What is Data Visualization?

Asking Good Research Questions with Data Visualization

INTRODUCTION TO DATA VISUALIZATION

THE GRADUATE CENTER AT CUNY

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Guiding Question

Given the drag and drop nature of Tableau and similar software, what roles (if any) do you think that people have in data visualization? What does the author bring to the process?

Author
Question
Data
Data Viz
Tools
Audience

Which comes first: Data or Questions?

DATA QUESTION

DATA

QUESTION

Exploratory

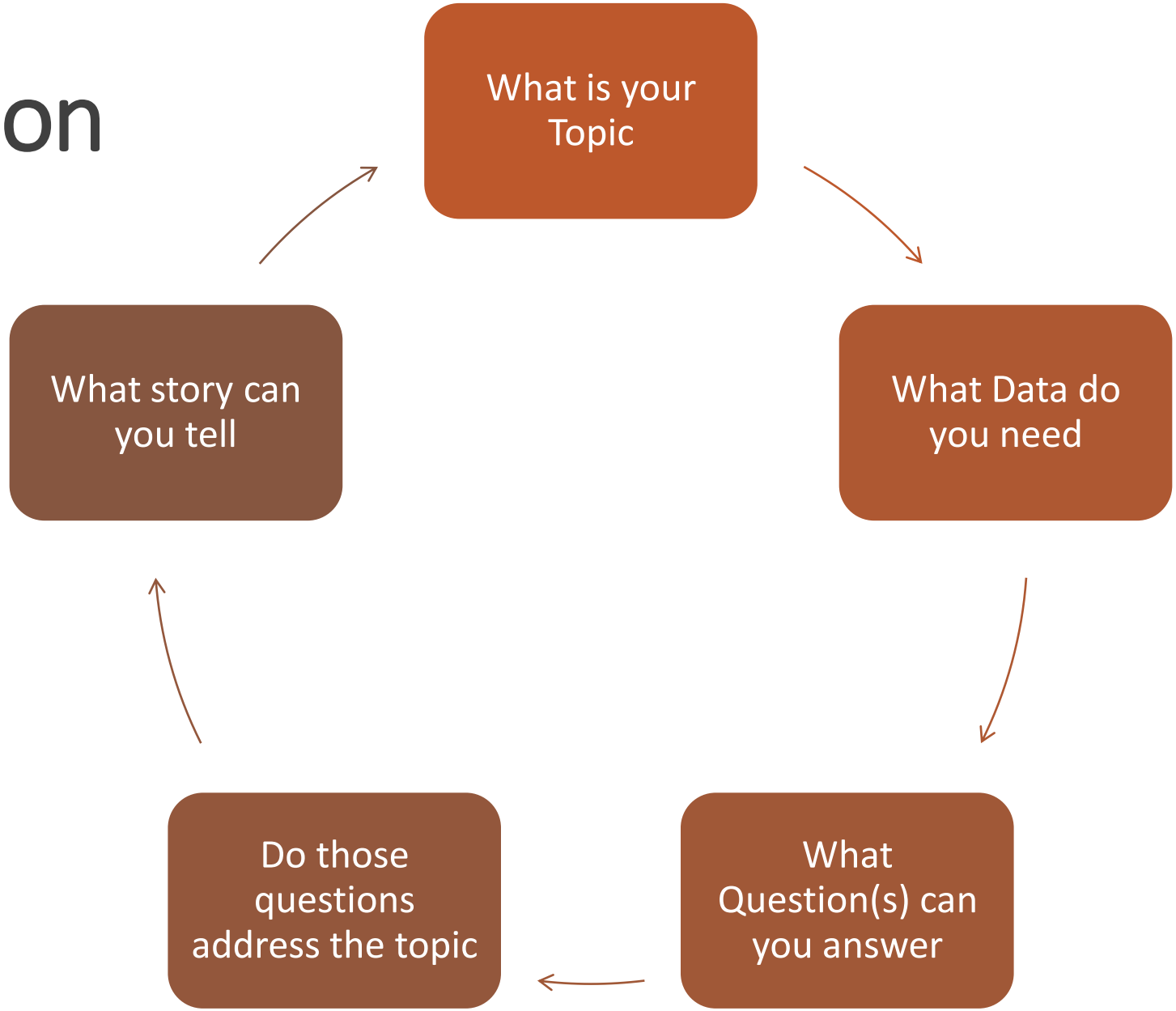
Experimental

Introduces bias

May not answer a question

DATA	QUESTION
Exploratory	Directed
Experimental	Focused
Introduces bias	Grounded
May not answer a question	Data may be unavailable

