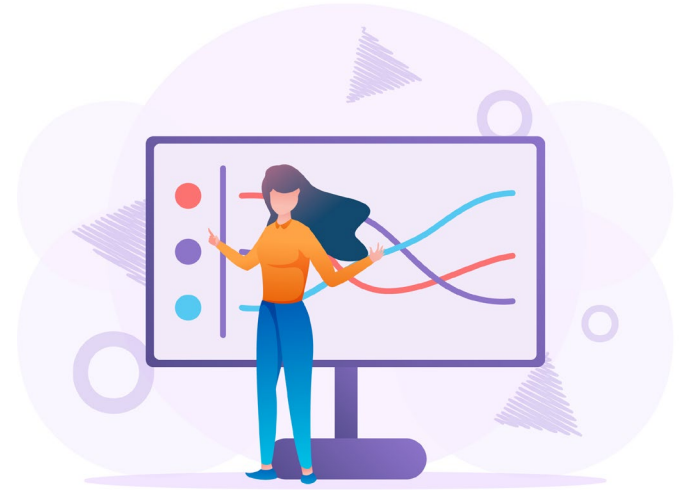
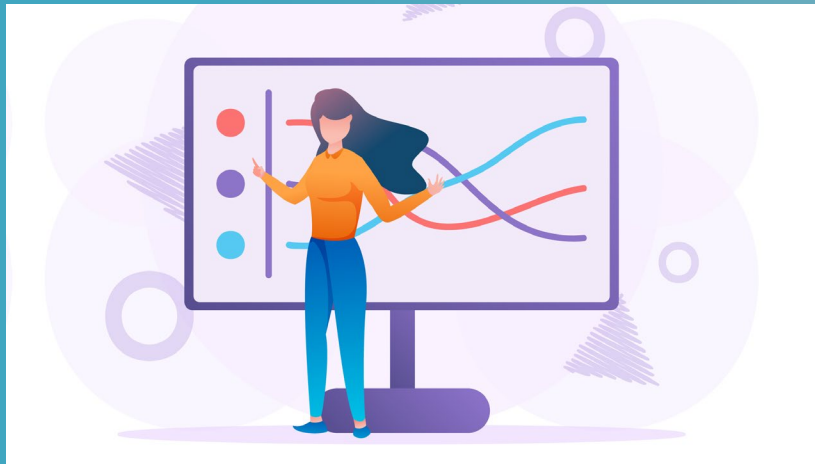


The Art of Data Storytelling

Objectives

1. Explain the Effectiveness of Storytelling in Data Visualization
2. Identify the 3 Key Process Steps to Create an Effective Data Story
3. Describe the Process of Selecting Relevant Data for Analysis
4. Apply Freytag's Arc to Compose a Data Narrative
5. Implement the 7 Principles of Effective Data Visualization





Objective 1

*Explain the Effectiveness of
Storytelling in Data Visualization*

What is Data Storytelling?

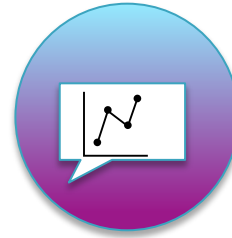
It is the ability to effectively communicate **insights** from a dataset using **narratives** and **visualizations**.

Key Components of Data Storytelling

1. Data: accurate and complete data is the foundation of your data story.
2. Narrative: a written storyline to communicate insights from the data to inspire.
3. Visualizations: visual representations of your data and a narrative to clearly and memorably cause change.



