

# Learning to Swim in a Sea of Data

07 July 2021

WELCOME









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Bibliotheca



# Goals for this session

## UNDERSTAND

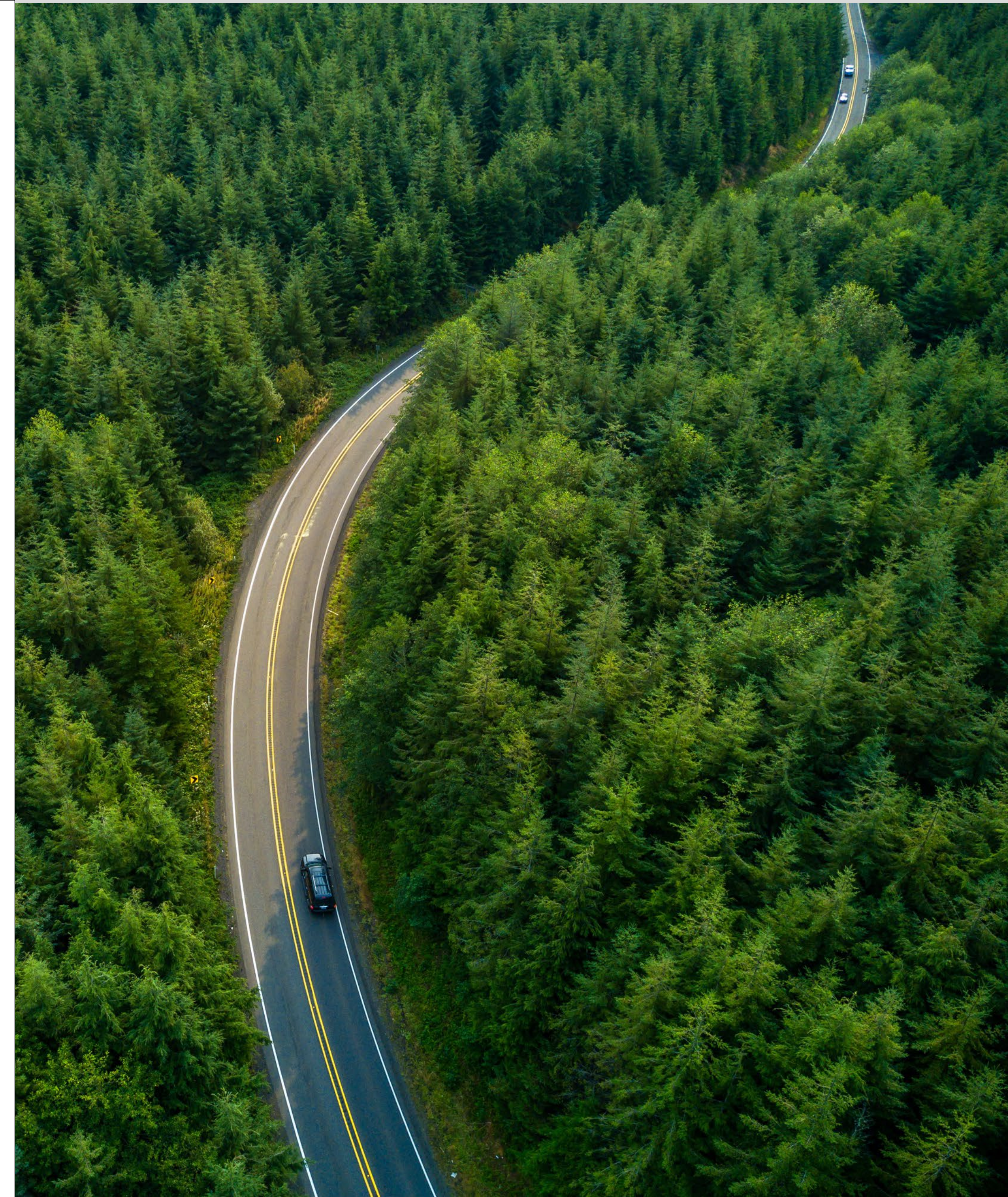
What data literacy may look like in K-16 educational contexts

## LEARN

What it's like to apply data literacy skills

## DISCUSS

The roles that librarians can play in supporting data literacy in your communities





# Agenda

WELCOME

WHAT IS DATA LITERACY AND ITS  
IMPORTANCE

APPLYING DATA LITERACY SKILLS

IMPORTANCE OF DATA LITERACY AND THE  
ROLE OF LIBRARIANS





# Share your thoughts

What comes to mind when you hear the word “data”?

# Share more thoughts

In your mind, what does it mean to be data literate?

# What are Data

“Data are units of information, often numeric, that are collected through observation.”

- Wikipedia, <https://en.wikipedia.org/wiki/Data>

“Data are not just numbers, they are numbers with a context.”

- Cobb & Moore (1997)



# Data are everywhere!





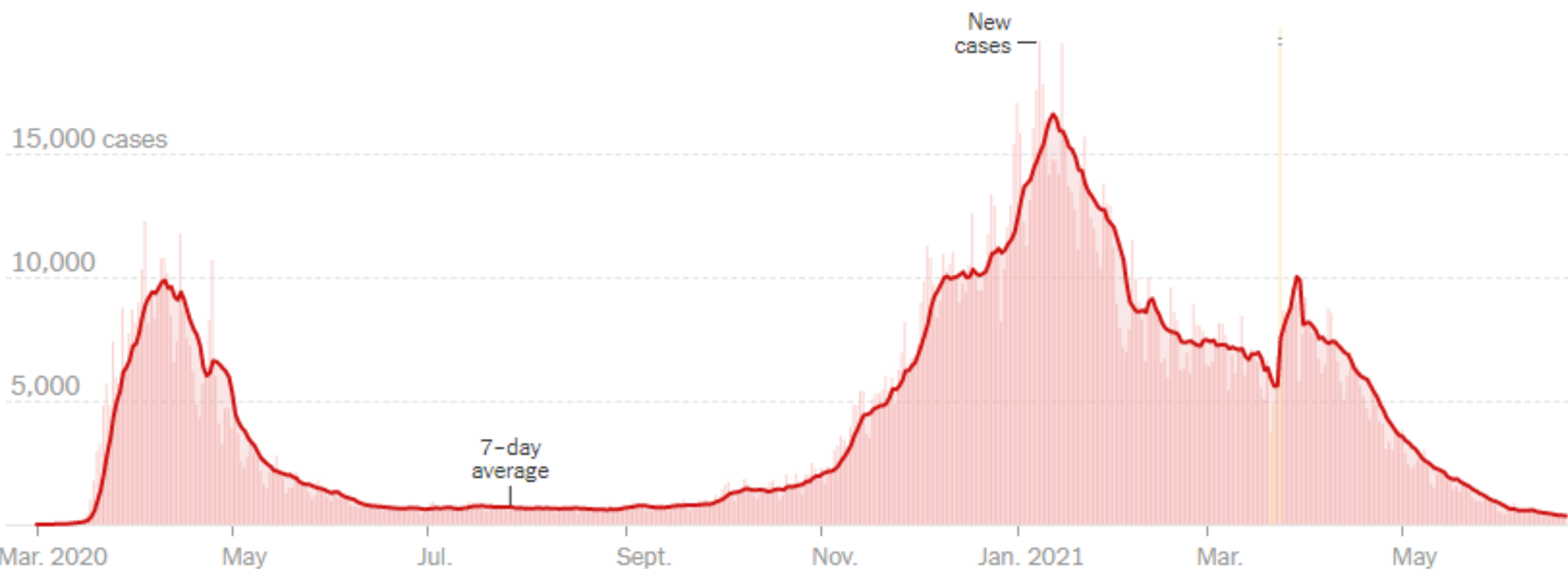
Data are  
everywhere!

- **Health**

# Tracking Coronavirus in New York: Latest Map and Case Count

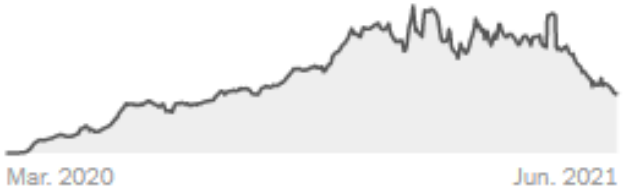
Updated June 22, 2021

## New reported cases

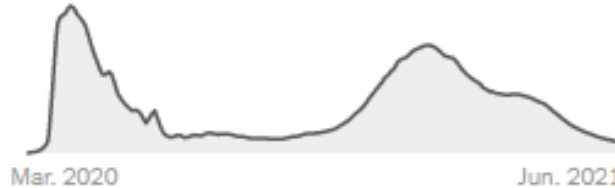


These are days with a reporting anomaly. Read more [here](#).

## Tests



## Hospitalized



## Deaths



AVG. ON JUN. 21

14-DAY CHANGE

TOTAL REPORTED

## Vaccinations

	AT LEAST ONE DOSE	FULLY VACCINATED
All ages	59%	52%
18 and up	71%	63%
65 and up	85%	78%

[See more details >](#)

[About this data](#)

