- **Messaging.** What is the message you are trying to communicate with the narrative visualization?
    - My narrative visualization project conveys the following messages:
        - Shows how fuel efficiency varies among different car brands, indicating which brands are more or less efficient.
        - Displays fuel consumption for cars using different fuel types (e.g., gasoline, diesel, electricity).
        - Shows how engine cylinder count affects fuel efficiency, with more cylinders usually resulting in lower efficiency.

- **Narrative Structure.** Which structure was your narrative visualization designed to follow (martini glass, interactive slide show or drop-down story)? How does your narrative visualization follow that structure? (All of these structures can include the opportunity to "drill-down" and explore. The difference is where that opportunity happens in the structure.)
    - Interactive slide show
    - This is because my narrative visualization project consists of three slides, each presenting a different aspect of MPG, which the user can navigate through in order. These three slides follow a main path led by the author (i.e., me), but at the same time allow the user to explore specific details (e.g., by hovering the mouse & entering the MPG range they want to investigate) to gain deeper insights. If the audience is not interested in the details of a particular slide, they have the option to move to the other scene and explore new content.

- **Visual Structure.** What visual structure is used for each scene? How does it ensure the viewer can understand the data and navigate the scene? How does it highlight to urge the viewer to focus on the important parts of the data in each scene? How does it help the viewer transition to other scenes, to understand how the data connects to the data in other scenes?
    - Structure: Helping a User Navigate a Scene
        - All three of my scenes use the clearest and most understandable visual structure to help the audience understand the data immediately. The structure consists of a main header, three navigation buttons (for jumping between pages), a bar chart, and comments on the right side of the chart. The overall layout is centered and free of distracting redundant information, allowing users to easily navigate and interpret the data.
    - Highlight: Directing a User's Attention in a Scene
        - To bring out the focus of the data, I use color highlighting & contrast. For example, in Scenes 1 and 3, when the mouse hovers over a piece of data in the bar, it changes from steelblue to orange, which allows the users to focus on the data they want to investigate without getting lost. In addition, in scene 2, when comparing the effects of the three fuel types on the highway MPG, I use three different colors, so

that the user can see the strong contrast, and thus easier to understand the information he wants.

- Transition: Keeping Users Oriented Between Scenes
  - I used a relatively consistent color scheme and layout style across all of my scenes to help the user understand the different aspects of the impact of the highway MPG while staying focused on the overall story being told. In general, my transition design goes a long way in helping my users orienting between scenes.

- **Scenes.** What are the scenes of your narrative visualization? How are the scenes ordered, and why

1. **Brand Comparison: Average Highway MPG**

   This scene summarizes the average highway fuel efficiency (MPG) of each vehicle brand, showing which brands are typically more fuel-efficient.

   Order and why: This is the first scene. The reason for comparing brands first is that users are likely to be most interested in this, as brand is usually the first criterion consumers use when choosing a vehicle.

2. **Fuel Type Comparison: Average Highway MPG**

   This scene categorizes vehicles by fuel type (gasoline, diesel, electric) and compares the average fuel efficiency of each type.

   Order and why: This is the second scene because it builds on the brand-level overview provided in the first scene by narrowing the focus to the impact of different fuel types on fuel efficiency.

3. **Engine Cylinders Comparison: Average Highway MPG**

   This scene discusses the impact of the number of engine cylinders on fuel efficiency.

   Order and why: This is the last scene to provide more specific technical details, which is valuable for users interested in technical details.

- **Annotations.** What template was followed for the annotations, and why that template? How are the annotations used to support the messaging? Do the annotations change within a single scene, and if so, how and why
  - Each scene's annotations follow a simple and consistent template. All annotations include a short text description (providing extra information on data or background knowledge) placed near the right side of the bar chart. This template was chosen because all annotations use clear font and avoid highlighting to prevent distracting the user's attention and overwhelming them with too much information. Also, using a consistent annotation style helps my users easily recognize annotations across different scenes.
  - My annotations fall into two main types and they both support the messaging.
    - First, they explain potential outliers in the data to prevent user confusion. For example, in Scene 1, I note that Tesla's MPG is higher because it is an electric car.

        - Second, they provide background knowledge to help users who may not be familiar with automotive terms. For instance, in Scenes 2 and 3, I explain fuel types and engine cylinder counts so users do not feel lost.
    - My annotations do not change within a single scene because keeping them the same ensures clarity and avoids confusion. This static approach keeps the messaging clear and helps the user follow the narrative without having to adjust to new annotations all the time.

- **Parameters.** What are the parameters of the narrative visualization? What are the states of the narrative visualization? How are the parameters used to define the state and each scene?
    - Parameters:
      The parameter in my narrative visualization is the MPG range that the user can input to filter the data in Scene 1. This allows users to customize the visualization to better meet their needs or interests.
    - States:
      The states of the narrative visualization are defined by the different values of the MPG range parameter in Scene 1. Each state represents a different subset of data filtered by the user-specified MPG range. For example, if the user sets the MPG range to 20-30, the state will display the data for vehicles with MPG values within that range.
    - How Parameters Define the State and Each Scene:
        - Scene 1: The user inputs the desired MPG range, and the bar chart updates to show the average highway fuel efficiency (MPG) for each vehicle brand within that range. The parameter (MPG range) directly controls which data is displayed in the chart, defining the state of this scene.
        - Scene 2: This scene categorizes vehicles by fuel type (gasoline, diesel, electric) and compares their average fuel efficiency. It does not use user-defined parameters since there are only three fuel types, making it straightforward to compare.
        - Scene 3: This scene examines the impact of the number of engine cylinders on fuel efficiency. It also does not use user-defined parameters, as there are only eight different cylinder counts, making it simple to present the data without additional filtering.
        - The decision to use parameters only in Scene 1 is due to the larger number of vehicle brands compared to the limited variables in Scenes 2 and 3. Scene 1 benefits from user-defined filtering for a more customized exploration, while Scenes 2 and 3 provide clear comparisons without needing parameters.

- **Triggers.** What are the triggers that connect user actions to changes of state in the narrative visualization? What affordances are provided to the user to communicate to them what options are available to them in the narrative visualization?
    - Triggers:

        - Inputting MPG Range: In Scene 1, the user can input their desired MPG range, which acts as a trigger to filter and update the bar chart. The "GO!!!" button is the specific trigger that initiates this action.
        - Navigation Buttons: Each scene includes navigation buttons labeled "Scene 1," "Scene 2," and "Scene 3." These buttons are placed consistently across all scenes, allowing users to navigate through different parts of the narrative by clicking them.
    - Affordances:
        - MPG Range Input Box and "GO!!!" Button: In Scene 1, an input box with a "GO!!!" button and an annotation above clearly indicating users to enter their desired MPG range to filter the data by pressing the button.
        - Navigation Buttons: Each scene features navigation buttons labeled "Scene 1," "Scene 2," and "Scene 3." These buttons are consistently located, signaling to the user that they can navigate between scenes. When hovering over these buttons, they change color (from green to darker green), indicating that clicking them will navigate to another scene.
        - Color Change and Detailed Information on Hover: When the user hovers over data bars in the chart, the bars change color to highlight the selected data. This creates a visual contrast with the unselected data and helps the user focus. Additionally, hovering over the data bars displays a tooltip with more detailed information, indicating that the data can be explored interactively.