single birth – Born 1st, 2nd, 3rd, etc. (Specify)

54. Was infant transferred within 24 hours of delivery? ☐ Yes ☐ No
If yes, name of facility infant was transferred to:

55. Is infant living at the time of report?
☐ Yes ☐ No ☐ Transferred, Status Unknown

56. Is infant being breastfed?
☐ Yes ☐ No

Medical and Health Information

57. Risk Factors in this Pregnancy (Check all that apply):

58. Method of Delivery

59. Infections Present and/or Treated During this Pregnancy

WHO FILLS OUT THE FORM?

- Nurse at mom's bedside?
- Hospital registrar using mom's medical record?
- Midwife after home birth?
- Mom herself?
- Dad or relative?

AND…

- Can any of them remember the exact dates of things like prenatal visits?
- Does the hospital insist on completion of that field/other fields?

POTENTIAL DATA ISSUES WITH PRENATAL CARE

- Misremembering dates
- Not wanting to look like they started too late, so, fudging dates
- Filling out dates incompletely
- Skipping the question even if they remember month and year, since they can't remember the day
- Human error if using medical record
- Cultural differences (European dates reported differently)
- No one wants to fill out the "No" box
- If hospital doesn't insist on good quality data for that item, hospital staff may ignore it

AND ONCE THE CERTIFICATES ARE FILLED OUT

- Data has to be entered into a machine readable format—data entry errors?
- Data are vulnerable to technical glitches and file corruption
- Data must be "cleaned"—what to do with a record where mom's age is 199?
- Coding errors must be fixed—human race is not the same as other race
- Certificates have to be traded across borders (certificates for Oregon moms having babies in Washington are sent to Oregon, and vice versa)
- ALL THESE THINGS TAKE TIME

HOW DOES ALL THIS PLAY OUT IN MAINTAINING AND USING THE DATA?

- Missing data

  (What if a large local hospital accounting for a major proportion of county/state births was not filling out the prenatal care question? Along with missing data from other hospitals, the resulting prenatal care info would be very poor quality!)

- The data that there are can take longer to release if extensive cleaning needs to be done

- The data that there need to be reviewed for quality control—if they are poor quality, it has big impacts on programs and services, and our understanding of what people are actually doing

- Or, the data are trusted too much, given all of the pitfalls—THIS IS THE PART WHICH WE CAN REALLY HELP WITH!

DATA CREATION AND MAINTENANCE: RECAP!

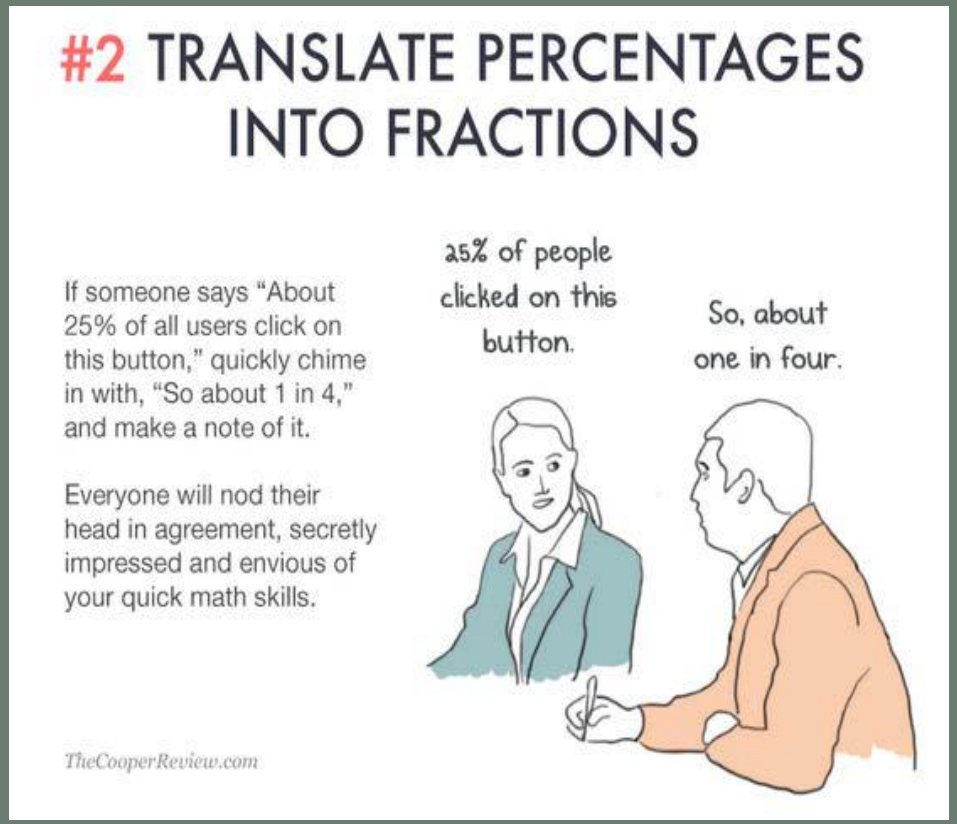
- Data don't come out of nowhere—they represent a phenomenon, and have to be collected! (either by humans or machines, and machines aren't perfect)
- There are many points at which the data can be "compromised"– there's no perfect source, you just have to know the caveats!
- This is why documentation is so important! Also, user forums, and hands-on experience
- Maintenance is a big deal too—most users want data at regular intervals, in consistent formats, and with consistent fields (questions). This takes time and money and the will to continue!
- Often older data sets are not offered online, but usually the owner can supply them (at least in government)