## Restrictions >

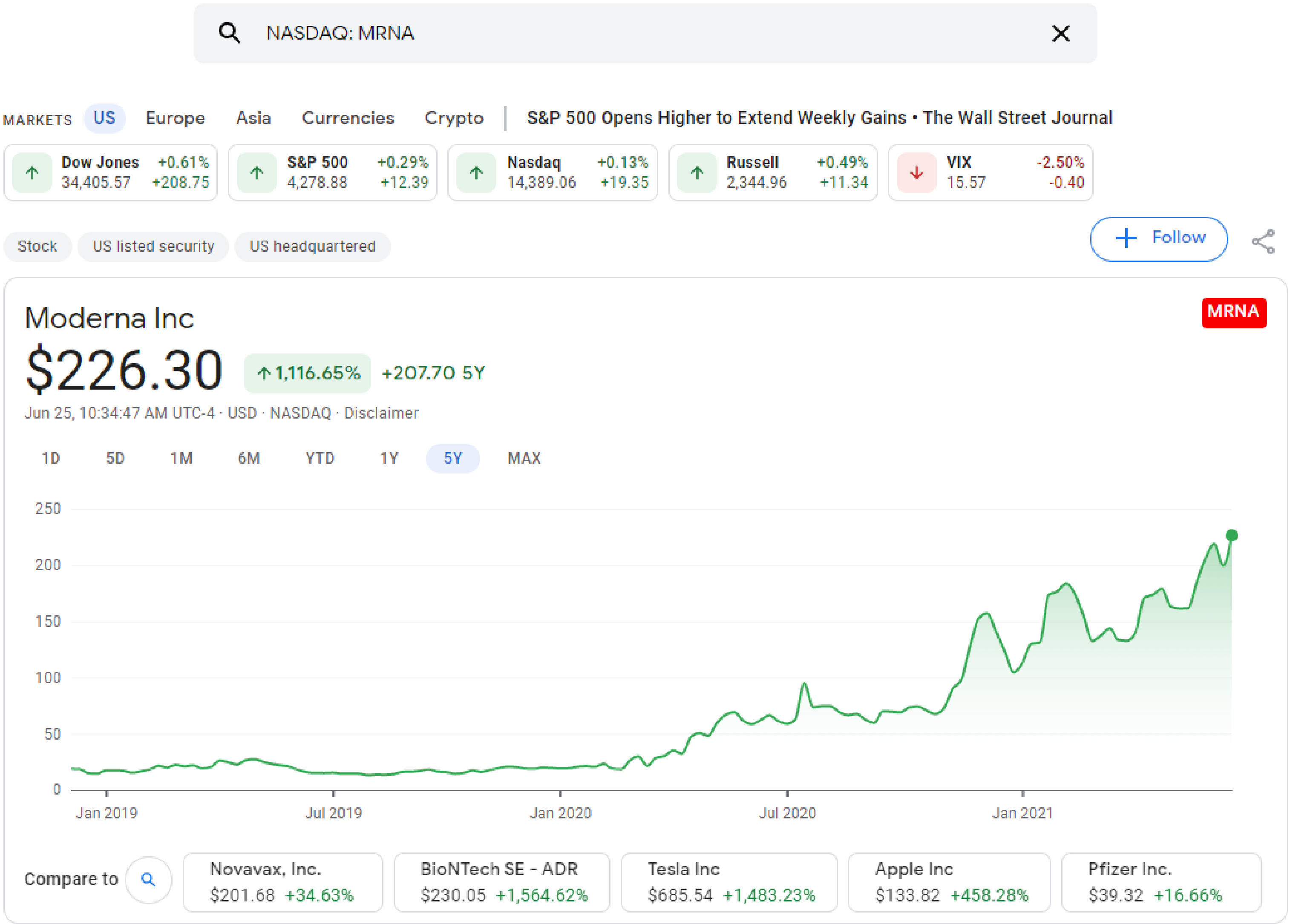
### Reopened

Masks required indoors for the unvaccinated



# Data are everywhere!

- Health
- Finance

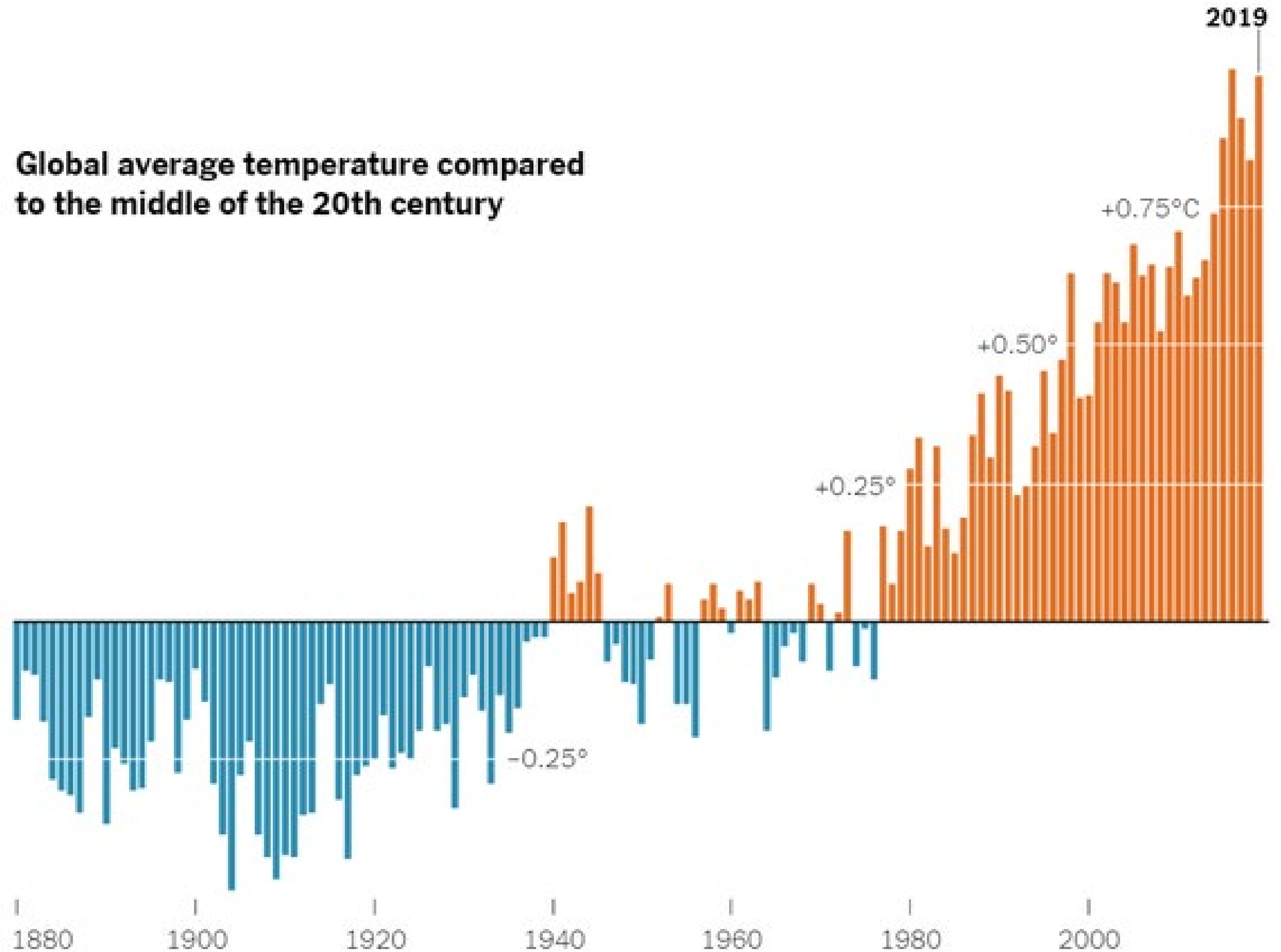




# Data are everywhere!

- Health
- Finance
- **Societal Issues**

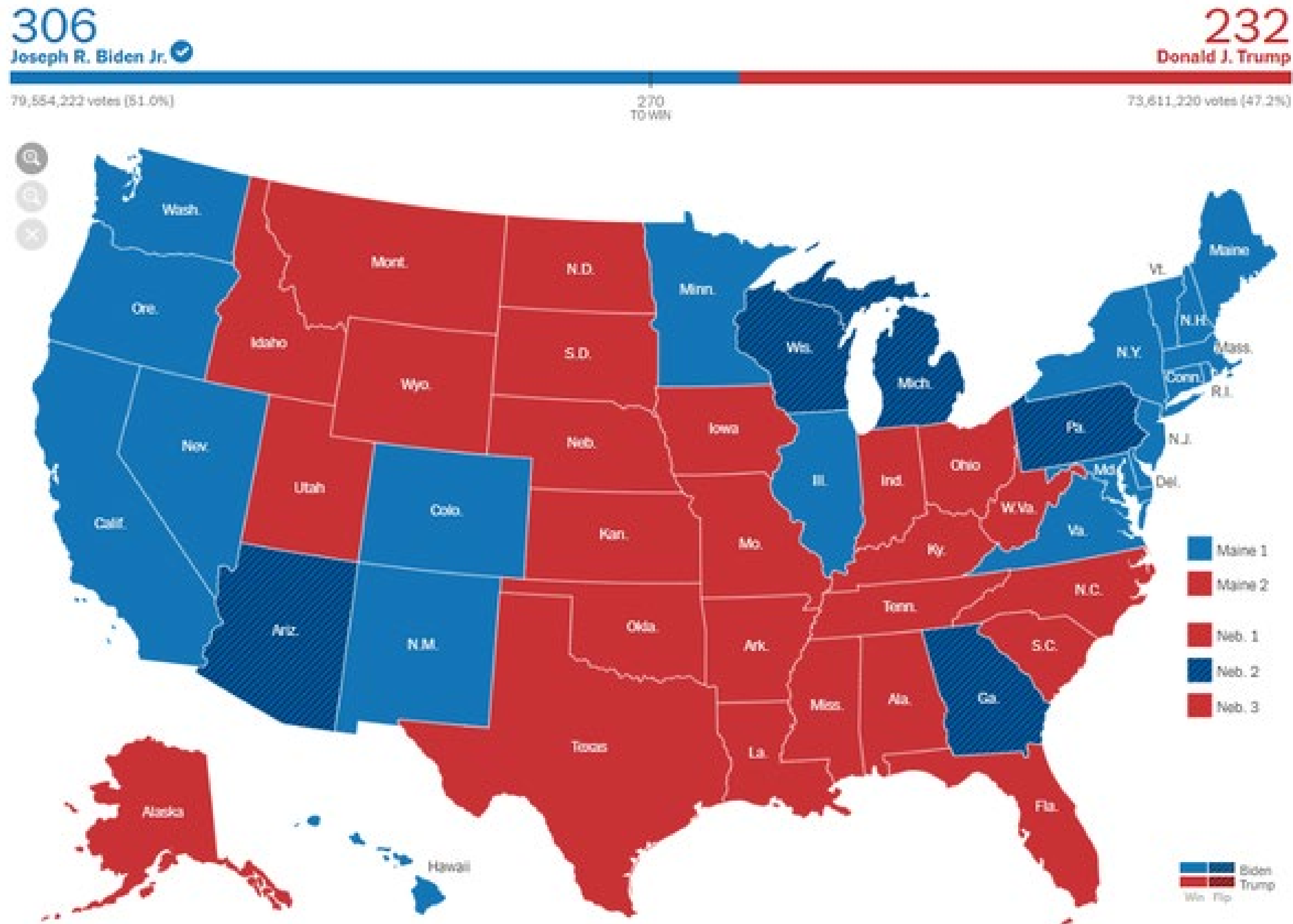
Global average temperature compared to the middle of the 20th century





# Data are everywhere!

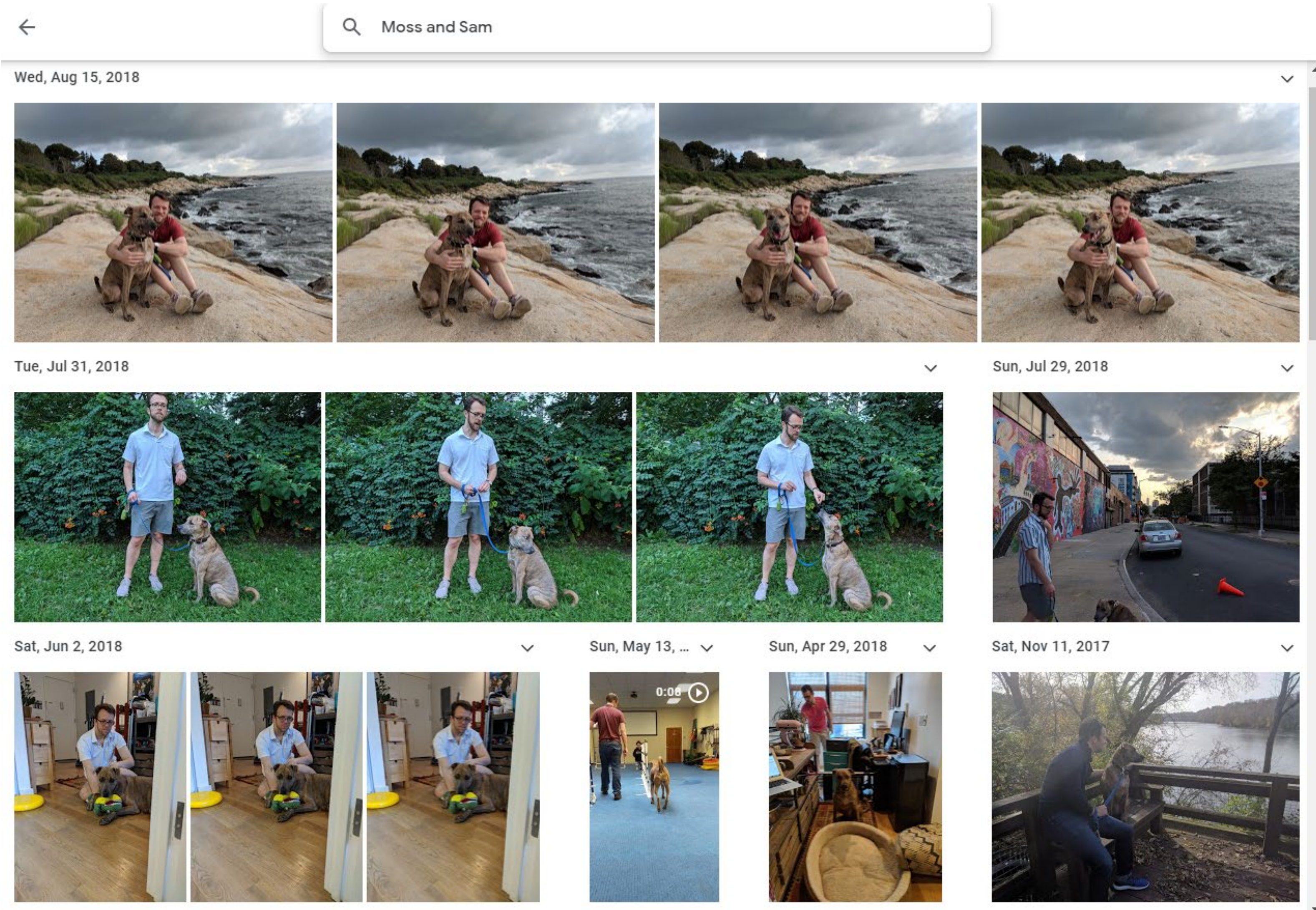
- Health
- Finance
- Societal Issues
- **Politics**





# Data are everywhere!

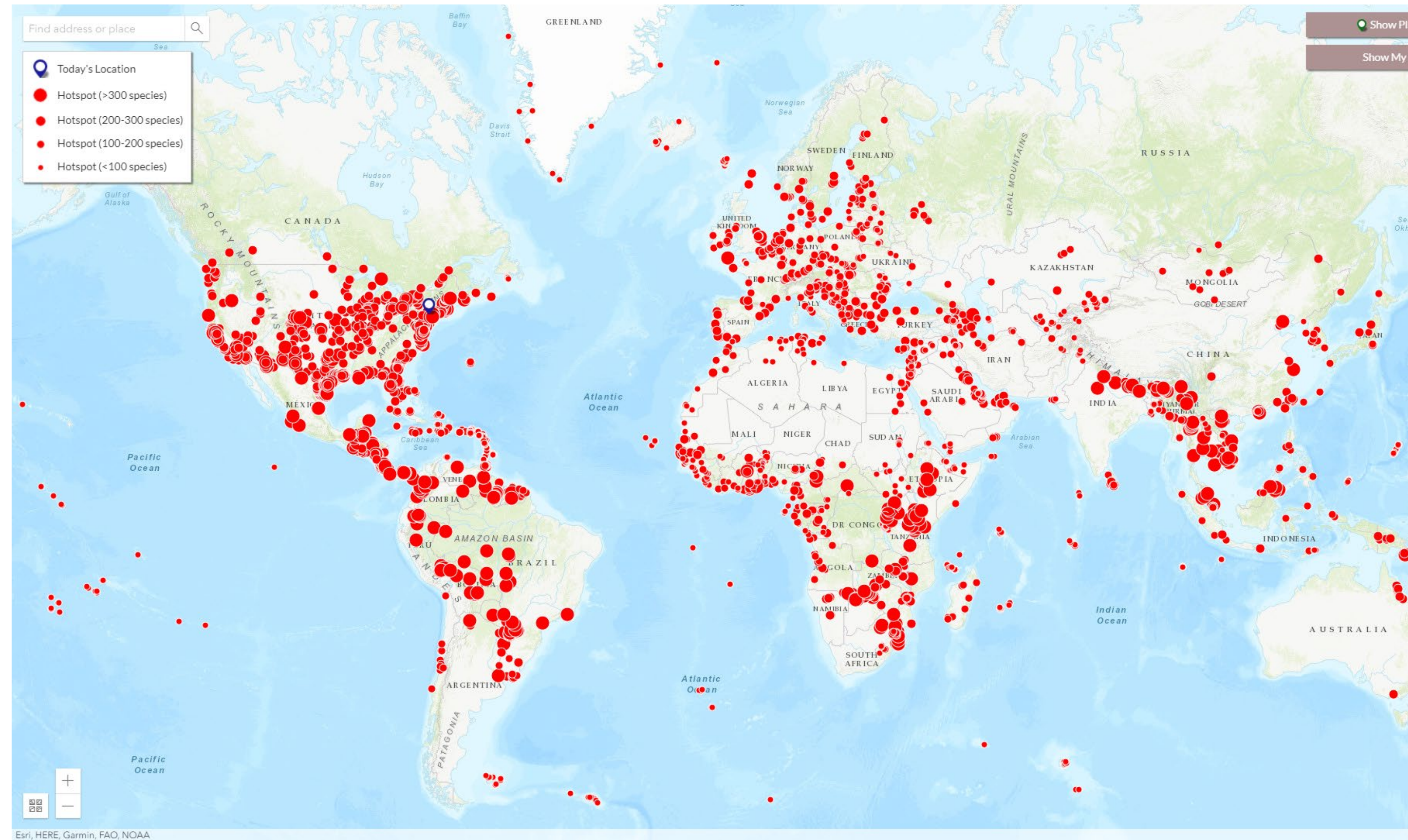
- Health
- Finance
- Societal Issues
- Politics
- **Relationships**