Data



Narrative



Visualization

Storytelling

Psychological Power

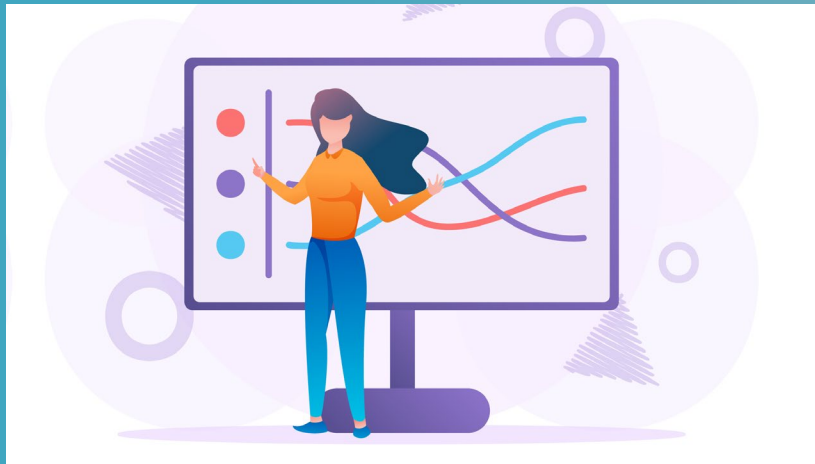
The brain prefers stories over pure data information and needs to determine what's important to process and remember and what can be discarded.

Storytelling engages multiple parts of the brain:

- Wernicke's area, which controls language comprehension
- Amygdala, which processes emotional response
- Mirror neurons, which play a role in empathizing with others
- Hippocampus, converts the story into long-term memory



Storytelling is the most powerful way to put ideas into the world today. —Robert McKee



Objective 2

*Identify the 3 Key Process Steps to
Create an Effective Data Story*

Process to Create Your Data Story



1. Data Foundation

- Identify data source
- Select data to review
- Scrub the data
- Find the story in the data
- Analyze the data using the 2-Step Process:
 1. Exploratory
 2. Explanatory



2. Narrative Data Insights

- Identify central *insight* from data analysis
- Define the audience
- Craft the story using Freytag Arc model



3. Visuals Representing Data & Story

Apply the 7 Principles to create better visuals:

1. Set-up the scene
2. Apply the polish



Asking the Right Questions

The ability to ask the right questions “involves domain knowledge and expertise, coupled with a keen ability to see the problem, see the available data, and match up the two.” (Patil & Mason 2015)

Four-Dimensional Framework to Navigate Numbers

1. Problem
2. Outcome
3. Actions
4. Measures





Find the Story in Your Data

Before Constructing a Data Story Determine:

1. What data matters?
2. What is the data telling you?
3. Analyze the data and find insights.
4. Structure your story.





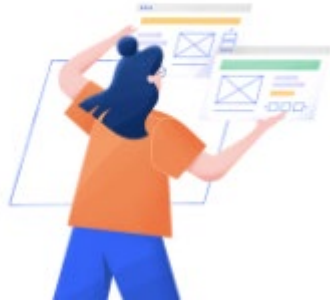
The Analysis Process

Exploration to Explanation

Data Analysis is a two-step procedure:

1. Exploratory: exploratory data visualizations to discover insights.
2. Explanatory: explanatory data visualizations used to tell the story.