Iteration


What is your Topic
What Data do you need
What Question(s) can you answer
Do those questions address the topic
What story can you tell

Good Topics

Intriguing

Grounded in:

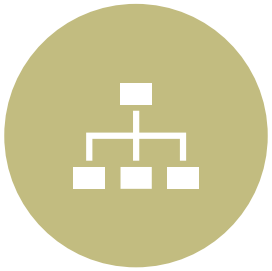
- Experience
- Theory
- Research
- Media

Good Data

RELEVANT

SPECIFIC (CONSTRAINED OR CONSTRAINABLE)

QUANTIFIABLE



ORGANIZED

Good Research Questions

Specific

Measurable

Answerable

Relevant

Non-biased

Open-ended

Constrained

Bad Research Questions

- *A lot of these examples are bad for multiple reasons.*
- NOT Specific
  - Does more education make people better citizens?
- NOT Measurable
  - How much does reading the news affect someone's politics?
- NOT Answerable
  - If Clinton had won, would the planet be cooler?
- NOT Relevant
  - Topic: Hotel Ratings
  - Question: What is the median income of surrounding area? (note this could be related, but the link would have to be explicitly stated)
- NOT Non-biased
  - How many fewer jobs would have been lost if the US implemented a shutdown 2 weeks later?
- NOT Open-ended
  - How many noise complaints were there in 2020? (note this is a good sub-question within the larger context of a research question)

Our Topic

We want to know more about electric cars. We found a dataset about alternative fuel corridors and want to understand both how far someone can drive in an alternative fuel corridor and if those areas are predominantly democrat.

Our Research Question

Are electric cars only for the rich? (Note this is a great headline!)

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Are electric filling stations only in wealthy neighborhoods?

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Our Research Question

~~Are electric cars only for the rich? (Note this is a great headline!)~~

~~Are electric filling stations only in wealthy neighborhoods?~~

~~Are electric fuel corridors only in wealthy neighborhoods?~~

What is the median income of the regions surrounding electric fuel corridors?

Our Research Question

~~Are electric cars only for the rich? (Note this is a great headline!)~~

~~Are electric filling stations only in wealthy neighborhoods?~~

~~Are electric fuel corridors only in wealthy neighborhoods?~~

~~What is the median income of the regions surrounding electric fuel corridors?~~

Who has access to electric fuel corridors?

Research Question (RQ) vs. Hypothesis

Hypotheses must fit a specific shape

Hypotheses make a specific prediction that can be tested

Hypothesis must be be “rejectable”

RQ’s may be predictive or descriptive

RQ’s must be open ended

RQ’s must be demonstrable

Research Question:

Who has access to electric fuel corridors?

Hypothesis:

Electric fuel corridors go through disproportionately white and wealthy neighborhoods.

Null hypothesis:

There is no difference in the race or income of the neighborhoods that have electric fuel corridors compared to the country on average.

FOR THIS CLASS you do not need to test hypotheses.

Reaching an Audience

Turning Research Questions into Stories

How can people connect?

Where is the hook?

Finding a Story

Does an outlier provide interesting insight?

A natural beginning or ending?

Is there another way to aggregate the data?

Inherent patterns? Time? Location?