HOW DATA ARE ANALYZED

- I hate to say it, but, it depends! On what?
  - The data file
  - The question being answered
  - The analyst

- Usually structured data (that falls into rows and columns) is analyzed using some software; Excel can do a lot but statistical packages can do more

- In research, generally there is a starting hypothesis that is tested, but, you can just explore the data too (do descriptive work rather than statistical analysis)



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QUANTITATIVE VS QUALITATIVE

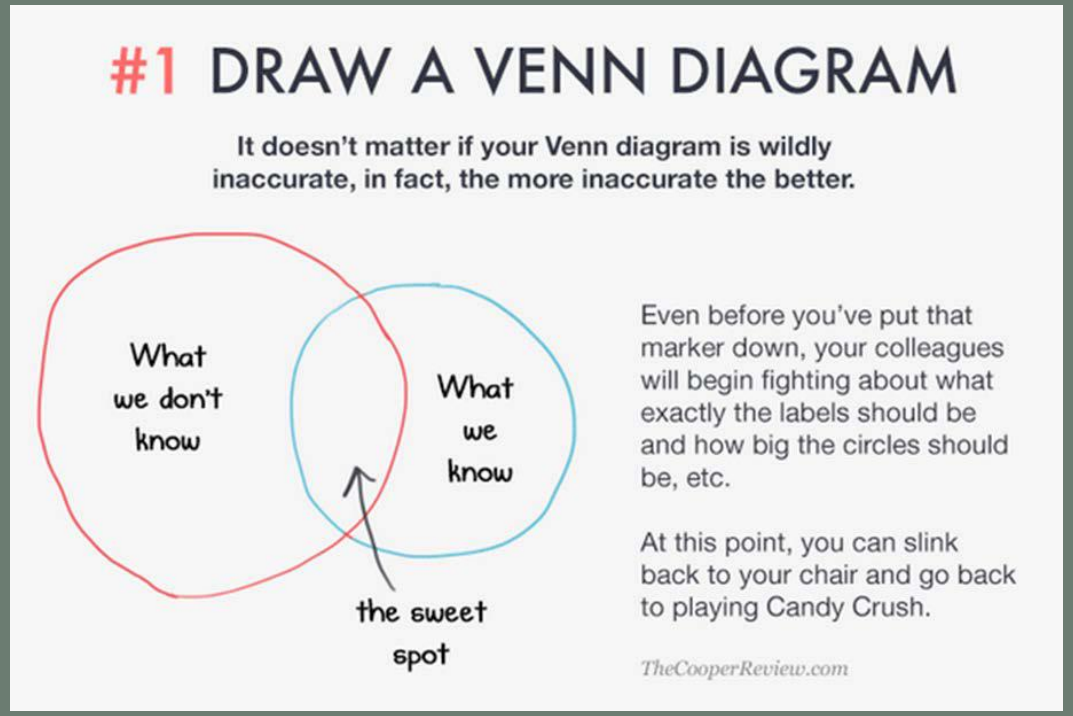
- The two work together- qualitative can inform quantitative
- Qualitative data is stronger than anecdote, and can help you persuade someone that an anecdote is true
- Can be directed at specific groups and questions
- Can get at issues that quantitative data doesn't
- Can incorporate cultural difference
- Combining stories with quantitative data gives a human face to the issue
- Qualitative data analysis methods are very sophisticated!