# Data are everywhere!

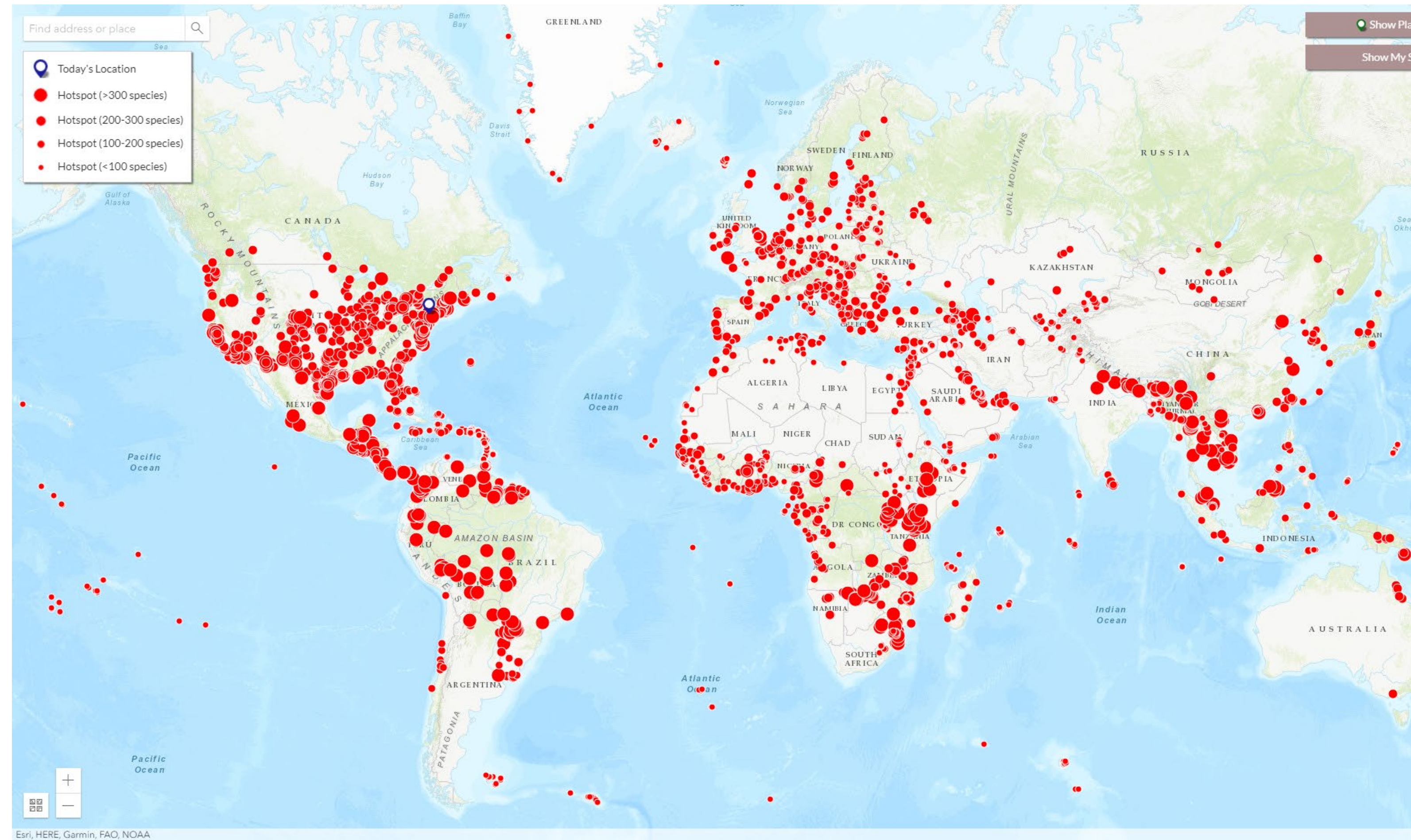
- Health
- Finance
- Societal Issues
- Politics
- Relationships
- **Leisure**





# Data are everywhere!

- Health
- Finance
- Societal Issues
- Politics
- Relationships
- Leisure
- ...





# Data Literacy is Critical for Society



Our global **economy and our jobs are increasingly shaped by data** and by the knowledge and skills required to use it effectively.



**We all produce streams of data**, which we need to be aware of, shape, and manage to ensure our privacy and personal security.

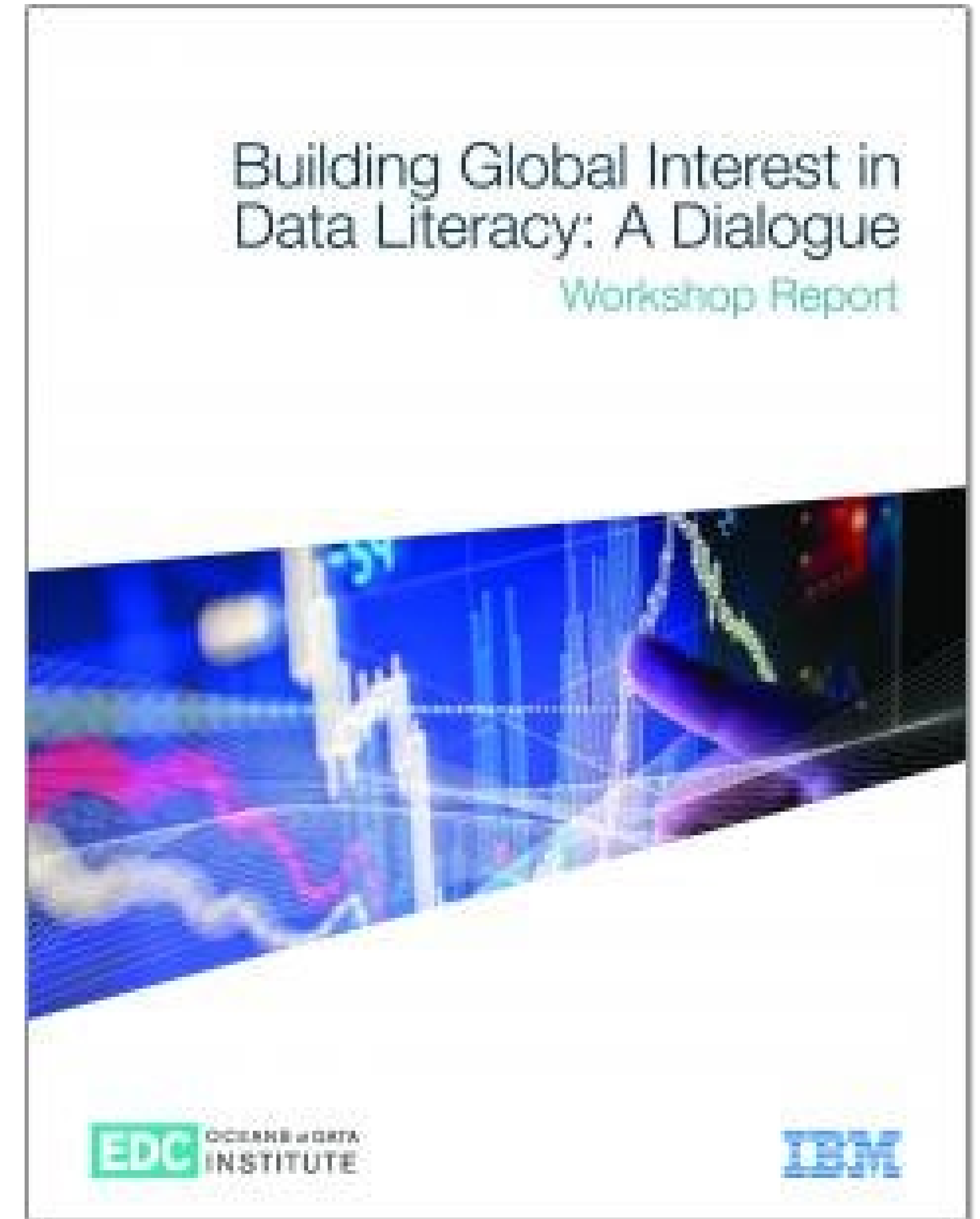


Effective use of **data empowers us** to make objective, evidence-based inferences and fundamental decisions our lives and our society.



# The data literate individual:

- understands, explains and documents the utility and limitations of data
- controls their personal data trail
- finds meaning in and acts based on data
- can identify, collect, evaluate, analyze, interpret, present and protect data



# What is Data Literacy

No single consensus definition, but frequently refers to:

- Understanding the nature of data
- Understanding the data investigation process
- Ability to draw valid conclusions from data
- Habits of questioning throughout all stages of data investigation
- Understanding one's own data trail and security issues

**→ INVOLVES INTERDISCIPLINARY  
KNOWLEDGE AND PRACTICES**





# Understanding the nature of data

## DATA SOURCES

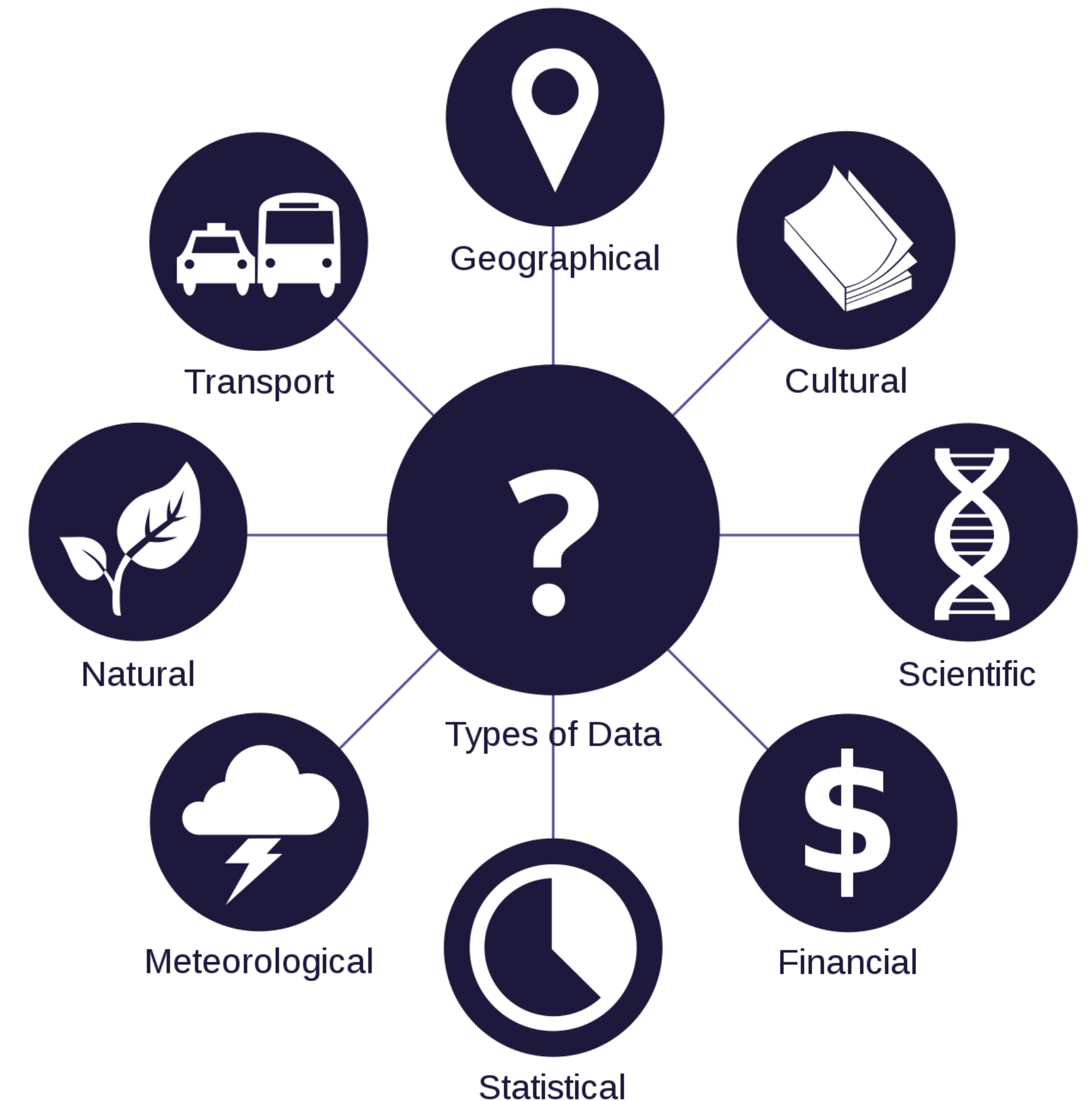
- Primary (collected first-hand)
- Secondary (collected by others)
- Ourselves (our own digital data trail)