Finding a story

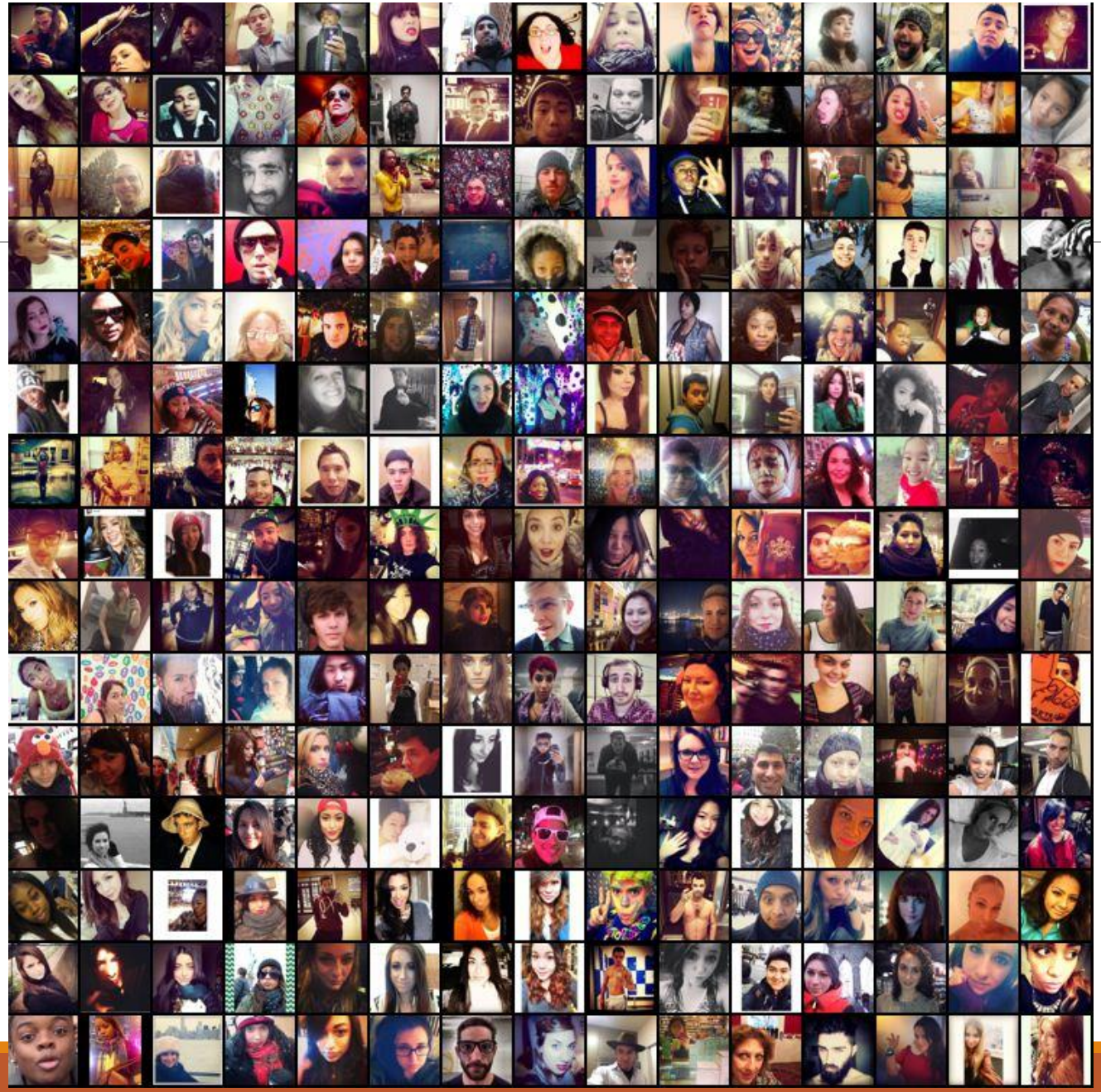
Start at the end. In one sentence, what do you want your viewers to take away? What did you learn through doing this project? That insight goes first.