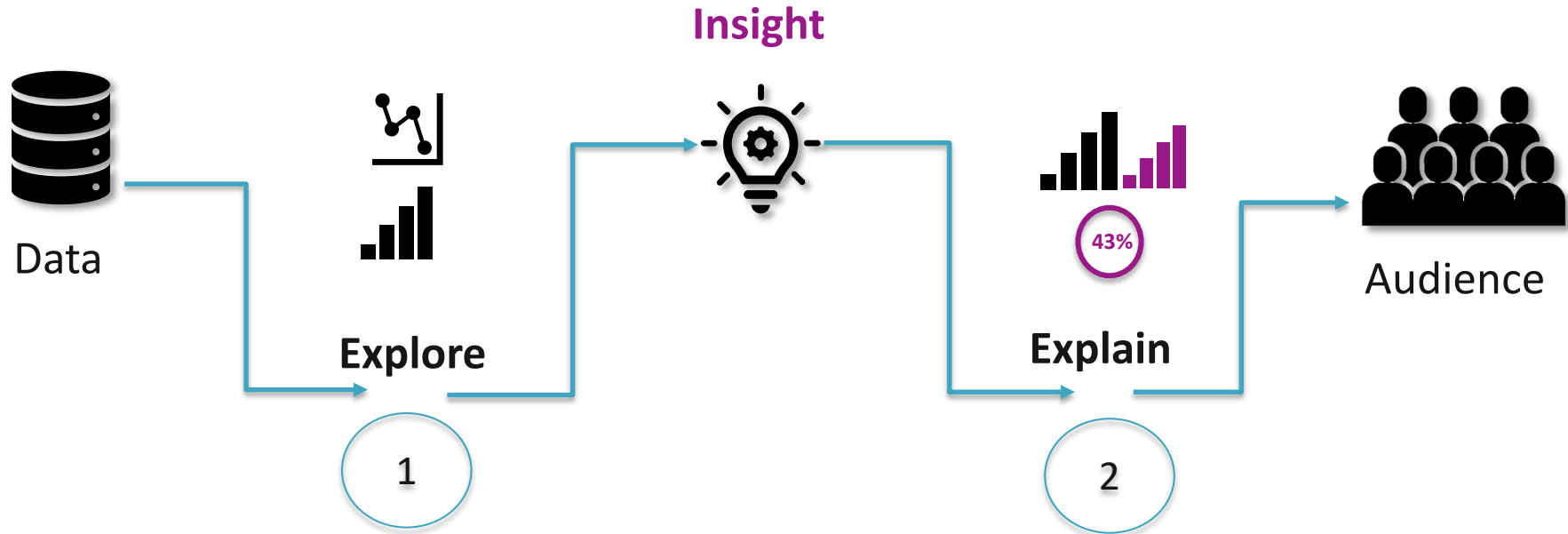
Exploratory Analysis



Explanatory Analysis



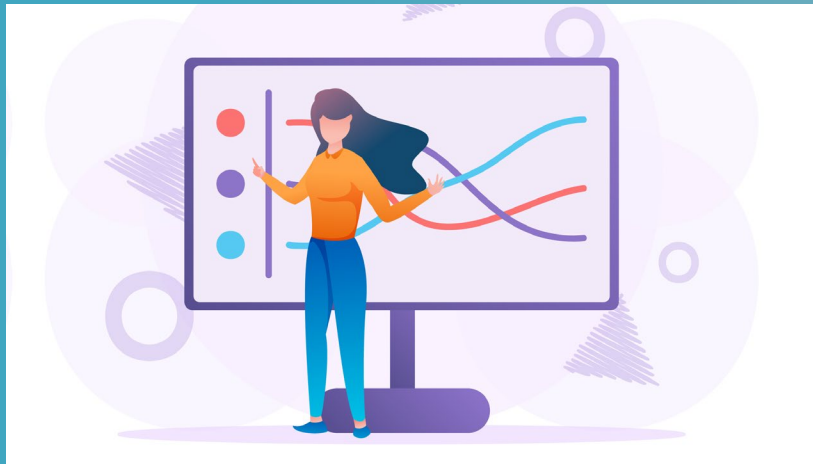
2-Step Process to Develop Data Story





Differences in the 2-Stage Analysis Process

	Exploratory	Explanatory
Goal	Understand	Communicate
Audience	You	Others
Data Familiarity	You, Very Familiar	Others, Less Familiar
Visualization Focus	Flexibility Speed	Simplicity, Clarity, Cohesion
Narrative	Unknown	Known
Outcome	Insight	Action



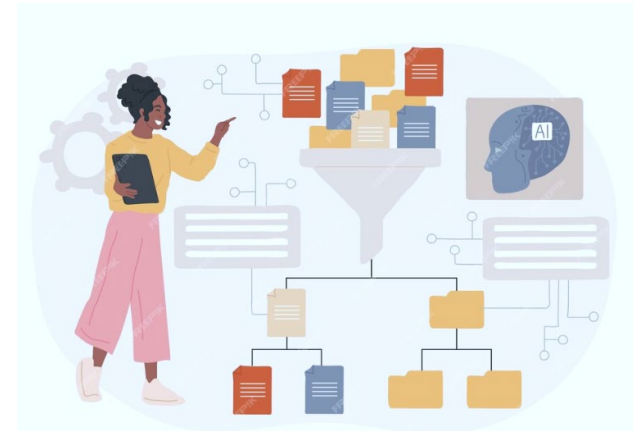
Objective 3

Describe the Process of Selecting Relevant Data for Analysis



Narrow Down the Data

- What data is irrelevant?
- What data is redundant?
- What data is confusing or ambiguous?
- What data is weak or questionable?
- What data is not aligned with your central insight?