## TRADITIONAL VARIABLE TYPES

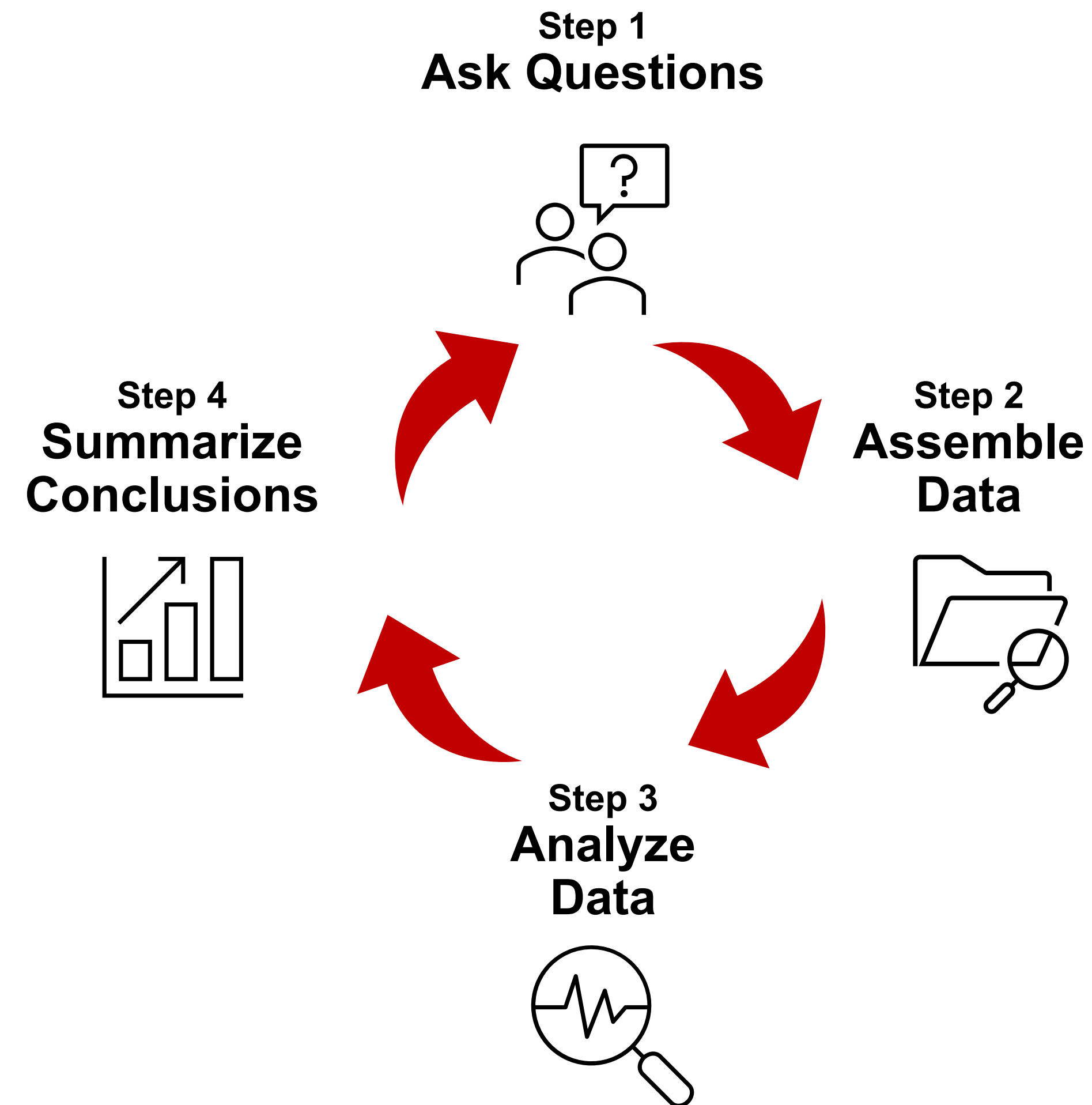
- Categorical (e.g., employed vs. unemployed)
- Quantitative (e.g., temperature in degrees F)