Abstractions

Abstraction

https://public.tableau.com/profile/michelle.mcsweeney5354#!/vizhome/shootings_1/Sheet1

Abstraction

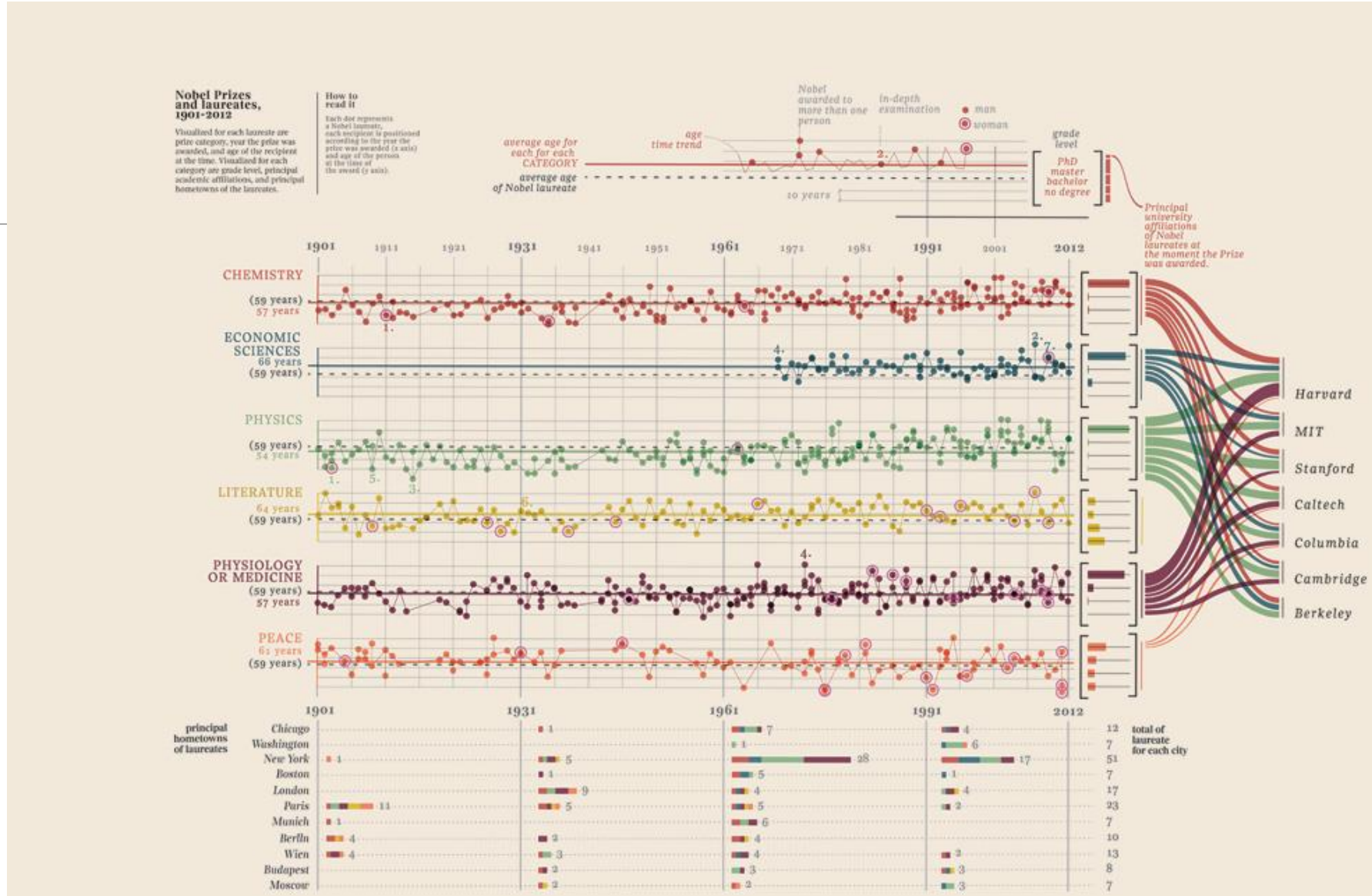


Selfie City, NYC

Abstraction

https://centerforspatialresearch.github.io/colombia_site/applications/interactiveViz.html