Data Attributes Suited for Storytelling





Central Insight-Main Point



Central Insight is the key takeaway or the most important finding that you want your audience to understand and remember.

Key Aspects of Central Insight

- Clarity
- Relevance
- Actionable
- Supported by the Data
- Engaging





Who Is Your Audience?

Knowing your audience is key to effective communication. To create an effective data visualization, it is important to know your audience when selecting the type of visualization and how you decide aspects of design.



Think about:

- *How familiar the audience is with the subject matter of your data?*
- *How much context they already have versus what should supply?*
- *Their familiarity with various methods of data visualization?*



Audience Considerations

Audience attributes can influence how you approach your data story.

1. Key Goals and Priorities
2. Beliefs and Preferences
3. Specific Expectations
4. Topic Familiarity
5. Data Literacy
6. Seniority Level
7. Audience Mix

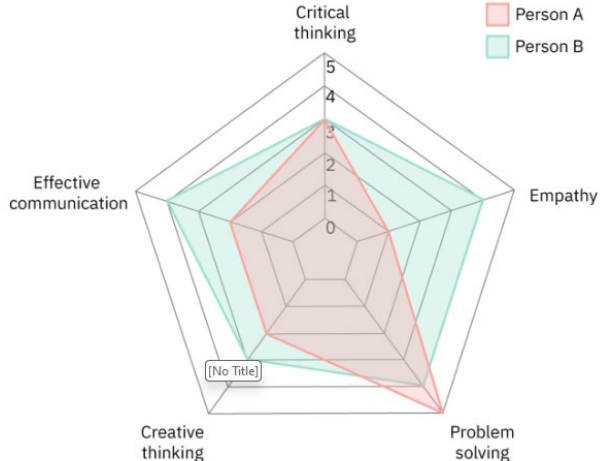




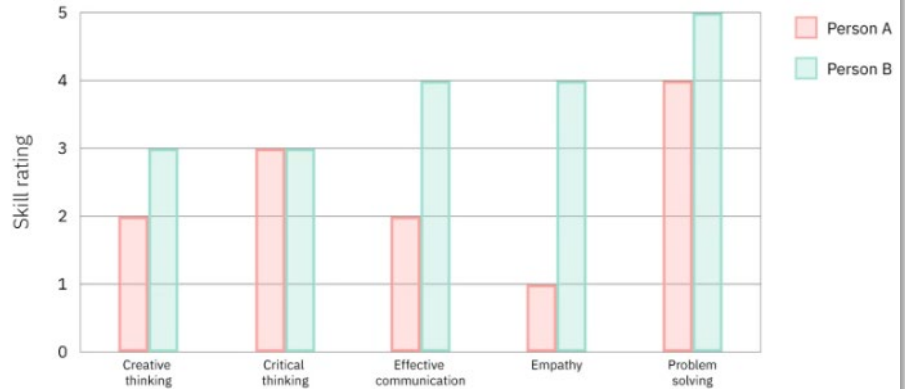
Keep It Simple for Your Audience

Keep in mind that less is more. When selecting a chart type, try to create a data visualization that's as simple as possible while effectively communicating your intended message(s) to your audience.