## OTHER VARIABLE TYPES

- Pictures, sound, video, words

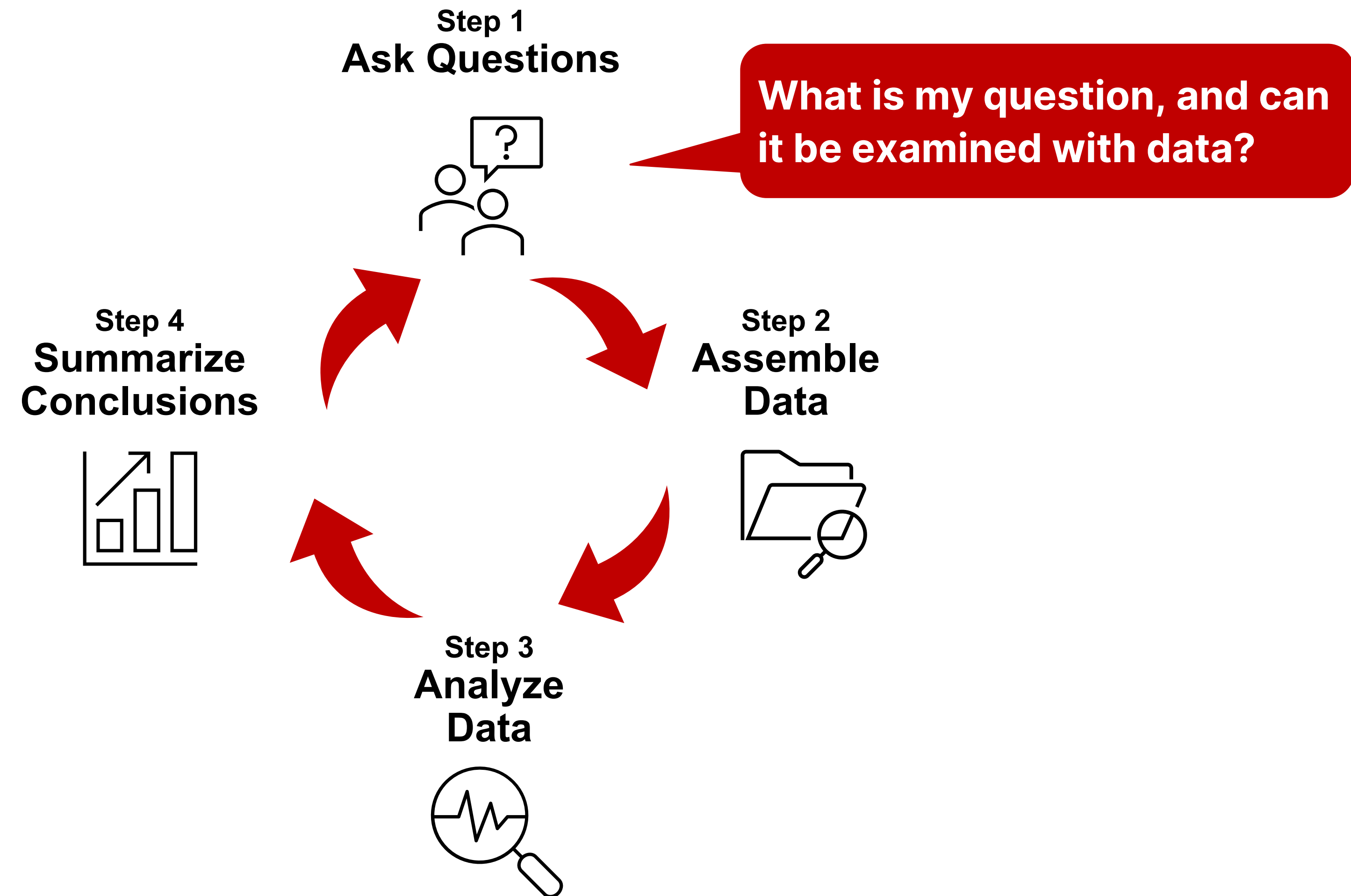


# Understanding the Data Investigation Process

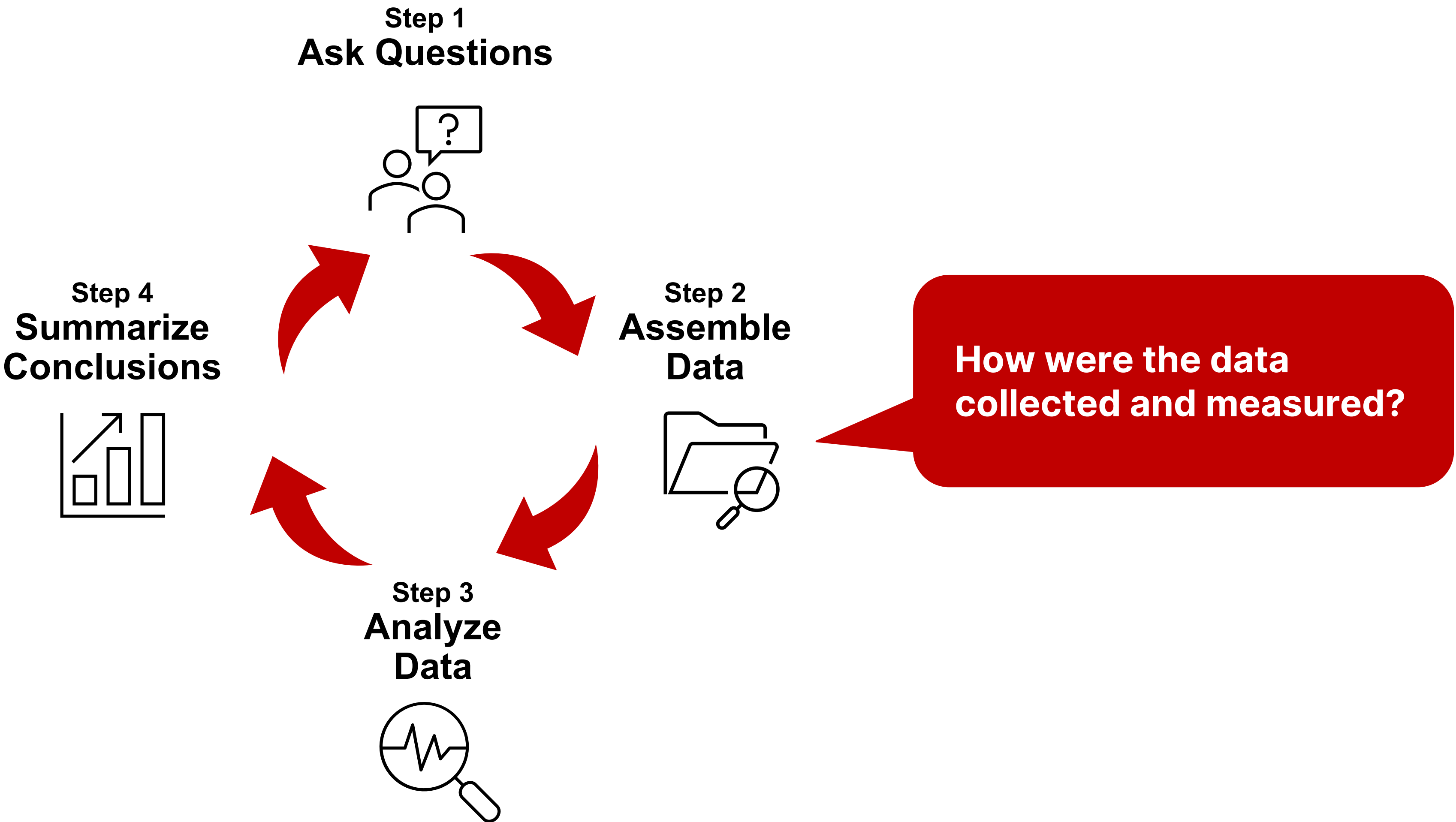




# Habits of questioning

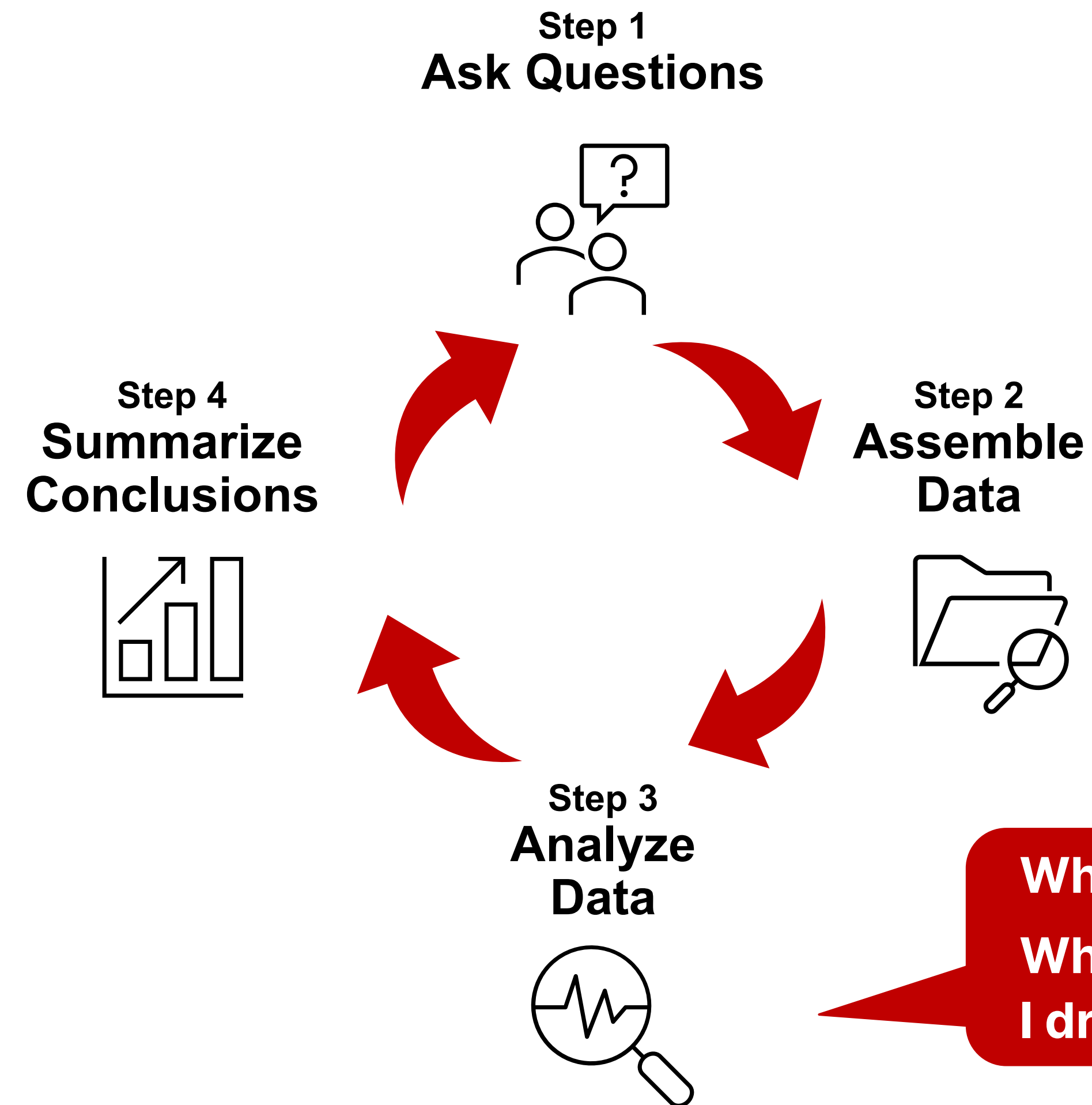


# Habits of questioning

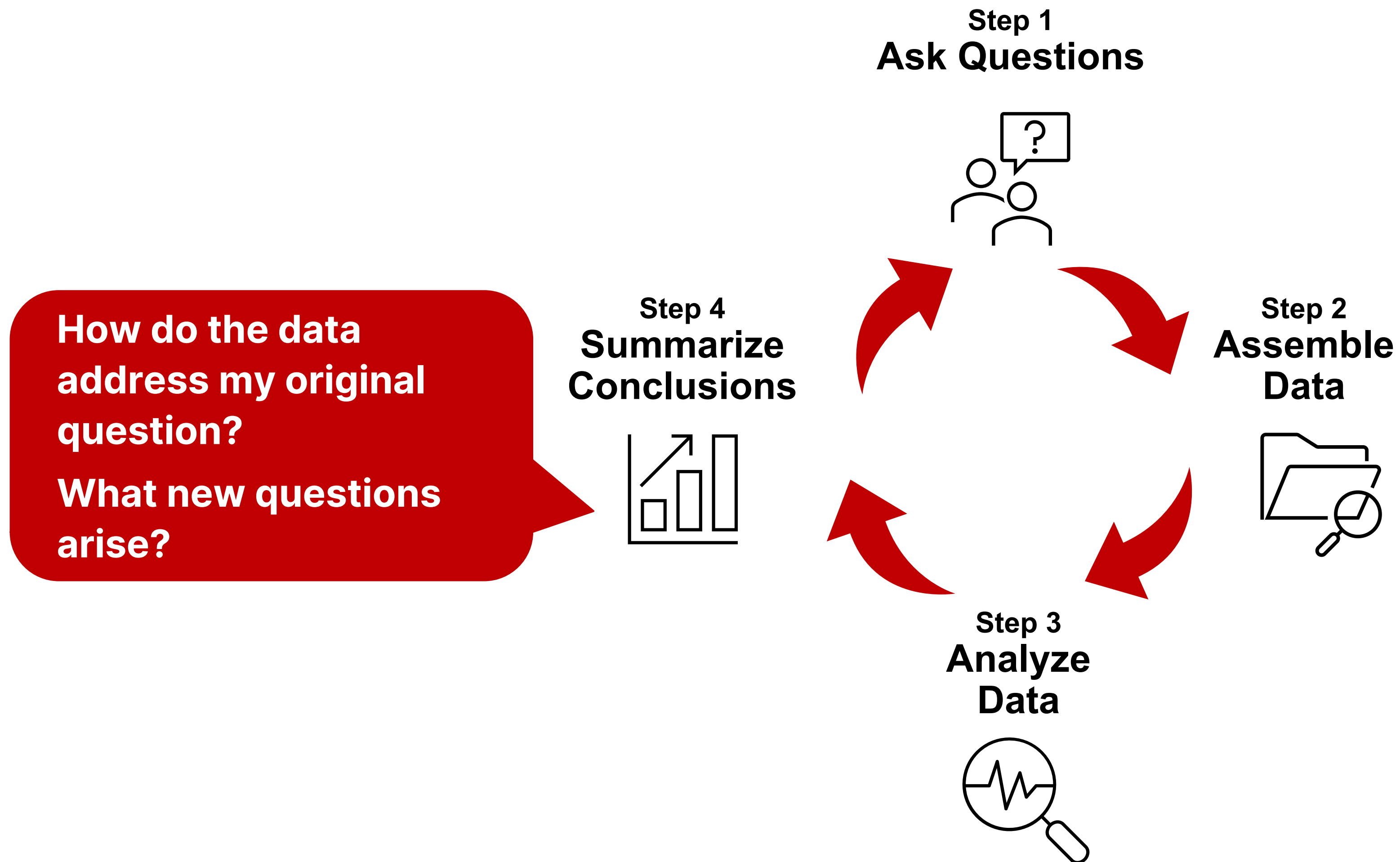




# Habits of questioning



# Habits of questioning





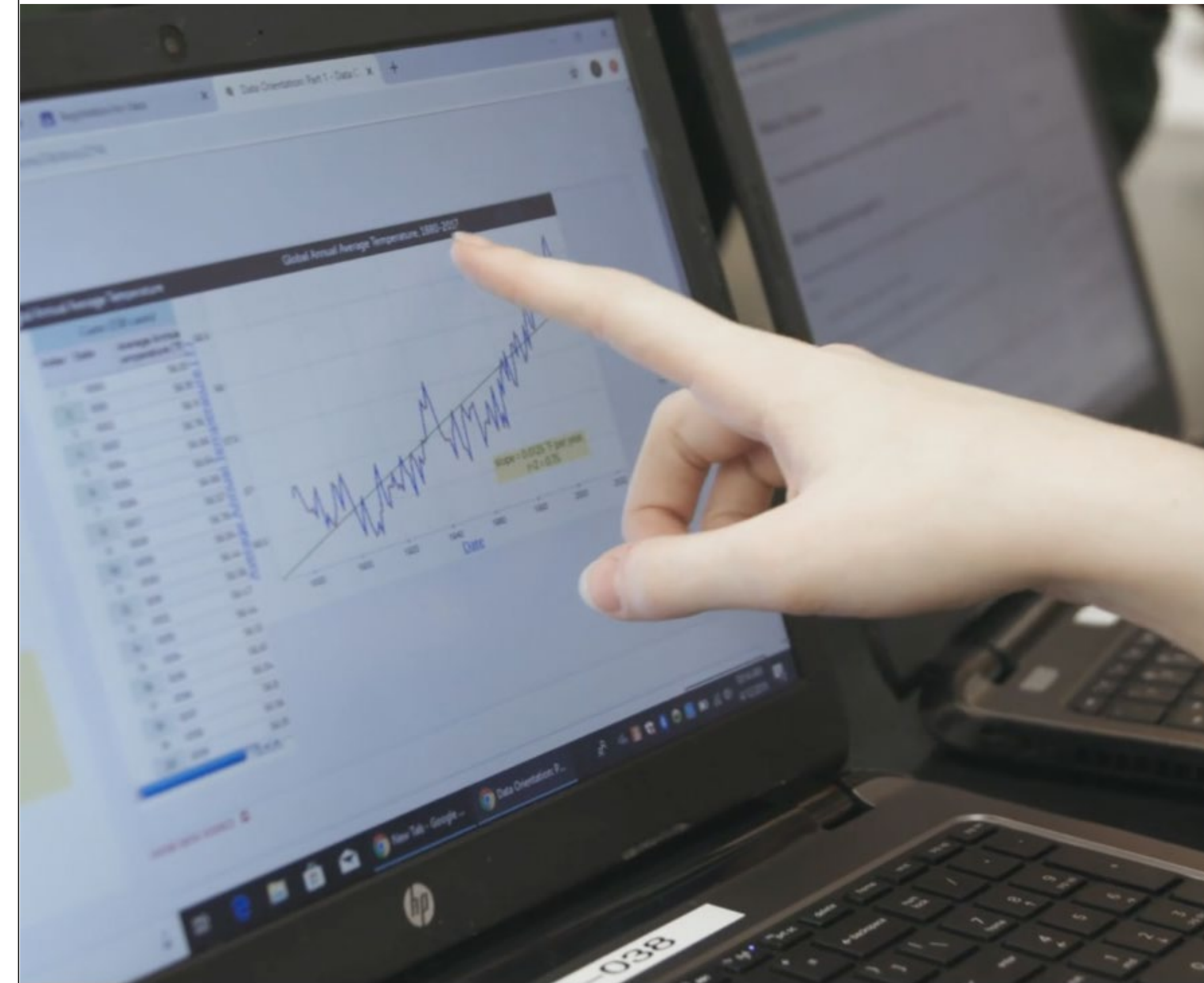
# Data consumers → data investigators

## SKILLED DATA CONSUMERS CAN

- Interpret and critically evaluate data and data-related arguments
- Discuss or communicate their understanding of what data mean

## SKILLED DATA INVESTIGATORS CAN

- Actively conduct all stages of the data investigation process



# Applying data literacy skills

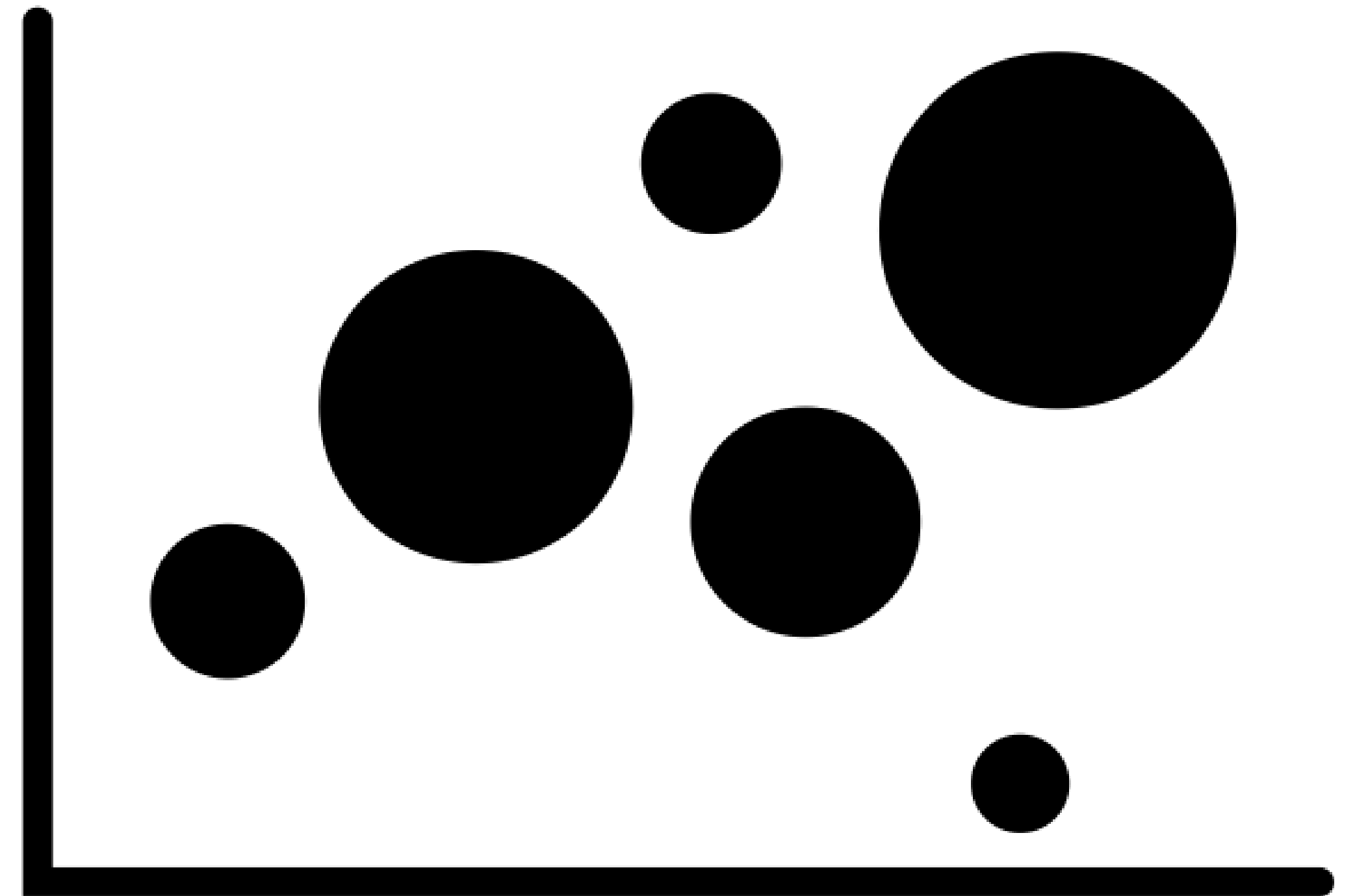
WHAT'S WRONG WITH THIS GRAPH?