Abstra-ction

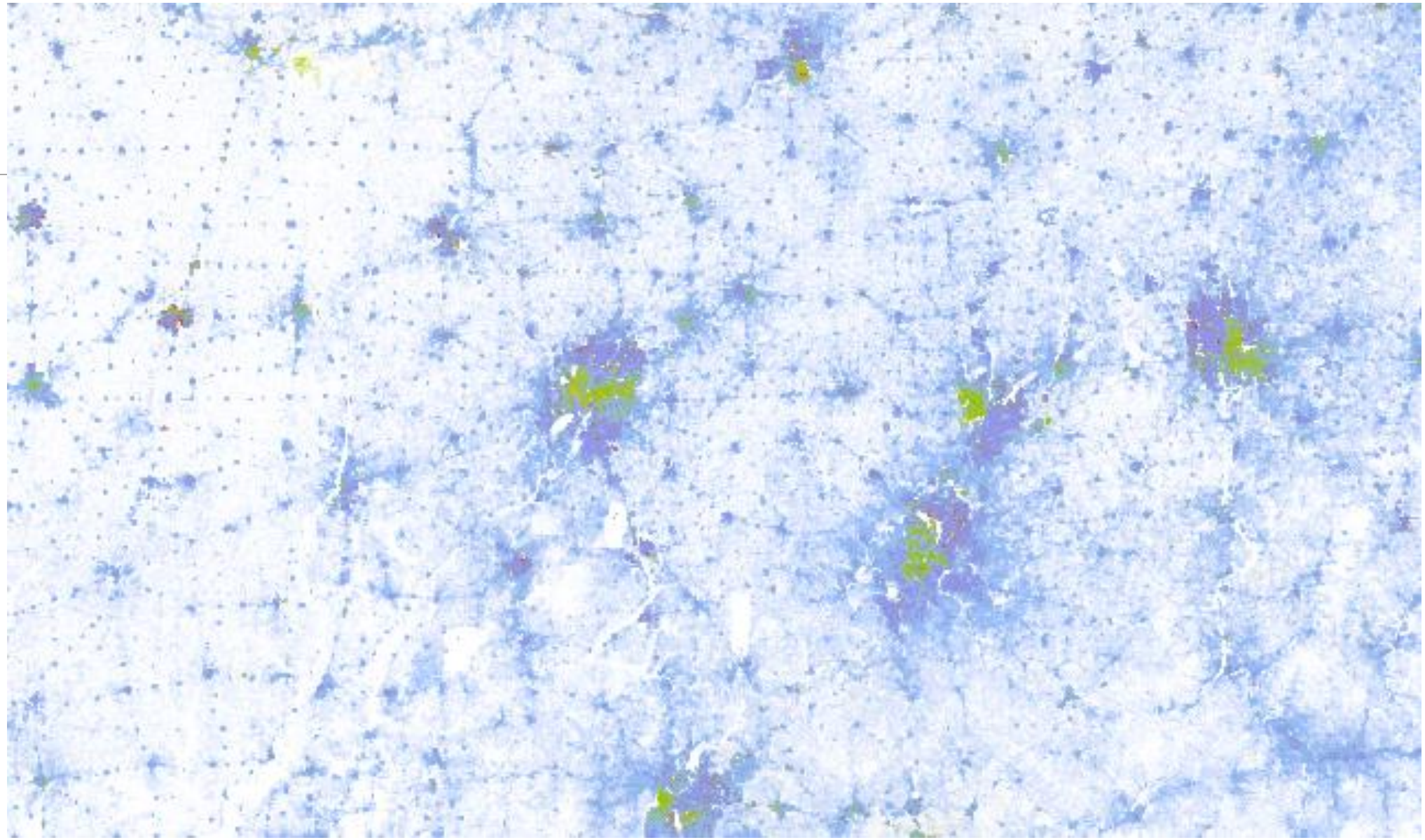


2012

Design and production: Accurat

(Giorgia Lupi, Gabriele Rossi and Simone Quadri, with Davide Ciuffi, Federica Fragapane and Francesco Majno).