POPULATION DATA ARE IDEAL, BUT WHAT ABOUT SURVEYS?

- Surveys let us use a sample of the population to represent the whole---
- This saves money!
- Data can be collected more quickly!
- Since time and money are saved, can ask more detailed questions
- Often can be more customized (languages, geographic areas covered, etc.)
- Data can be collected about questions of immediate interest, trends
- BUT—Survey data analysis is REALLY complex; you can't just throw it in Excel! For large data sets, you pretty much need training and data savvy to use it in its raw form

VISUALIZATION: THE NEXT FRONTIER

- THIS IS A HUGE TOPIC. AND I ONLY HAVE TWO SLIDES.
- Visualization is a way to understand the data better, and show patterns so that others do too
- There are different types of visuals that are best for showing different aspects of the data
  - Line graphs are great for timelines
  - Pie charts can be good if the percentages add up to 100
  - Bar charts can be good for comparing groups
  - Maps are good IF there is a spatial component
- Colors, labels and other aspects help make points as well!



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MORE ON VISUALIZATION

- Check out this site: *https://eazybi.com/blog/data_visualization_and_chart_types/*
- Check out the work of Edward Tufte, if you haven't already
- Check out some of the sites that let you make infographics, like Piktochart—you can combine different visualizations to make a story
- Pay attention to visualizations in publications that are great at them—the New York Times, the Wall Street Journal, and others
- LISTEN TO SALLY GORE! ***http://tinyurl.com/sallygoredataviz***

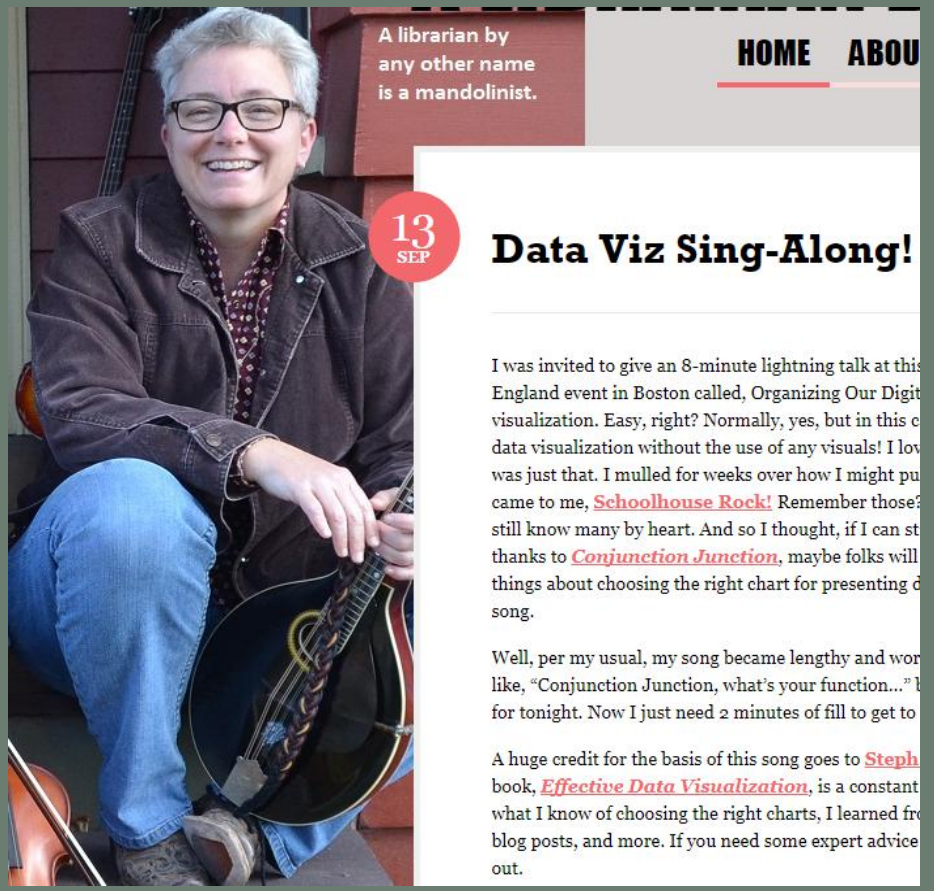

Image from: https://librarianhats.net

ANSWERING PATRON QUESTIONS AROUND DATA: YOU ALREADY KNOW HOW TO DO THIS!