# What's wrong with this graph?

## QUESTIONS TO CONSIDER

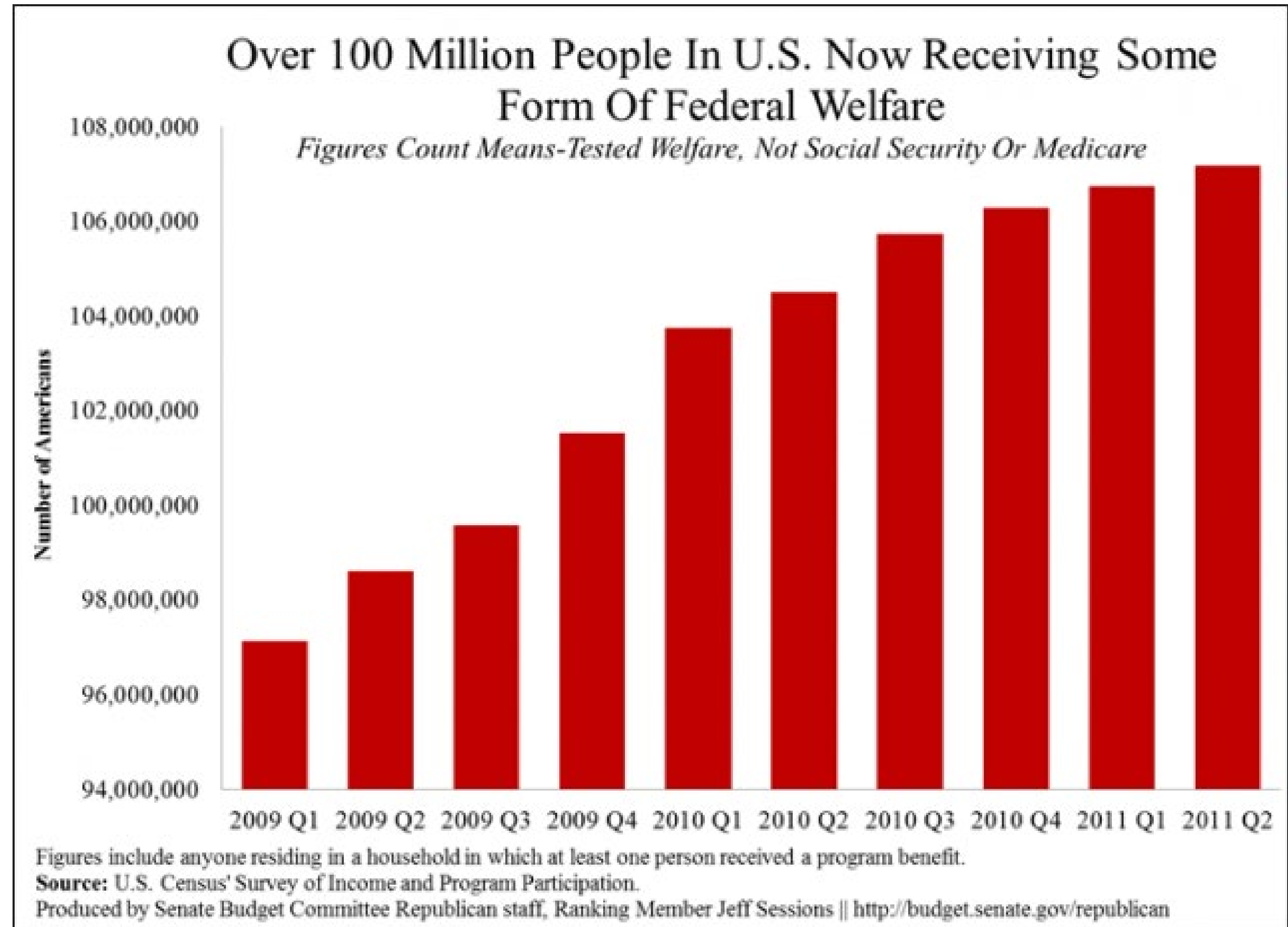
- What do you see from this graph? What story is it telling?
- Who is the source of the graph? What is their agenda?
- Who or which data were included or excluded?
- How were the data measured, and how are the scales shown?
- What valid conclusions can you draw from this graph?



# What's wrong with this graph?

## QUESTIONS TO CONSIDER

- What story is this graph telling?
- How were the data measured and how are the scales shown?

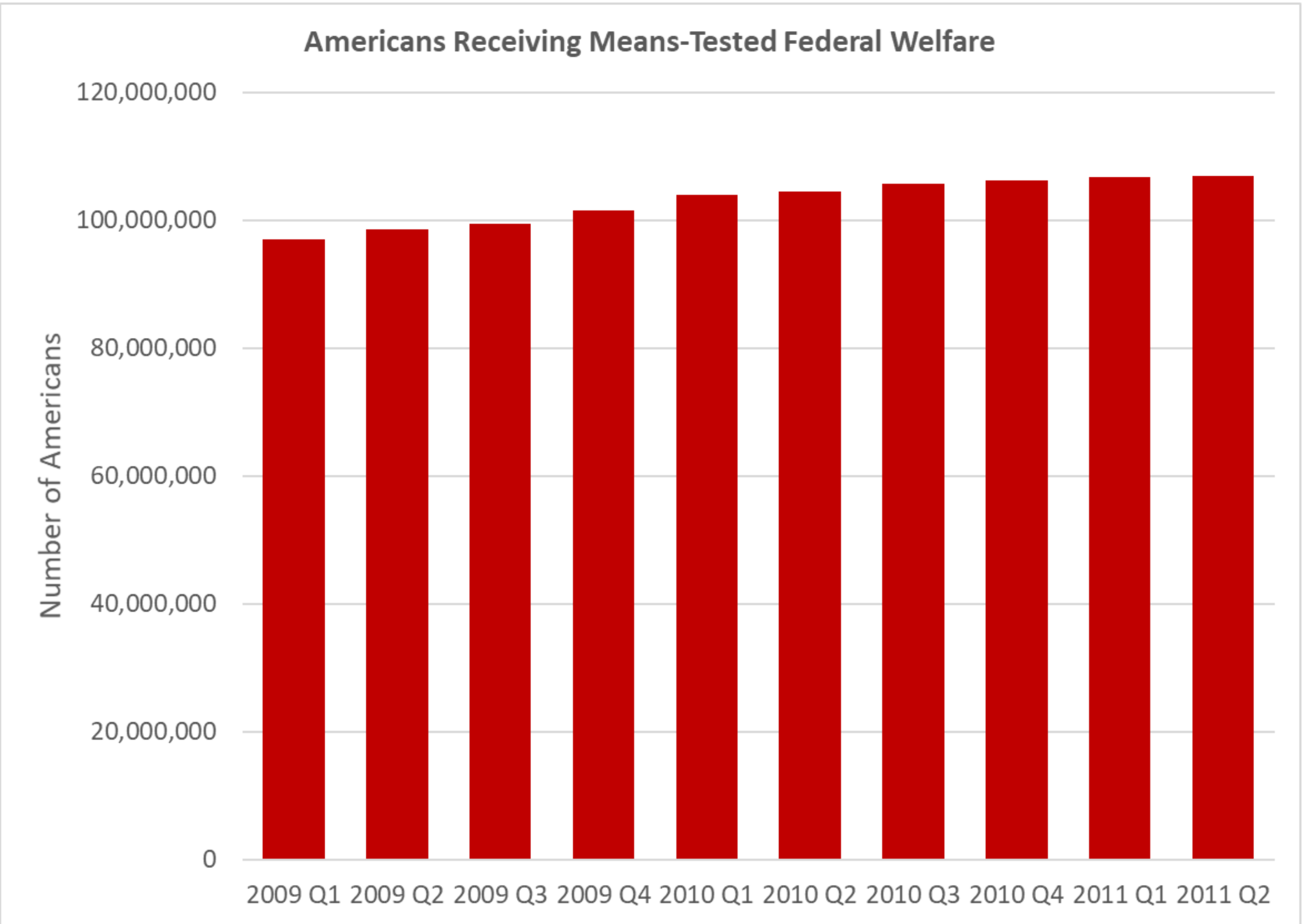




# What's wrong with this graph?

## QUESTIONS TO CONSIDER

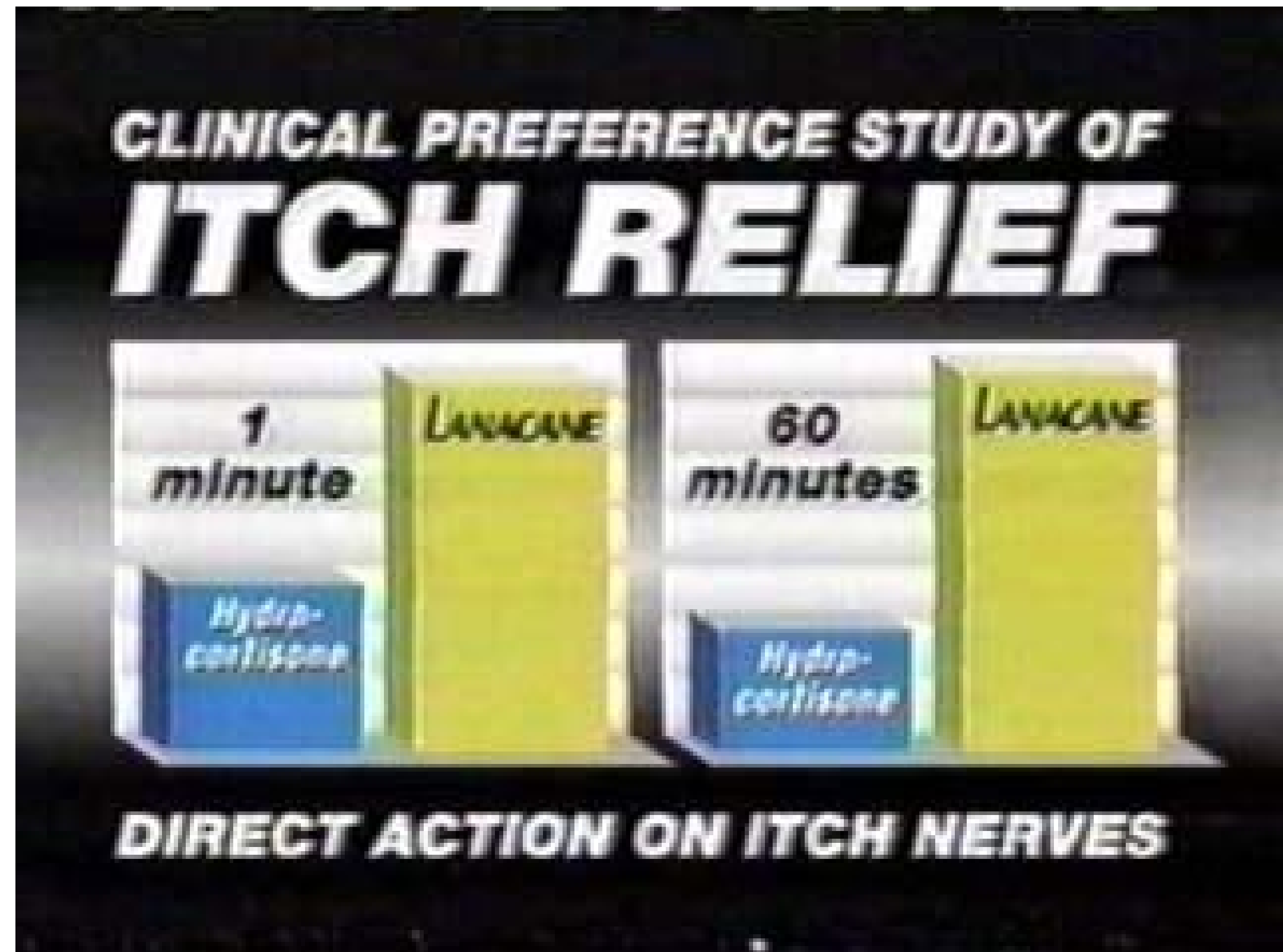
- What story is this graph telling?
- How were the data measured and how are the scales shown?



# What's wrong with this graph?

## QUESTIONS TO CONSIDER

- Who is the source of the graph? What is their agenda?
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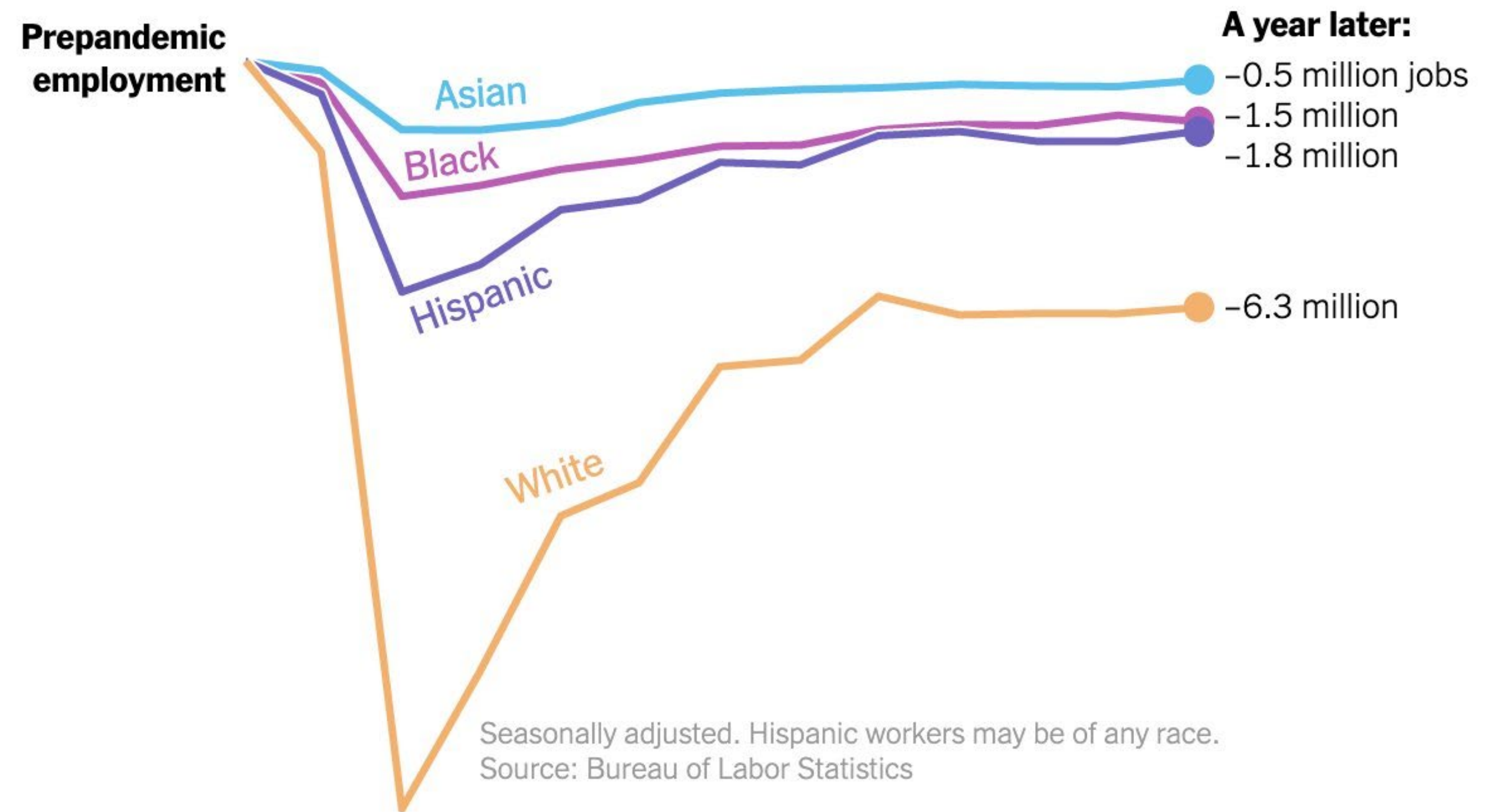