Context



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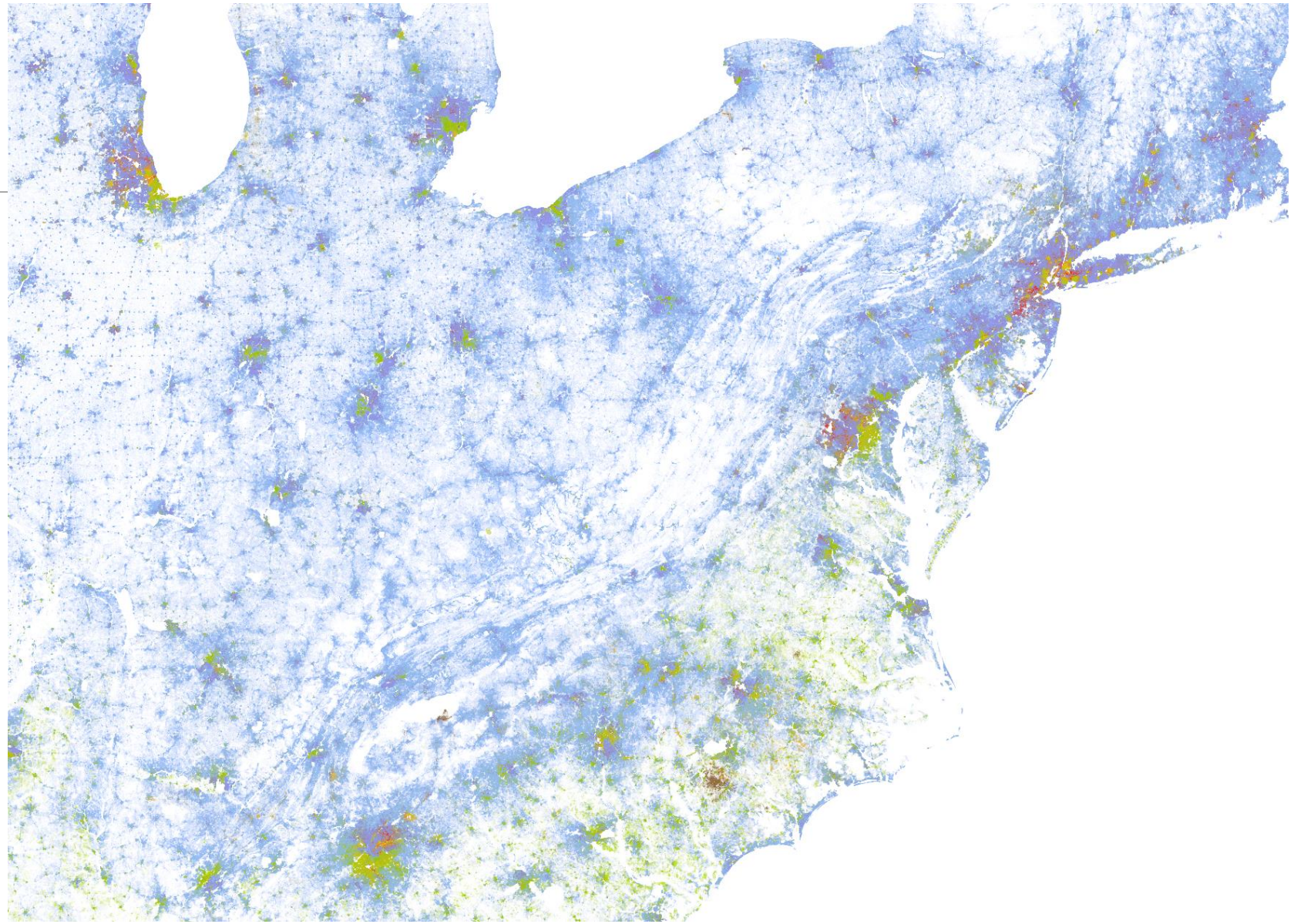