Skills ratings for two people across five categories



Skills ratings for two people across five categories



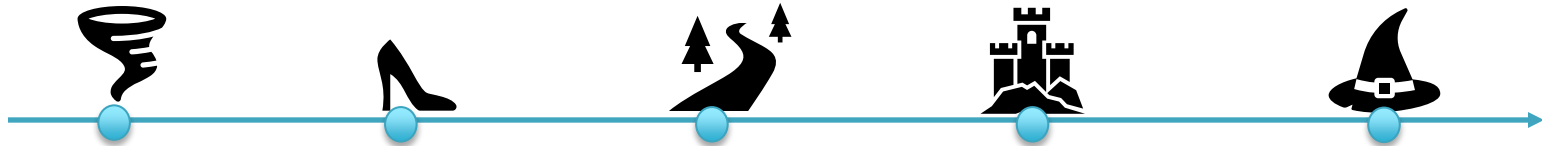


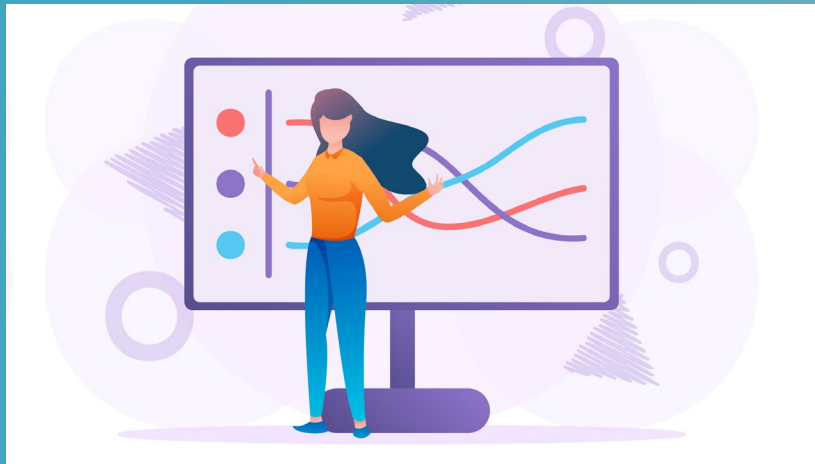
How to Craft a Compelling Data Narrative

Four Primary Story Components:

1. Characters: the stakeholders
2. Setting: set the scene (i.e., recent rise in sepsis cases)
3. Conflict: describe the root issue (i.e., care team not using powerplan)
4. Resolution: purpose your solution or share your success