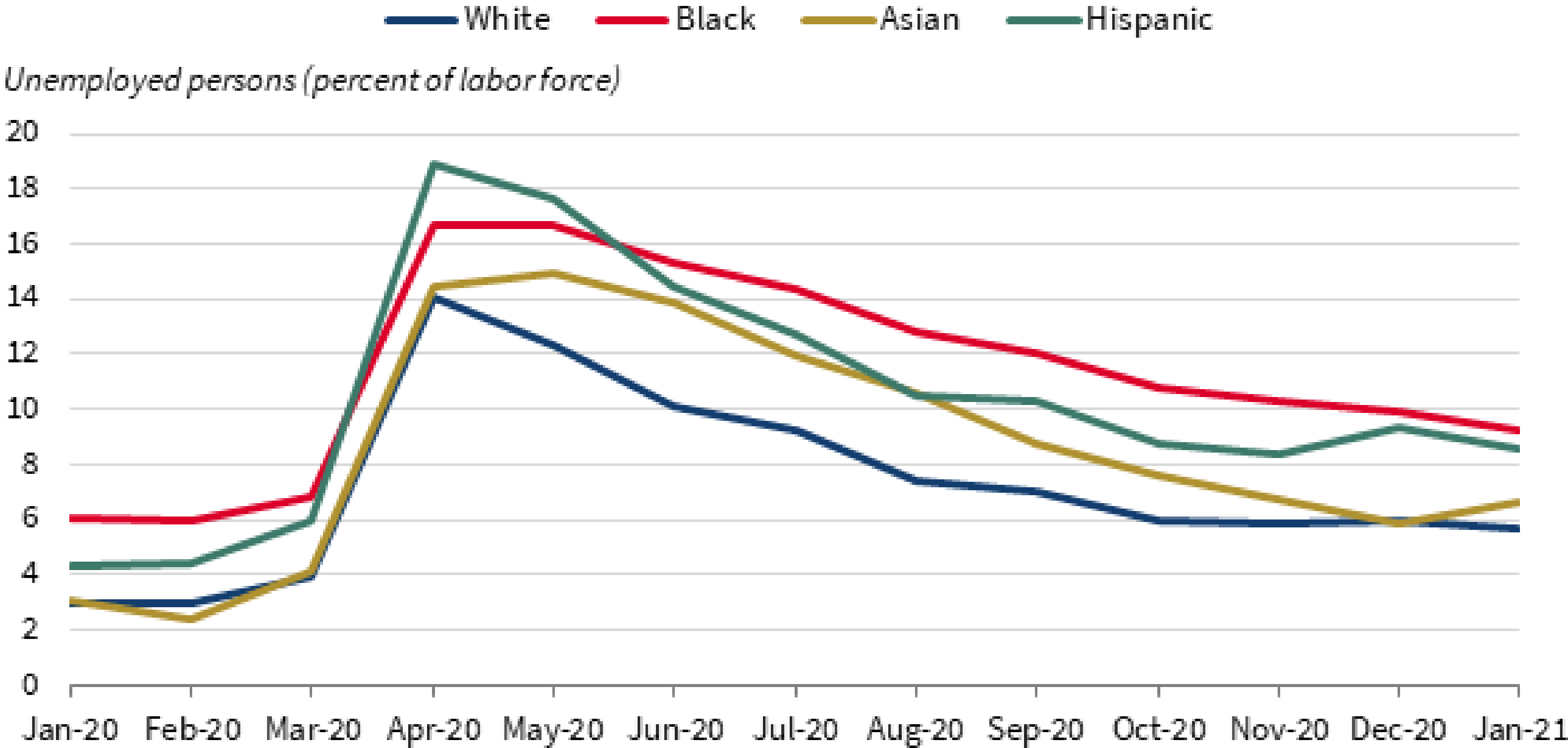
# What's wrong with this graph?

## QUESTIONS TO CONSIDER

- What story is this graph telling?
- Who or which data were included or excluded?
- What valid conclusions can you draw from this graph?



# Monthly Unemployment Rate by Race, Jan. 2020–Jan. 2021



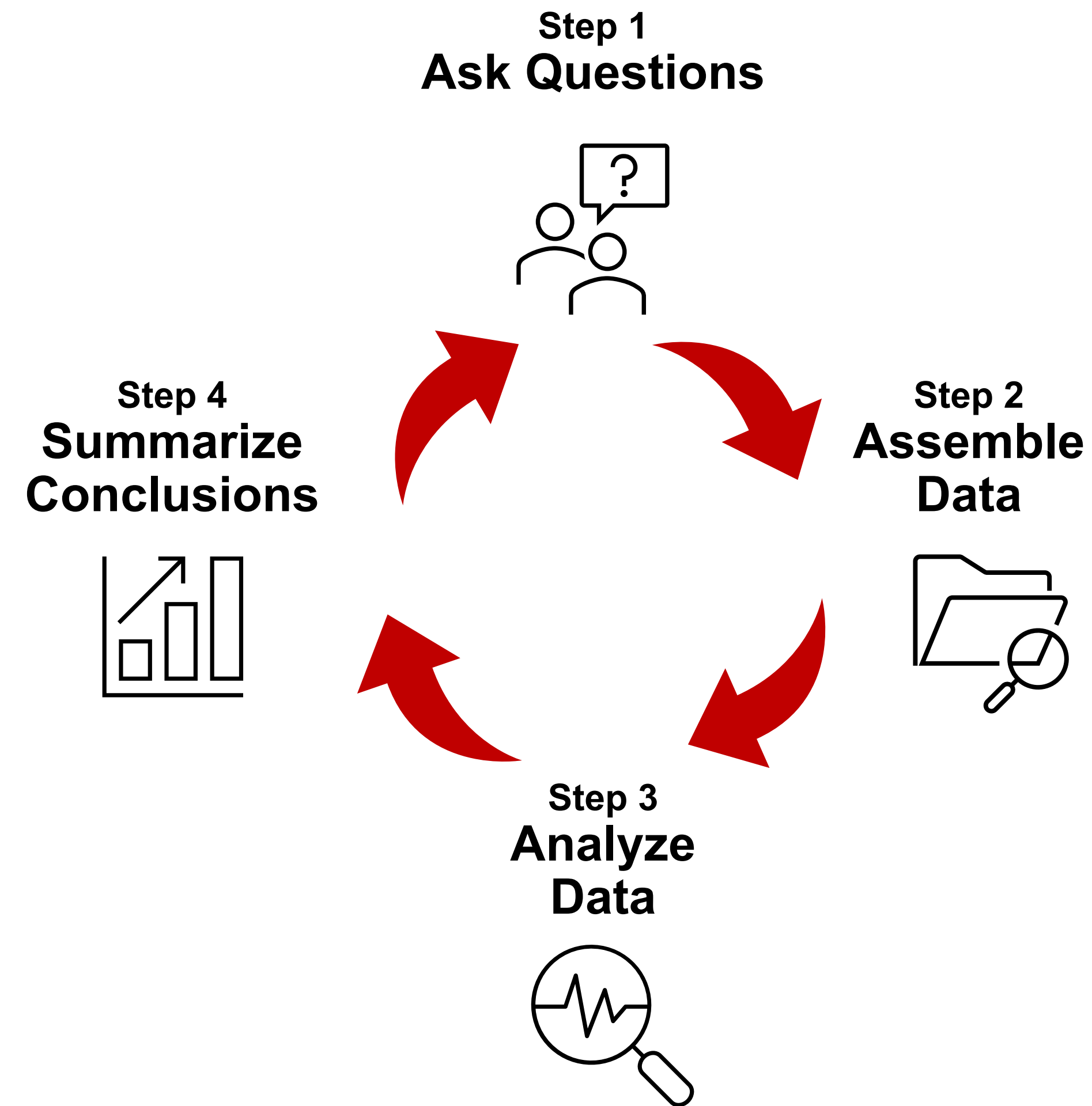
Source: Bureau of Labor Statistics.



# Applying data literacy skills

HOW MIGHT WE INVESTIGATE IMPORTANT  
QUESTIONS WITH DATA?

# The Data Investigation Process





# Ask questions

Do I have a question that I can answer with data?

## What is income inequality?

# Ask questions

Do I have a question that I can answer with data?

## What is income inequality?

→ *No, asks for a definition*



# Ask questions

Do I have a question that I can answer with data?

**How much income inequality exists in the U.S.?**

# Ask questions

Do I have a question that I can answer with data?

## How much income inequality exists in the U.S.?

→ *Yes – asks about conditions that can be observed and measured or counted*

# Ask questions

Do I have a question that I can answer with data?

**When might it be fair for people to have different incomes?**



# Ask questions

Do I have a question that I can answer with data?

**When might it be fair for people to have different incomes?**

→ *No – involves judgments, values, opinions*

# Ask questions

Do I have a question that I can answer with data?

**What types of jobs do the highest (or lowest) earners hold?**

# Ask questions

Do I have a question that I can answer with data?

**What types of jobs do the highest (or lowest) earners hold?**

→ *Yes – could conduct a survey to collect this information*



How much income inequality exists  
between males and females in the  
U.S.?

# Assemble data

## U.S. Decennial Census American Community Survey ~3.5 million households

Sample Individuals from ACS Survey										
Cases (12 cases)										
index	Age	Sex	Marital_s tatus	Numbe... _children	Family_s ize	Educati... e_recod	Race-mu lti	Hispanic	Birthpla ce	Spe En
1	39	Female	Marrie...	2	4	Associa...	Other r...	Mexican	Califor...	Yes
2	68	Female	Divorced	0 childr...	1	Master,...	Black/A...	Not His...	Texas	Yes
3	28	Female	Never ...	1 child ...	2	Bachel...	Black/A...	Not His...	Indiana	Yes
4	37	Female	Never ...	0 childr...	1	Master,...	White	Not His...	New Je...	Yes
5	48	Female	Marrie...	4	6	Master,...	White	Not His...	North ...	Yes
6	30	Female	Marrie...	0 childr...	2	1 or mo...	Other r...	Other	Texas	Yes
7	25	Male	Never ...	0 childr...	3	1 or mo...	White	Not His...	Indiana	Yes
8	50	Male	Marrie...	2	6	Some s...	Other r...	Mexican	Mexico	Do
9	63	Male	Marrie...	0 childr...	2	Doctor...	White	Not His...	Michig...	Yes
10	34	Male	Marrie...	2	4	High sc...	Chinese	Not His...	China	Yes
11	44	Male	Marrie...	4	6	1 or mo...	Black/A...	Not His...	Texas	Yes
12	48	Male	Marrie...	4	6	Associa...	White	Not His...	Califor...	Yes

13197082

Read over all of the questions on this page and answer the ones circled in blue

### Person 1

→ Please copy the name of Person 1 from page 2, then continue answering questions below.

Last Name \_\_\_\_\_ First Name \_\_\_\_\_ MI \_\_\_\_\_

7 Where was this person born?

☐ In the United States – Print name of state. \_\_\_\_\_

☐ Outside the United States – Print name of foreign country, or Puerto Rico, Guam, etc. \_\_\_\_\_

8 Is this person a citizen of the United States?

☐ Yes, born in the United States → SKIP to question 10a

☐ Yes, born in Puerto Rico, Guam, the U.S. Virgin Islands, or Northern Marianas

☐ Yes, born abroad of U.S. citizen parent or parents

☐ Yes, U.S. citizen by naturalization – Print year of naturalization \_\_\_\_\_

☐ No, not a U.S. citizen

9 When did this person come to live in the United States? If this person came to live in the United States more than once, print latest year. Year \_\_\_\_\_

10 a. At any time IN THE LAST 3 MONTHS, has this person attended school or college? Include only nursery or preschool, kindergarten, elementary school, home school, and schooling which leads to a high school diploma or a college degree.

☐ No, has not attended in the last 3 months → SKIP to question 11

☐ Yes, public school, public college

☐ Yes, private school, private college, home school

b. What grade or level was this person attending? Mark (X) ONE box.

☐ Nursery school, preschool

☐ Kindergarten

☐ Grade 1 through 12 – Specify grade 1 – 12 \_\_\_\_\_

☐ College undergraduate years (freshman to senior)

☐ Graduate or professional school beyond a bachelor's degree (for example: MA or PhD program, or medical or law school)

11 What is the highest degree or level of school this person has COMPLETED? Mark (X) ONE box. If currently enrolled, mark the previous grade or highest degree received.

**NO SCHOOLING COMPLETED**

☐ No schooling completed

**NURSERY OR PRESCHOOL THROUGH GRADE 12**

☐ Nursery school

☐ Kindergarten

☐ Grade 1 through 11 – Specify grade 1 – 11 \_\_\_\_\_

☐ 12th grade – NO DIPLOMA

**HIGH SCHOOL GRADUATE**

☐ Regular high school diploma

☐ GED or alternative credential

**COLLEGE OR SOME COLLEGE**

☐ Some college credit, but less than 1 year of college credit

☐ 1 or more years of college credit, no degree

☐ Associate's degree (for example: AA, AS)

☐ Bachelor's degree (for example: BA, BS)

**AFTER BACHELOR'S DEGREE**

☐ Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA)

☐ Professional degree beyond a bachelor's degree (for example: MD, DDS, DVM, LLB, JD)

☐ Doctorate degree (for example: PhD, EdD)

12 This question focuses on this person's BACHELOR'S DEGREE. Please print below the specific major(s) of any BACHELOR'S DEGREES this person has received. (For example: chemical engineering, elementary teacher education, organizational psychology)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

13 What is this person's ancestry or ethnic origin? \_\_\_\_\_

(For example: Italian, Jamaican, African Am., Cambodian, Cape Verdean, Norwegian, Dominican, French Canadian, Haitian, Korean, Lebanese, Polish, Nigerian, Mexican, Taiwanese, Ukrainian, and so on.)

14 a. Does this person speak a language other than English at home?

☐ Yes

☐ No → SKIP to question 15a

b. What is this language? \_\_\_\_\_

c. How well does this person speak English?