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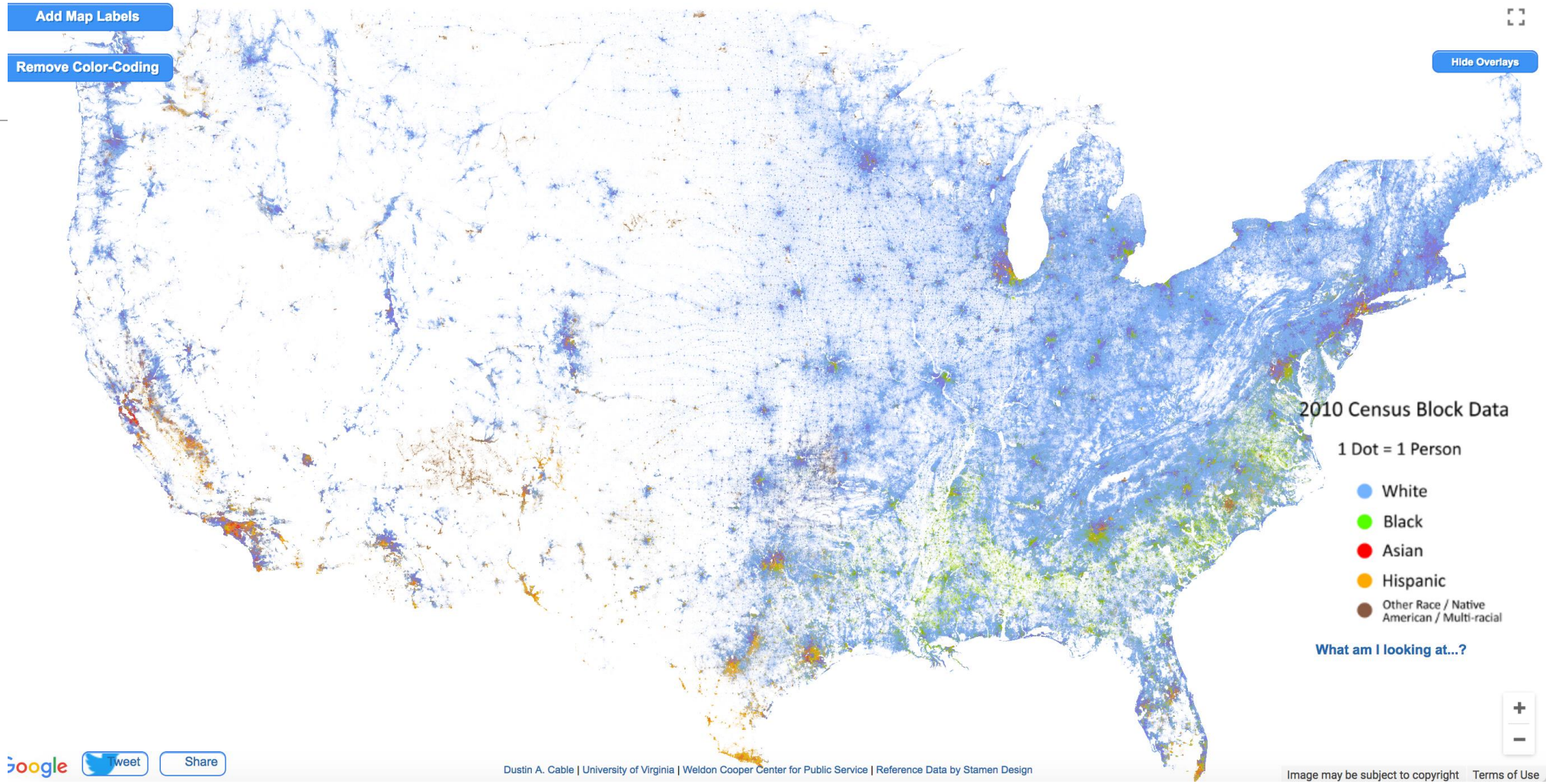
Add Map Labels
Remove Color-Coding
Hide Overlays
2010 Census Block Data
1 Dot = 1 Person
White
Black
Asian
Hispanic
Other Race / Native American / Multi-racial
What am I looking at...?
Tweet
Share