Linear Storytelling has a beginning, middle, and end





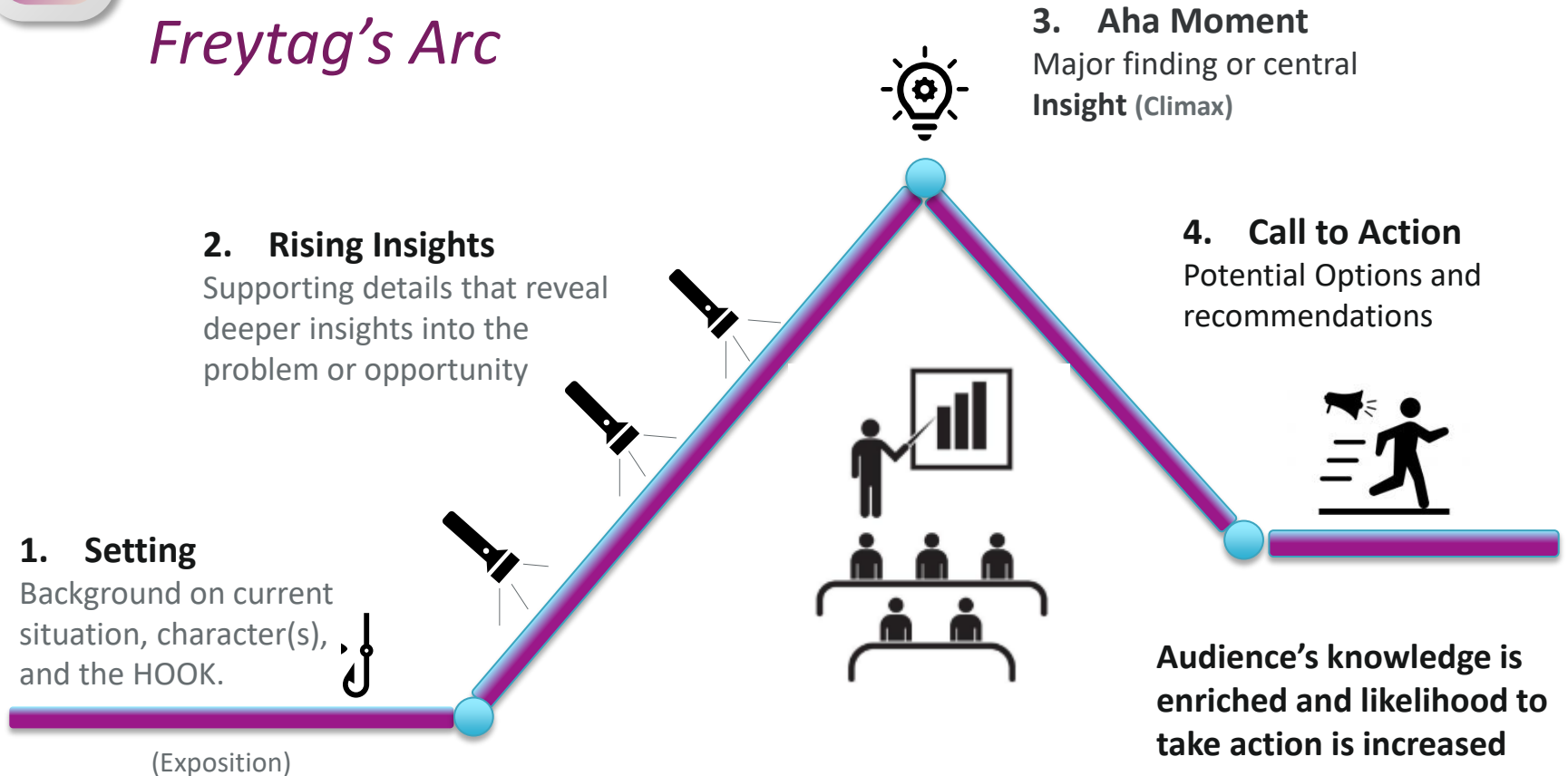
Objective 4

Apply Freytag's Arc to Compose a Data Narrative



Data Storytelling Arc

Freytag's Arc



Identify Your Aha Moment

1. What is your Aha Moment?

1. AHA Insight

\$320K in
Avoidable
Blood Waste

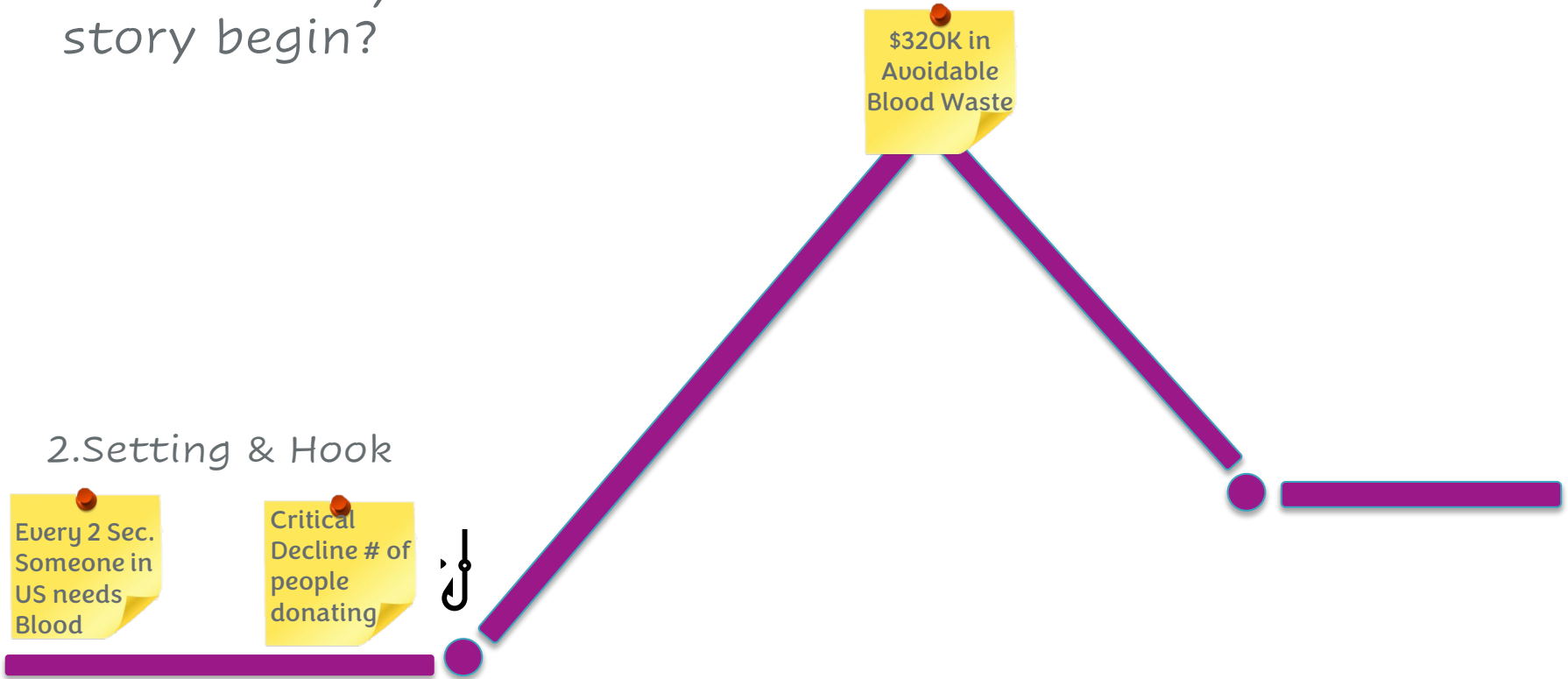


The diagram consists of three thick purple line segments connected by three small purple circles. The first segment is horizontal at the bottom left. The second segment starts from the end of the first, goes diagonally up and to the right. The third segment starts from the end of the second, goes diagonally down and to the right, ending with a horizontal segment. A yellow sticky note with a red pushpin is attached to the top vertex where the second and third segments meet.

Find Your Beginning (Setting and Hook)

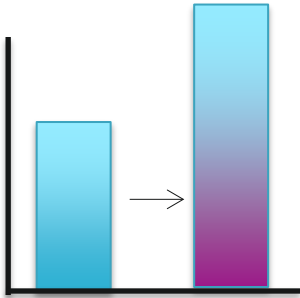
2. Where does your story begin?