☐ Very well

☐ Well

☐ Not well

☐ Not at all

15 a. Did this person live in this house or apartment 1 year ago?

☐ Person is under 1 year old → SKIP to question 16

☐ Yes, this house → SKIP to question 16

☐ No, outside the United States and Puerto Rico – Print name of foreign country, or U.S. Virgin Islands, Guam, etc., below; then SKIP to question 16 \_\_\_\_\_

☐ No, different house in the United States or Puerto Rico

b. Where did this person live 1 year ago?

Address (Number and street name) \_\_\_\_\_

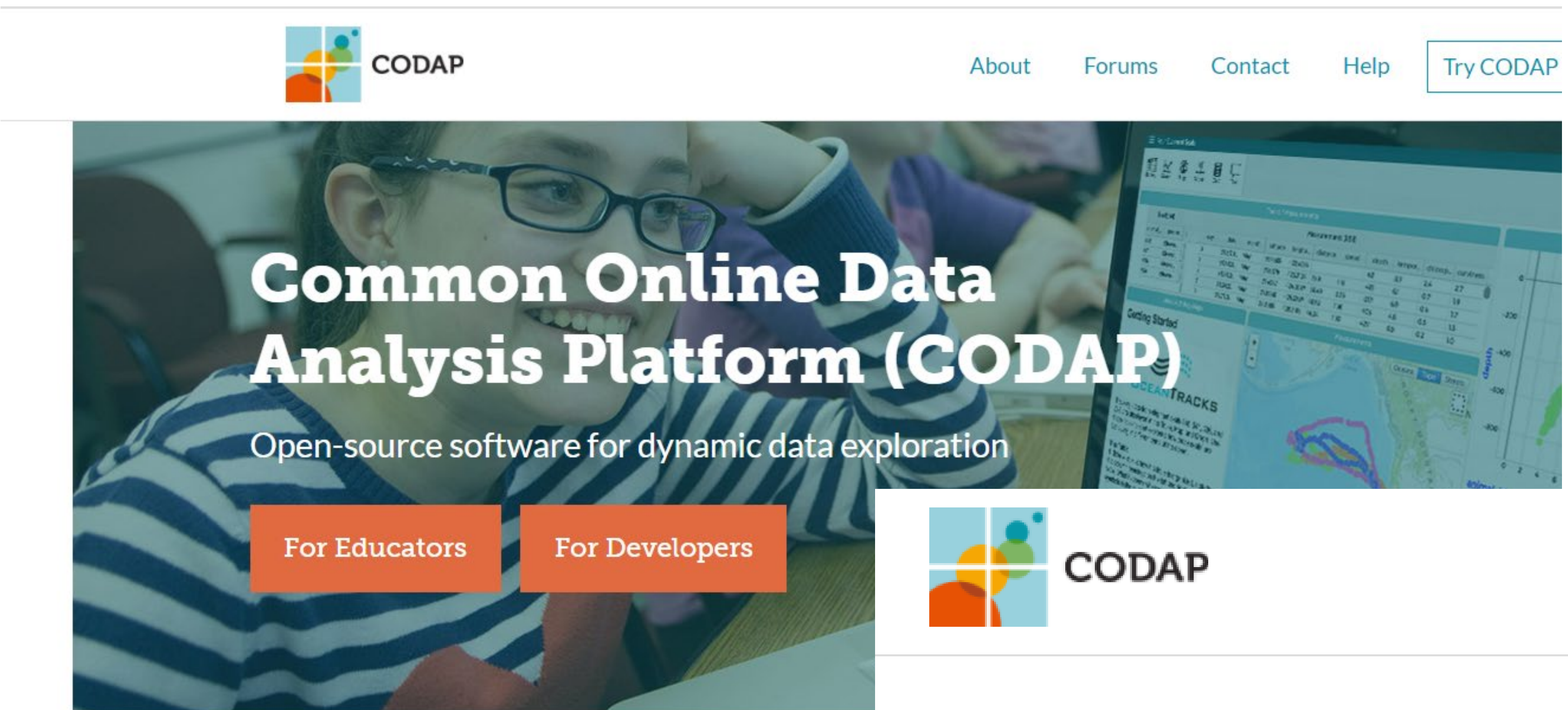
Name of city, town, or post office \_\_\_\_\_

Name of U.S. county or municipio in Puerto Rico \_\_\_\_\_

Name of U.S. state or Puerto Rico \_\_\_\_\_ ZIP Code \_\_\_\_\_



# Data Analysis Tool: CODAP



<https://codap.concord.org/for-educators/>

## For Educators: Teaching with CODAP

[CODAP](#) (Common Online Data Analysis Platform) is an easy-to-use data analysis environment designed for grades 5 through 14. CODAP can be used across the curriculum to help students summarize, visualize, and interpret data, advancing their skills to use data as evidence to support a claim.



# Microdata portal in CODAP

- Select from dozens of attributes, different states, different years
- Fetch up to 1000 individuals at a time, randomly selected from U.S. population

v0006

Microdata Portal

Retrieve random sample data from the [decennial census](#) and the [American Community Survey](#).

Place

all

▼

Years

1 2017

▼

Attributes

6 Age, Sex, Income-wages, State, Boundaries, Year

▲

Choose attributes to include in your data set from the lists below.

Basic demographics

2

▼

Race, ancestry, origins

0

▼

Work & employment

0

▼

Income

1

▲

Attribute

☐ Show descriptions

☐ Income-total

☒ Income-wages

☐ Income-family\_total

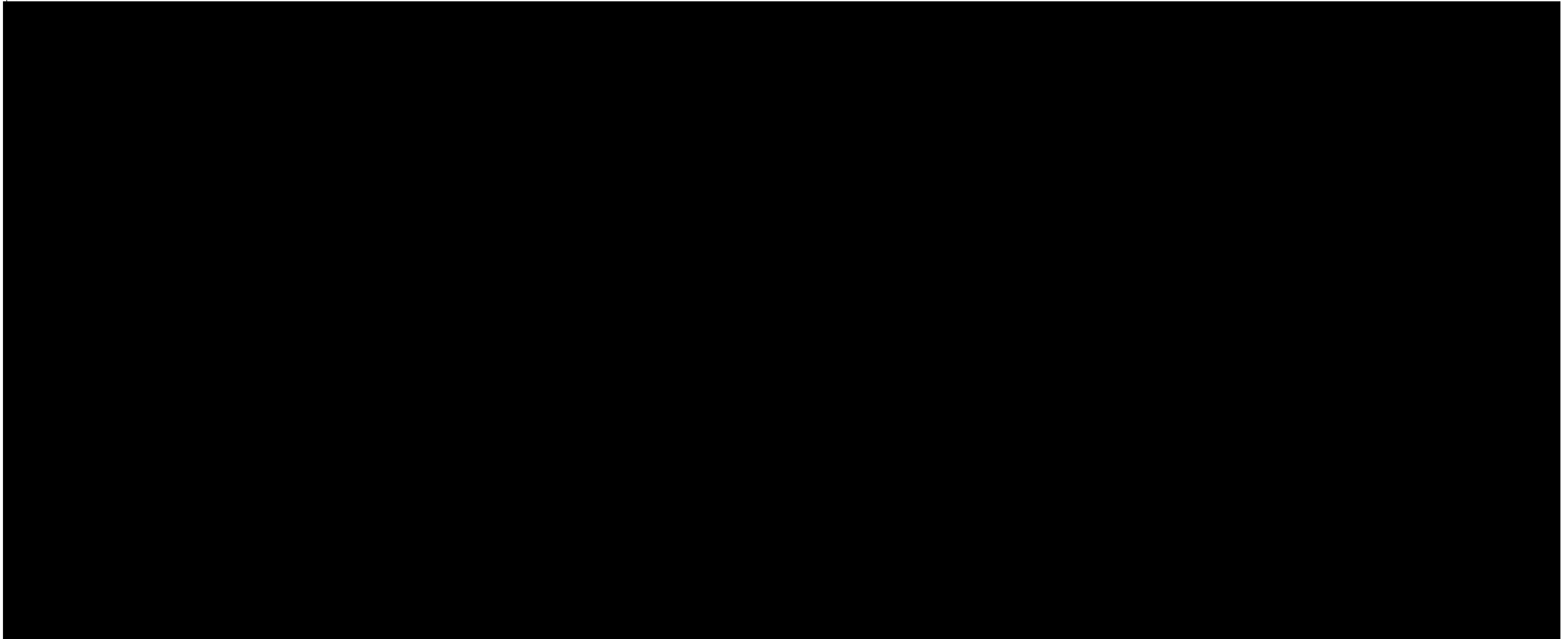
☐ CPI99

Fetch (Max 1000):

100

Keep existing data ☐

# Analyze data and Summarize conclusions: CODAP demonstration



# CONVERSATIONS

## Importance of data literacy

### AND THE ROLE OF LIBRARIANS



# Discussion:

I think data literacy is important.

Strongly disagree | Disagree | Neutral | Agree | Strongly Agree

I feel comfortable interpreting data.

Strongly disagree | Disagree | Neutral | Agree | Strongly Agree

I feel competent interpreting data.

Strongly disagree | Disagree | Neutral | Agree | Strongly Agree

I know where to go for help interpreting data.

Strongly disagree | Disagree | Neutral | Agree | Strongly Agree





# ATTENDEE Q&A

# One last thing

If you could give just one tip, action step or piece of advice for all the librarians out there, what would it be?



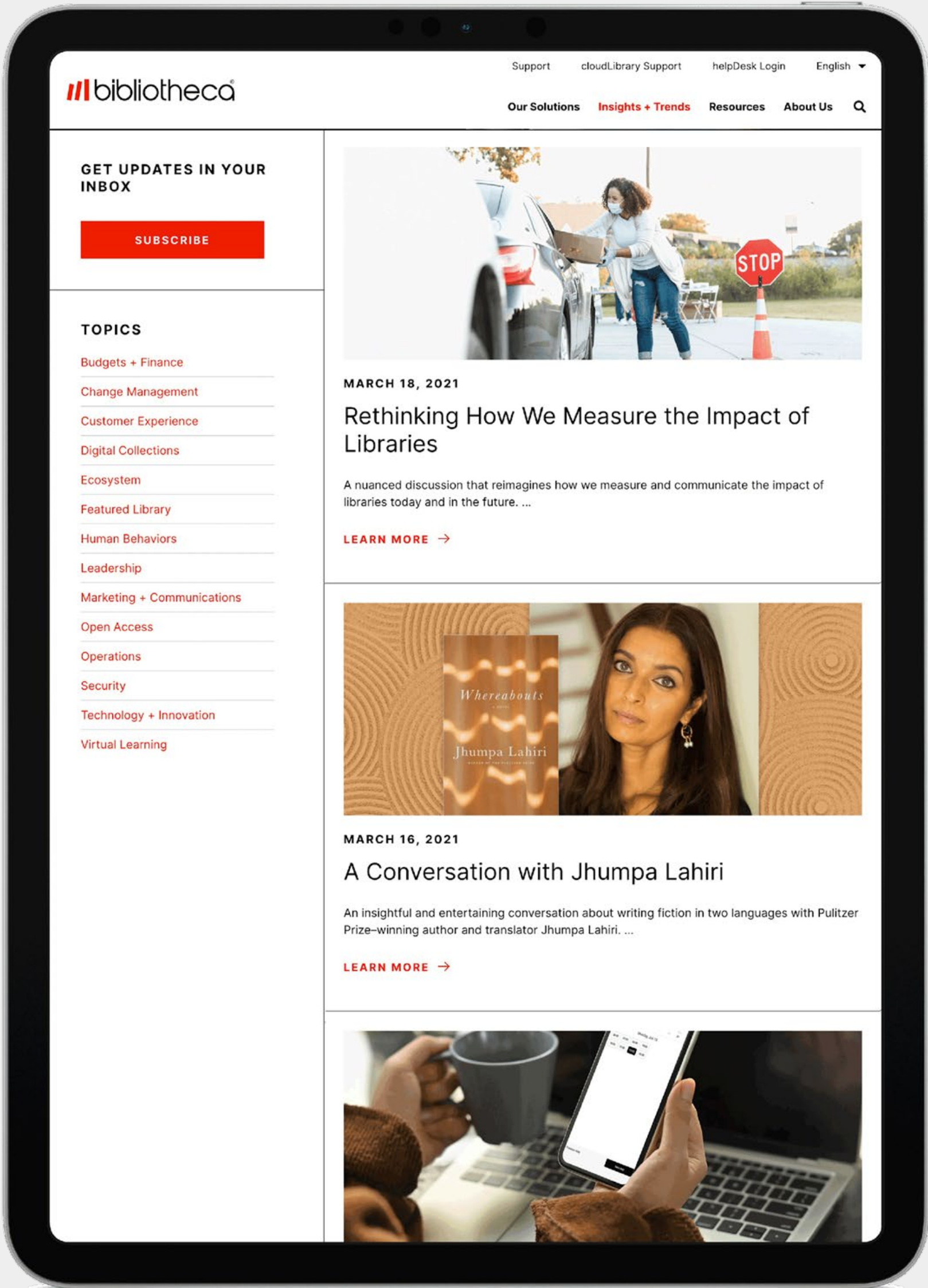
# Learn from library leaders around the world

Catch up on-demand and join the discussion live with global leaders: **bibliotheca.com**



“This is my second webinar from your site and I really look forward to them. You include interesting speakers and topics and I wish the presentation didn’t have to end. Thank you!

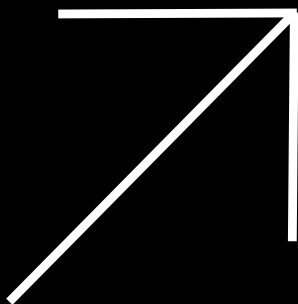
Webinar attendee, 2020



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https://www.surveymonkey.com/r/Y2XRTJP

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How did we do? We appreciate you taking the time to share feedback. Webinar comments and insights will be shared with our team and library presenters. Thanks!

\* Which webinar did you attend or watch on-demand?

⌵

\* In what country do you live?

⌵

\* How informative did you find the webinar?

0 (Not informative)

5 (Very informative)

Do you have any comments or questions?