Dustin A. Cable | University of Virginia | Weldon Cooper Center for Public Service | Reference Data by Stamen Design
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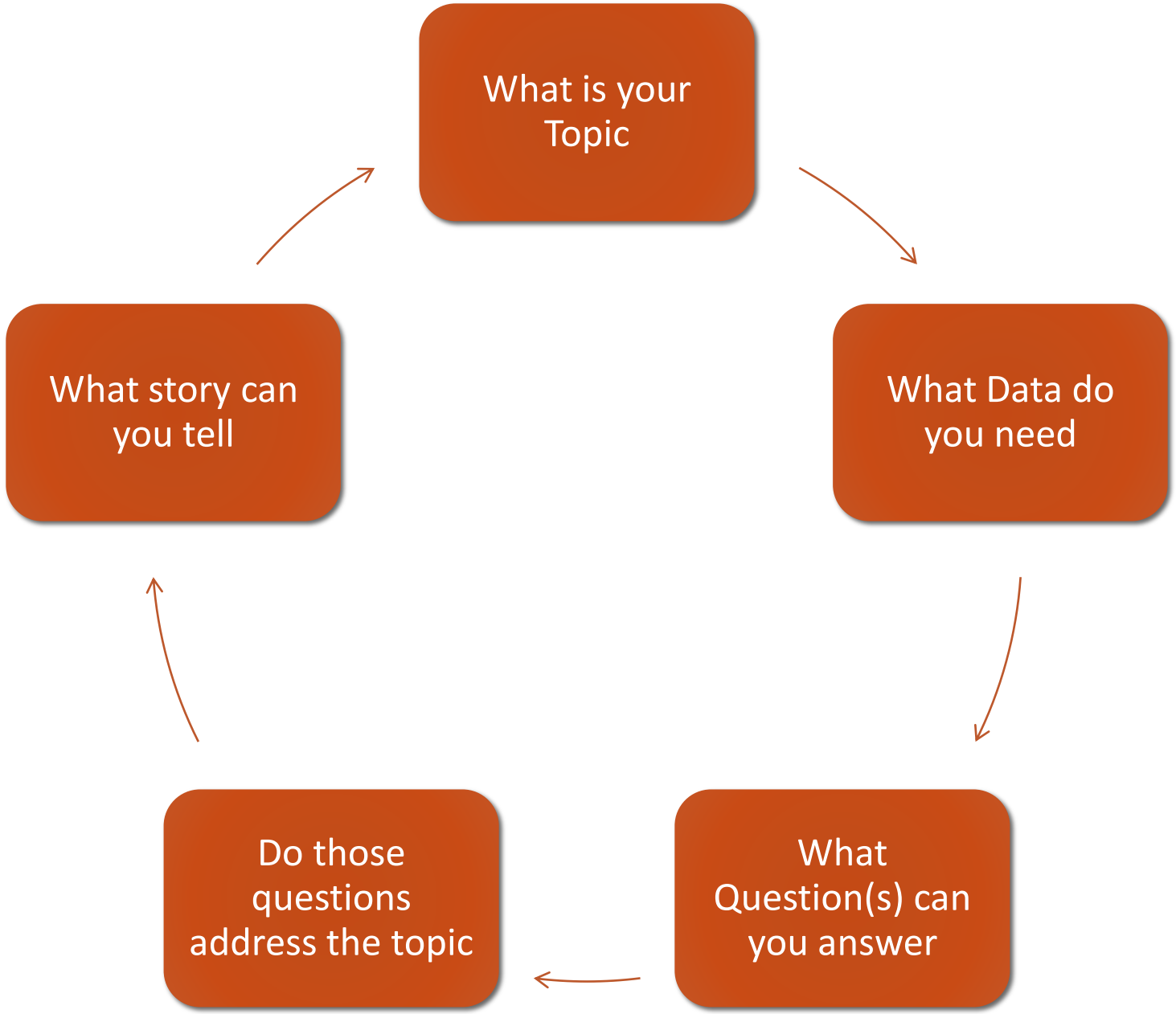
Context

https://demographics.virginia.edu/DotMap/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