- We already answer questions using data! Many tools on the internet that deliver answers are doing data analysis behind the scenes
- We are comfortable with classification and ordering of information—this is a fundamental data skill
- The ways we attack problems can translate neatly to data questions:
  - We do a careful reference interview
  - We evaluate sources for currency, bias, authority and reliability
  - We know how to search to find out what's already been done rather than recreating the wheel

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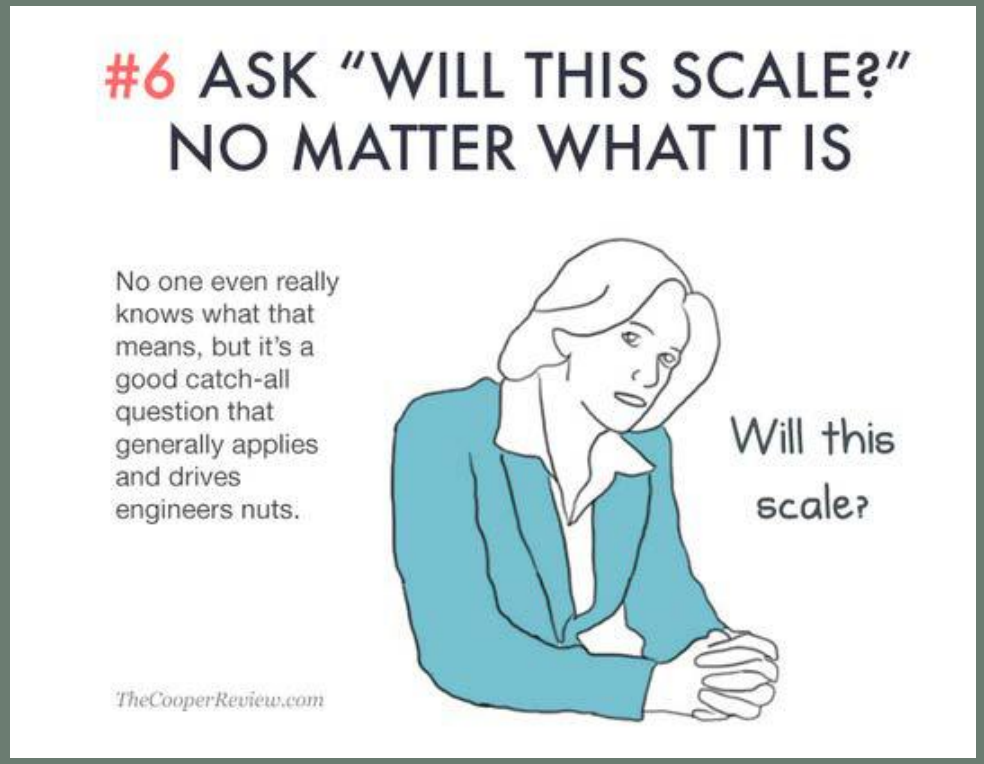
DATA VS. STATISTICS

- Data is the raw information (such as, an Excel file with the information from all the birth certificates).
- Statistics are what comes out when an analysis/data interpretation has been done (such as, a report on birth weights by county, perhaps in a visualization such as a bar chart)
- Consider whether you and/or your patron really need to mess around with the data, or, can you find reports or tables online that are ready-made?
- This relates to the question of primary and secondary data—it's just like primary and secondary sources! Do you really have to collect data yourself, or has someone done it already?



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DATA PITFALLS, OR, HOW TO BE A CRITICAL DATA CONSUMER

- Look for limitations; for example, there may be bias if not everyone is represented and the lack of representation might be systematic:
  - People of color
  - People whose first language is not English
  - Low income people
  - Homeless people
  - People without landlines (at least in the olden days)

- It can be hard to get enough respondents to look at small geographic areas (the "small numbers" issue; some statistical methods can help, but not totally!)

- Geographies can be tricky (zip codes don't match census tracts, and more!)

MORE PITFALLS TO AVOID!

