Lecture 3. Practical Real-World Applications

PUBH 6199: Visualizing Data with R, Summer 2025

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Outline for today

- Introductions
- What does a data visualization designer do?
- Interactive case study
- Questions

Introductions

About me

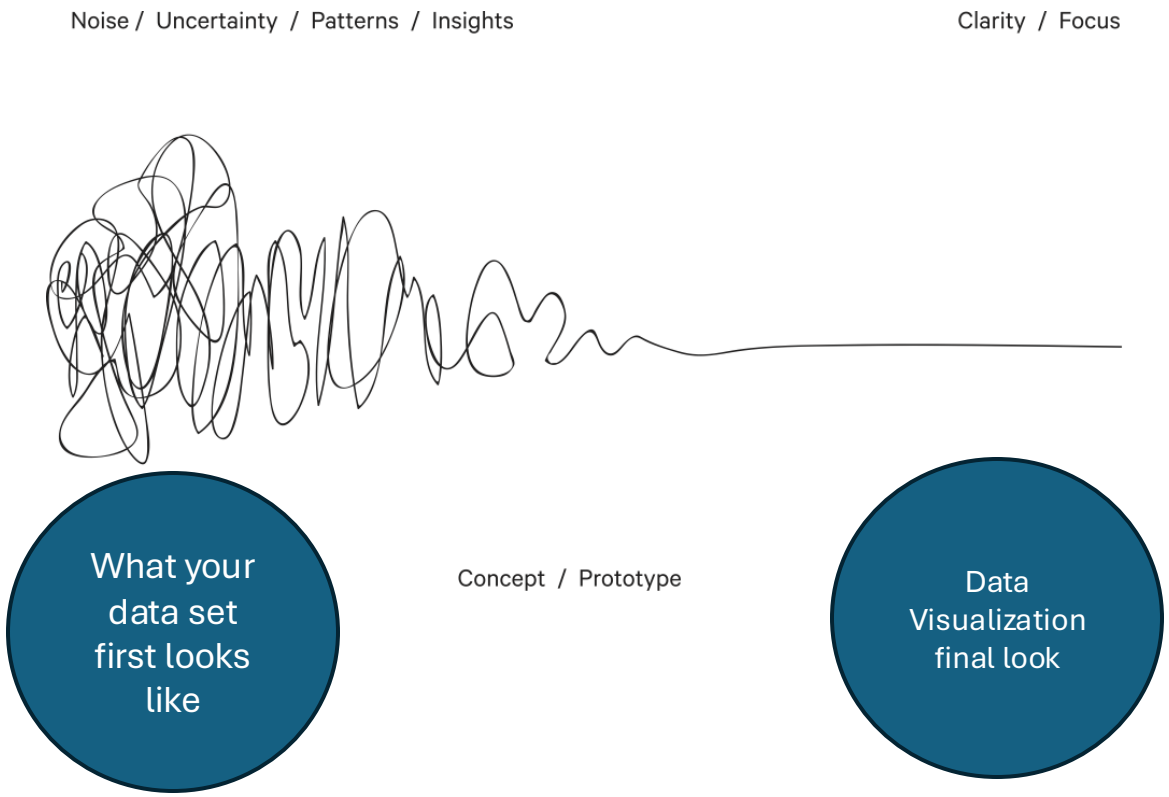
- User Experience Designer/Researcher
- Worked in the field of public health for 5+ years
- Spent most of career in different policy consultant roles (web development, event planning and facilitating, help desk, data analysis)
- Favorite role is working in data visualization design and leading qualitative research studies (interviews, usability tests, field studies, focus groups)

What does a data visualization designer do?