(NOTE: THESE ARE FOR SOCIAL SCIENCE DATA, BUT THE SAME CRITICAL EYE IS NEEDED FOR ANY DATA!)

Look at the survey instrument

- Wording of questions makes a big difference
- Order of questions makes a big difference
- Certain types of questions are problematic (example—"recall bias")

Remember the birth certificate example about how people answer questions

- They want to please the interviewer
- They don't like sharing sensitive information
- Women and older people are more likely to say yes even among randomly chosen people
- Many people are not comfortable answering questions online

FINDING THE PERFECT DATA SET (OR NOT?)

- Look for published statistics and/or secondary data
- Ask “who cares?” What organization might have already collected data?
- Have a sense of which data are open and which are proprietary
- Look in the literature for similar instances of dealing with the topic; what data sets did they use?
- Check out LibGuides, user forums, and other places data might be discussed
- Consider data archives and repositories (if you are game to analyze data once you get it)
- Ask a data librarian! ☺

SOME TRICKS

- Do a REEEEEELY good reference interview, so that you are looking for the right thing! Need a refresher? Check this out: *https://libguides.lib.fit.edu/ReferenceTraining*
- It's OK to ask people to hone in! *http://www.bpl.org/contact/examples.htm*
- Remember your own databases (ReferenceUSA, others related to finance/business, weather, environment, education/social welfare, health care, etc.)
- Maximize Google! You know Site:.gov; now try *http://www.powersearchingwithgoogle.com/* and *https://www.process.st/google-search-tips/*
- RIP, Internet Public Library ☹ See this page *http://www.ipl.org/div/farq/* for lists of most-asked reference questions, with links to potential answers
- "How to Find Data & Statistics: Finding Data"—LibGuide from Michigan State University (primary data focused, but some great suggestions)
- Who cares? Use association pages and list-servs!

WHAT IF YOU AREN'T FINDING DATA ON THE TOPIC?

- Give data for the larger area, then show proportions that apply to your neighborhood/city/smaller area
- Use data for a larger group, and then compare your group to the larger group
- Use substitutions (such as, teen births if teen pregnancies aren't available
- Internet (start with Google, but don't stop there!)
- Advocate for better collection of data sources of interest
- Consider gathering qualitative data
- Consult experts (in fact, they may do a special data run for you!)

BEST PRACTICES AS YOU USE DATA (WITH PATRONS OR NOT!)

- ALWAYS look at the documentation!
- Compare what you find to published sources where possible
- Consult with others who have used the source, or the software
- Consult an expert (data requests!)
- Prioritizing— try to focus on 2 or 3 crucial facts to make an argument
- Comparing—consistent units, correct frame of reference, eliminate bias
- Use maps and graphics AS APPROPRIATE (it isn't always!)
- Build a case with several data points—tell a story (infographics can be good here)
- Watch out for technical aspects such as size of files (open data files can get BIG)

BEST PRACTICES FOR ENGAGING PATRONS

- Narrate your process as you work
- Explain why you need each piece of information from them
- Emphasize that you are exploring together
- Explain why some data are not available openly
- Suggest adjustments to their question that may make data easier to find (warning—this often does not go over well!)
- See if they can use estimates (may be easier to find in other sources online!)
- Encourage them to follow best practices such as consulting the data dictionary, comparing with published sources
- Suggest tutorials as a refresher if it's been a while since they've done data work
- Know when to refer to an expert

WHAT ABOUT COMPUTER SKILLS, NUMERACY, CHALLENGES OF COMPLEX DATA ANALYSES?

- There's no way to make this easy. Data can be tough to work with, no matter what your level. The main goal is avoiding shaming, and offering support as possible
- You can't assume the patron's level of competency or understanding– just keep checking in on how they are receiving the information; are they repeating it back to you or sitting silently? Asking for clarification? Etc.
- Suggest other library or online classes that may be helpful either before or while they delve into the data; Excel is an important tool
- Offer ongoing assistance, as possible
- Offer options for professional assistance (This also does not go over well! But if someone wants a complex analysis of raw data for market research, and they can't perform it, they may have to pay for it!)