Day to Day Tasks

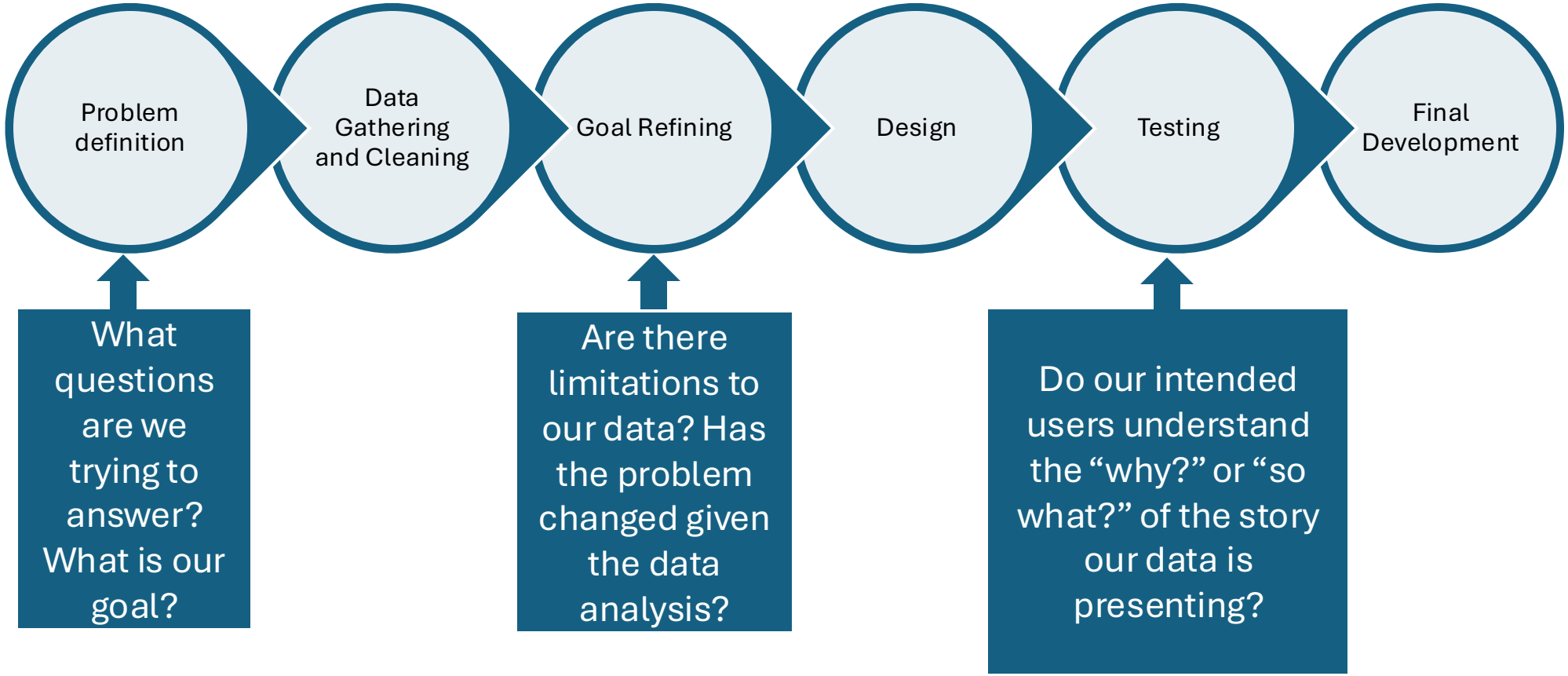
- Meet with content experts and clients to understand what story we want to tell with data sets.
- Develop documentation that outlines how we intend the user to interpret the data visualizations and interface.
- Determine what types of visualizations will tell the best story for the data we have.
- Identify how to convey a story without introducing bias, confusion, and risks of misinterpretation.
- Work with developers/data scientists to make sure we can implement my designs and the client requests.
- Meet with end users to gather feedback on how well out tool/visuals accomplish their needs and goals and convey the story we want them to understand through the data.

Impact of data visualization (why it matters)



The impact of your data visualization is dependent on how well you can organize your data to tell a clear, simple and accurate story of an occurrence or pattern.

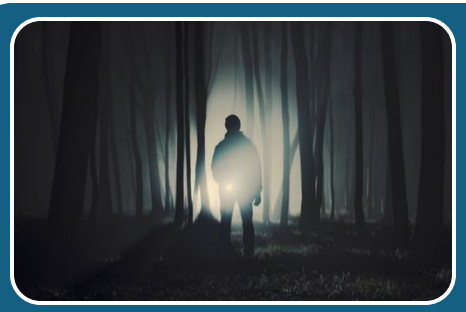
Project Life Cycle



Design Process

Problem Definition	What is the question we are interested in answering?	*Ex: Client's goal is to see where in the US are the most infants have a healthy weight at birth.*
Goal Refining	What does our data tell us about our main question?	*Ex: What states have the lowest percentage of infants born with low birth weight?*
Design and Testing	What visualization can provide our users with an understanding of the data?	*Ex: What visualization type works best for highlighting which state has the lowest percentage of infants born with low birth rate?*

Working with Clients: Types Clients



Unclear goals/unclear vision

- More exploratory data analysis
- Flexibility in design solutions
- Requires more workshopping with the client to identify a concrete outcome.

Either goals or vision are unclear

- Expected outcome is known but not necessarily how it will be executed.
- Requires more education and discussions around getting user input and perspective.
- Includes considering new perspectives on how to display the data.

Clear goals/clear vision

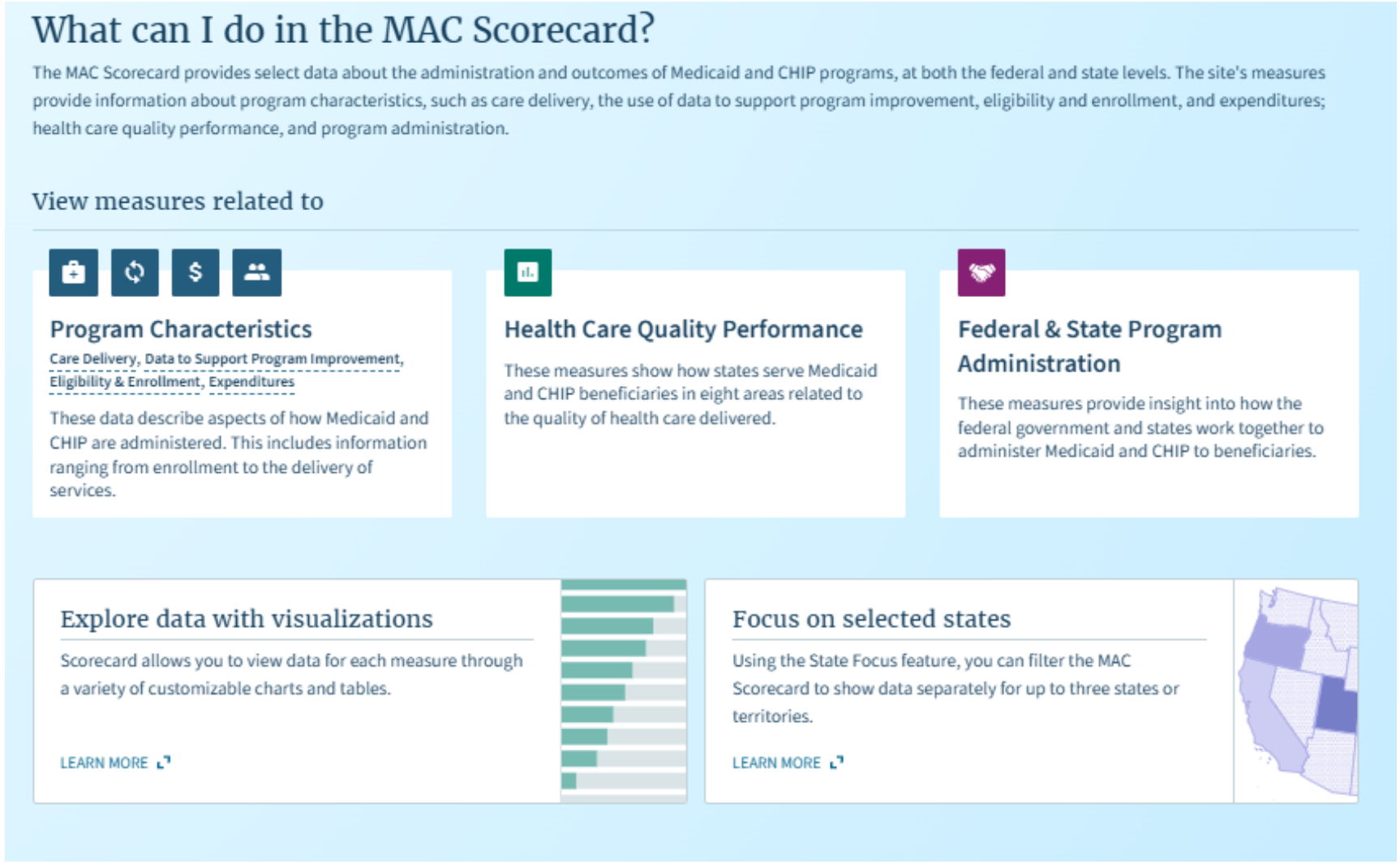
- There may be an existing product that needs refining.
- Design solutions may be more fixed, and attention may be more on improving how the message is relayed.

Interactive case study

Little Background

- In 2018, the Centers for Medicare & Medicaid Services (CMS) a national Scorecard for ranking state health outcomes.
- CMS developed the Scorecard to improve public transparency about the administration and outcomes of the Medicaid and CHIP programs.
- Medicaid provides healthcare to low-income adults and children and eligible adults and children with disabilities.
- CHIP provides low-cost health coverage to children and pregnant women in families that earn too much money to qualify for Medicaid.