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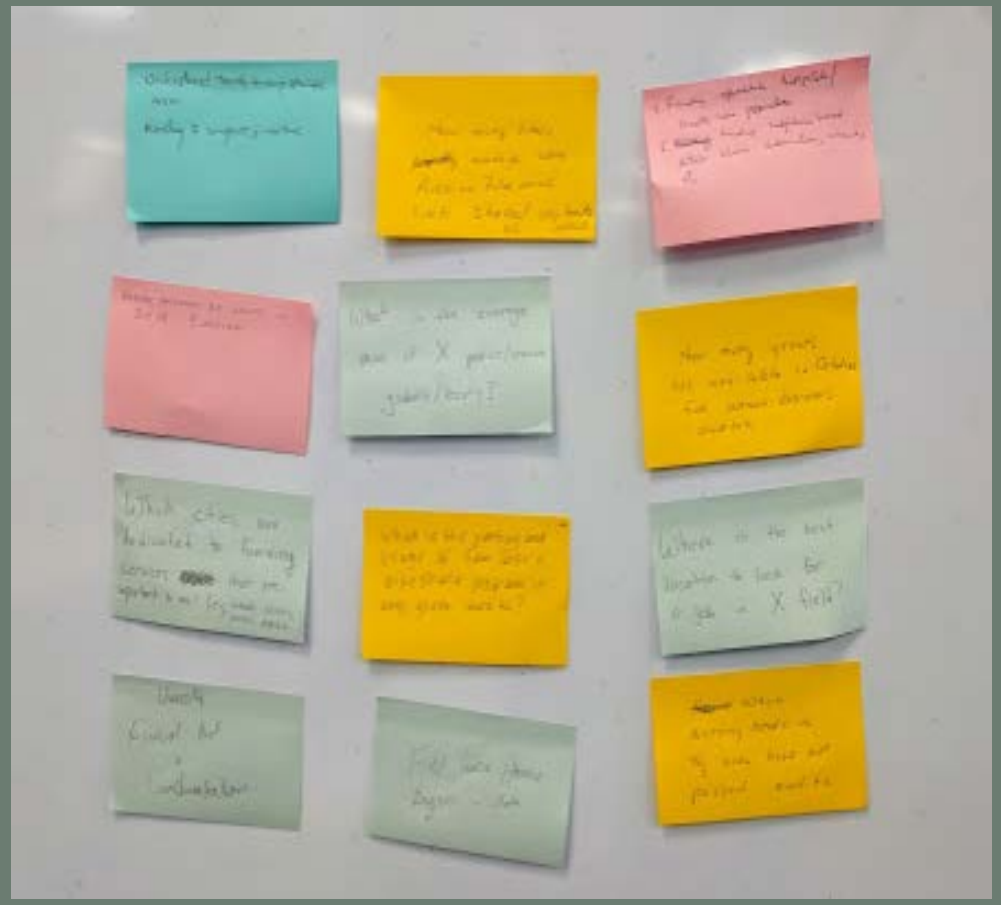
WHY A PATRON MIGHT ASK FOR OPEN DATA

- They know there's an issue in their community but need to prove it
- To get funding
- To affect policy
- To advocate for their community or organization
- To question what someone else is saying (fake news)
- To decide what programs they need to plan
- To direct you to next steps (remember- data can create more questions!)

QUESTIONS (REAL!) PATRONS MAY ASK

- How many times on average were fake news links shared compared with real news?
- How can I find affordable hospitals? Health care providers?
- How can I find out about education levels by neighborhood?
- How many grants are available for women business owners?
- What is the average price of X product/service globally/locally?
- What were the voting patterns by county in 2016?
- Which cities are dedicated to funding services that are important to me? (schools, library, public transit, etc.)
- What is the participant usage of my city's bikeshare program in a given month?
- Where is the best location to look for a job in X field?
- Which nursing homes in my area have passed audits?
- How can I get information about first time home buyers?
- I want to know about universities' financial aid and graduation data.



CONNECTIONS TO EXPLORE (PROGRAM IDEAS?)

- Between data and numeracy
- Between data and fake news
- Between data and advocacy
- Between data and coding (Hour of Code, Girls Who Code)
- Between data and business reference
- Between data and intellectual freedom/privacy
- Between the data you wanted (but isn't available) and other data sources you can use (finding data is easier for large areas!)
- Between your library assessment data and available open data

TRAINING FOR THE DATA-SAVVIER

- School of Data *https://schoolofdata.org/*
- Data Journalism Handbook *http://datajournalismhandbook.org/1.0/en/index.html*
- Open Data Institute *https://theodi.org/courses*
- Open Data Handbook *http://opendatahandbook.org/resources/*
- Data 101 *https://www.neighborhoodindicators.org/data-tech/course-catalog/data-101-data-visualization-data-literacy-and-storytelling*
- Watch for "Data Equity for Main Street" curricula, coming in 2018! *https://ocio.wa.gov/open-data/open-data-your-library*

(Also there are many online courses related to research data management—contact me if you want to know more)

TRAINING FOR THE DATA BEGINNER

- Coursera, edX and other MOOCs (the levels may vary!)
- Lynda.com if available through your library
- May work best to find basic statistics or even numeracy/math courses rather than starting with data, such as *https://onlinecourses.science.psu.edu/statprogram/review_of_basic_statistics* or *https://www.ipracticemath.com/learn/basicmath*
- Or look for resources for specific topic areas, such as Basic Data Analysis for Health Programs *https://www.measureevaluation.org/resources/training/capacity-building-resources/basic-data-analysis-for-health-programs*
- And again, the "Data Equity for Main Street" curriculum is coming soon! ☺

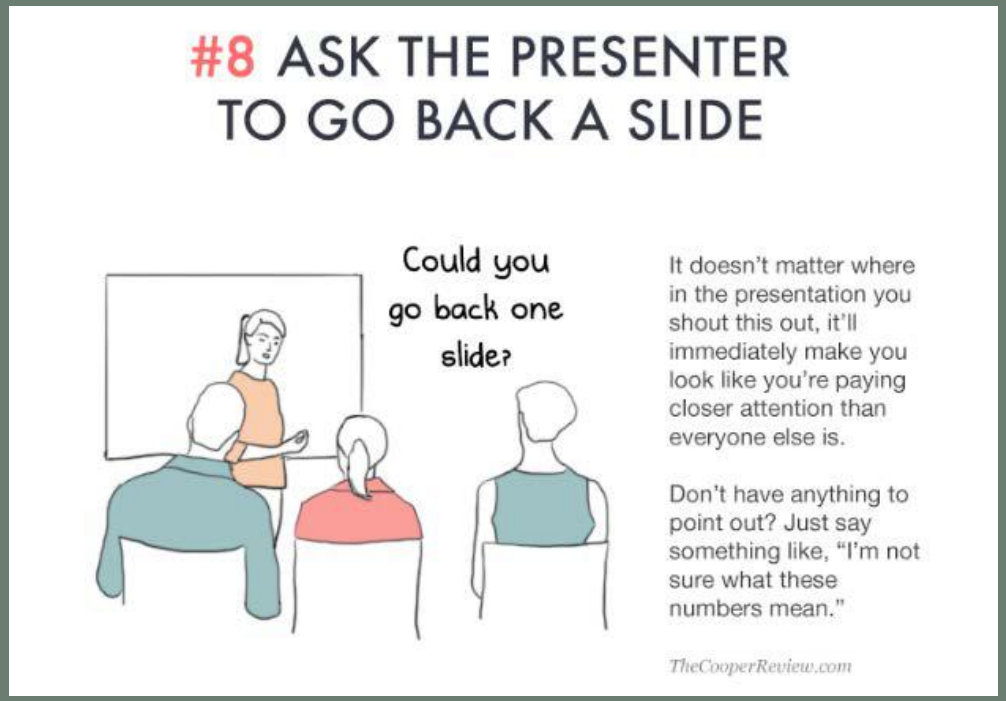
WASHINGTON-SPECIFIC OPEN DATA RESOURCES

- NW Data *https://nwdata.org/#data*
- State of Washington Open Data https://data.wa.gov/ (Will Saunders!)
- OFM *https://ofm.wa.gov/washington-data-research*
- OSPI *http://www.k12.wa.us/DataAdmin/default.aspx*
- DOH Health Stats and Provider Directory *https://www.doh.wa.gov/DataandStatisticalReports* and *https://fortress.wa.gov/doh/providercredentialsearch/*
- Department of Revenue Business License Lookup *https://secure.dor.wa.gov/gteunauth/_/*
- Washington State GIS Data *https://wagda.lib.washington.edu/data/geography/wa_state/*
- MSRC *http://mrsc.org/Home/Explore-Topics.aspx*
- Puget Sound Regional Council *https://www.psrc.org/data-and-resources/data-psrc*
- And so many more!