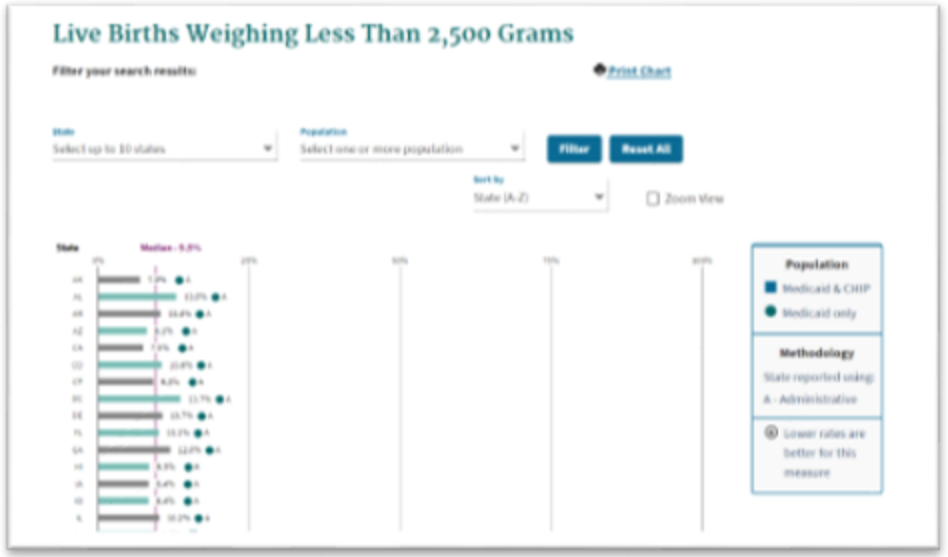
Scorecard: Website Walk Through



Visualizing Live Births Weighing Less Than 2,500 Grams

- For this project, the client was CMS.
- They had a clear goal and vision in mind of redesigning existing visualizations.
- The goal was to help states compare themselves to each other to see where they currently rank.
- The new design provided a map view in addition to a bar graph.
- The new design improved proportional representations of data and made color usage more consistent and meaningful.
- Limitations: We did not venture outside of other options for exploring the data. Instead, we provide CSV exports for users to do their own exploration.

OLD



New

Scenario

- Today we will be using data used in the Medicaid Scorecard website to create new visualizations to show the percentage of live births that weighed less than 2,500 grams.
    1. Review the current tool. Identify 5 questions that can be answered using the tool.
    2. Download the CSV of the data for 2021-2023.
    3. Use R studio to stack the CSVs into 1 dataset.
    4. Review the new dataset.
    5. Identify 5 additional questions that can be answered using the new dataset.
    6. For each question, provide a rationale for why the question might be useful to a user.

Let’s discuss our questions

Scenario

- Answer your questions with visualizations
  1. What visualization do you think will work best for your question?
  2. Create at least 1 visualization that shows data in a different way than how it is displayed in the Scorecard website.
  3. Share with a classmate to get feedback
     - How did they interpret the visualizations? What insights could they make?
     - Were they able to describe the data accurately?
     - Are there any changes you would make after sharing the visualization?

Things to keep in mind when creating data visualizations

Misleading Graphs

- Are you using proportional elements (y axis, pie charts, stacked bar charts)?
- How are outliers displayed?

Context

- Are denominators explained?
- Do colors have consistent meaning?
- Are terms well defined?
- Are important context on events/policies or other factors explained to help users make sense of the data?

Aesthetics

- Does the information overwhelm the user?
- Do you use distracting colors?

Resource Type	Resource	Description
Writing Tools	CDC Clear Writing Assessment and User Guide	Use it to assess entire documents or to test sections in long documents.
	Plain Language Guidelines 18F Content Guide	Lists guidelines established by the federal government to ensure that resources adhere to plain language best practices.
	Grammarly	Writing assistance software that uses AI to help make your writing clear and concise for a general audience.
	Hemingway App	Online tool that assesses writing by grade level, highlights the use of passive voice, adverbs and grammar errors. The tool also provides simpler alternatives for simplifying sentences.
	Be Readable	Online toolkit that helps writers everywhere improve their readability and bring their audience closer.
	Readability Test	Tests all, or parts of a web page. Links directly from a URL - it will compute the results for the referring page.
Data Visualization Guides	Designing Effective Tables and Graphs	Shares a checklist providing guidance on what type of visualizations to use for different messages.
	Do No Harm Guide: Centering Accessibility in Data Visualization	Provides lessons and tips on how to create visualizations that are more accessible to people with disabilities.
	Story Telling with Data Chart Guide	Shares effective applications and common pitfalls to avoid when considering different visualizations to convey a data story.

Let’s share our designs!

Questions?

Thank you for your time!