SHAMELESS SELF-PROMOTION

If you want a lot of this content in article format, check out my two articles in *Alki: The Journal of the Washington Library Association (http://www.wla.org/alki-archives)* :

- "The Secret Pitfalls of Data: How You—and Your Patrons—Can Avoid Them" (March, 2016)
- "Safety in Numbers: Helping People with Health Numeracy Challenges (Which is All of Us)" (November, 2016)



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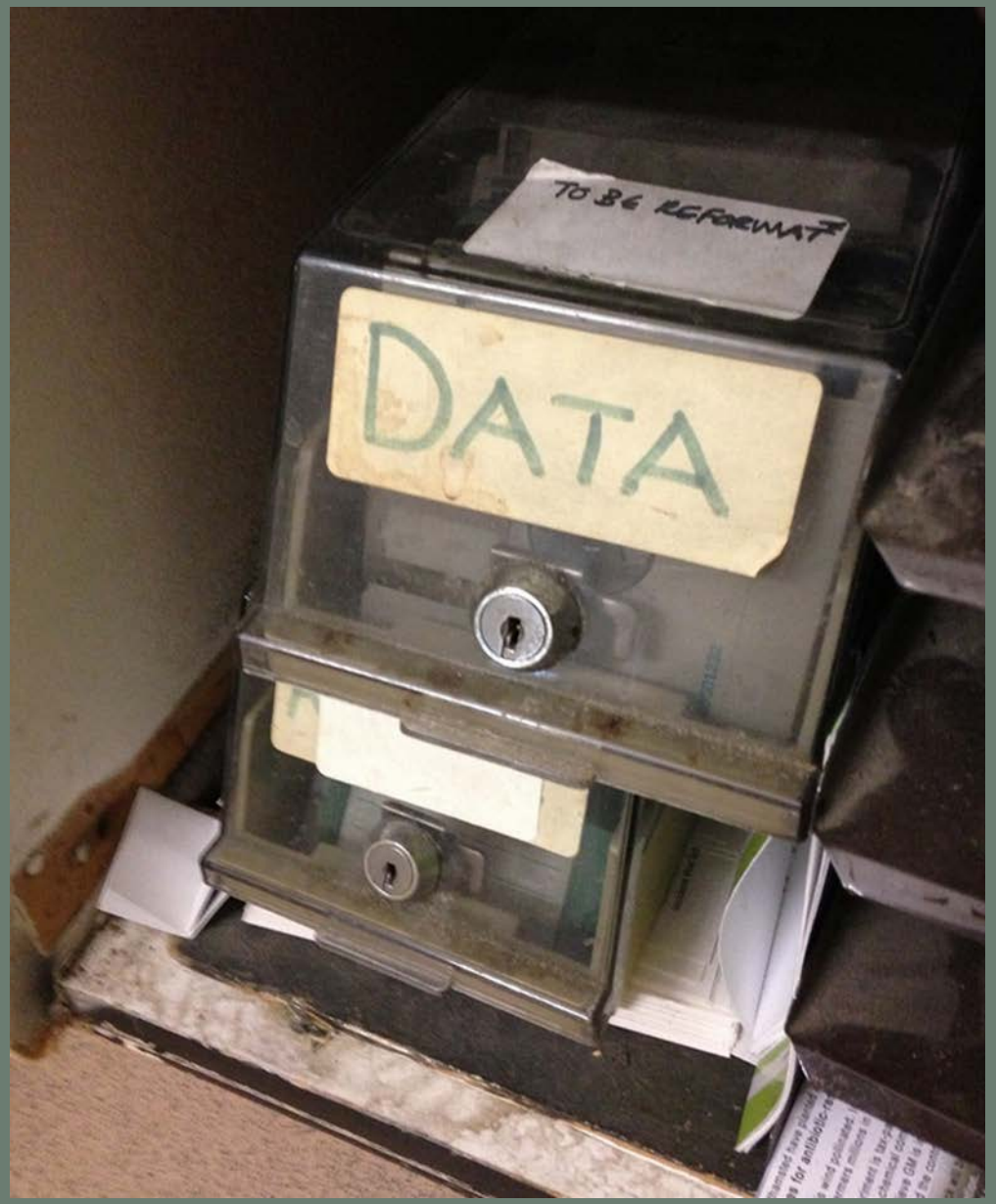
QUESTIONS?



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CONTACT ME!

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