1. AHA Insight

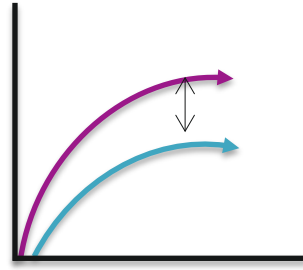




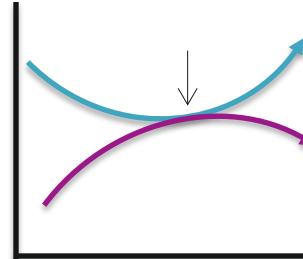
6 Common Types of Story Points



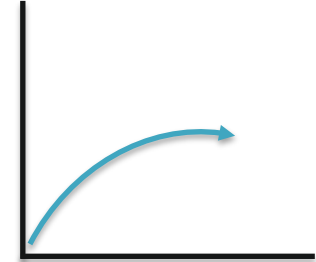
Comparison



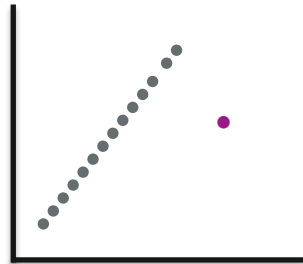
Relationship



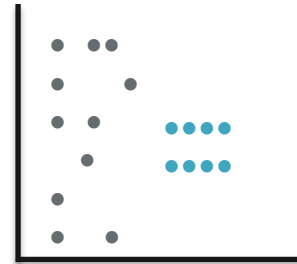
Intersection



Change Over Time



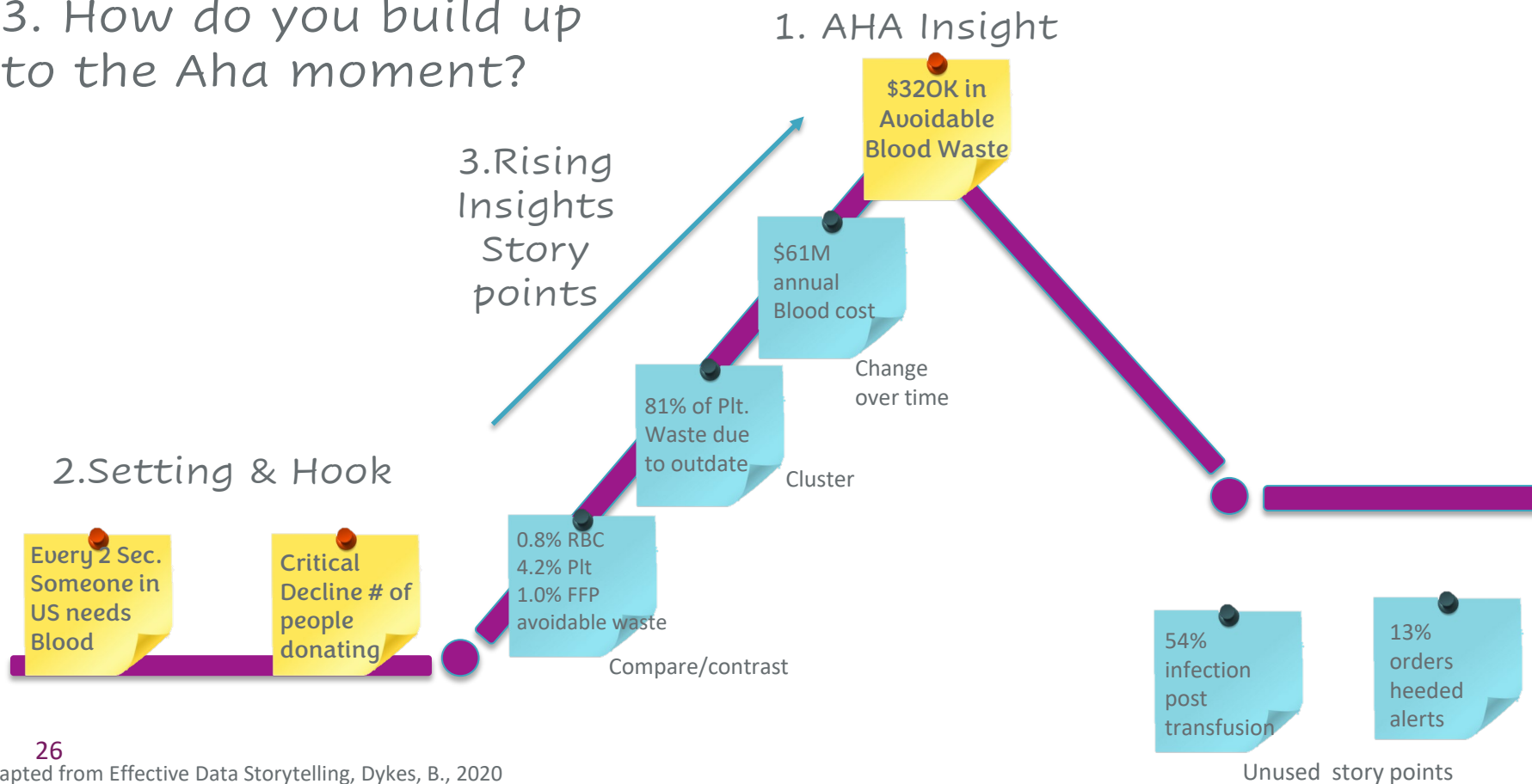
Outlier



Cluster

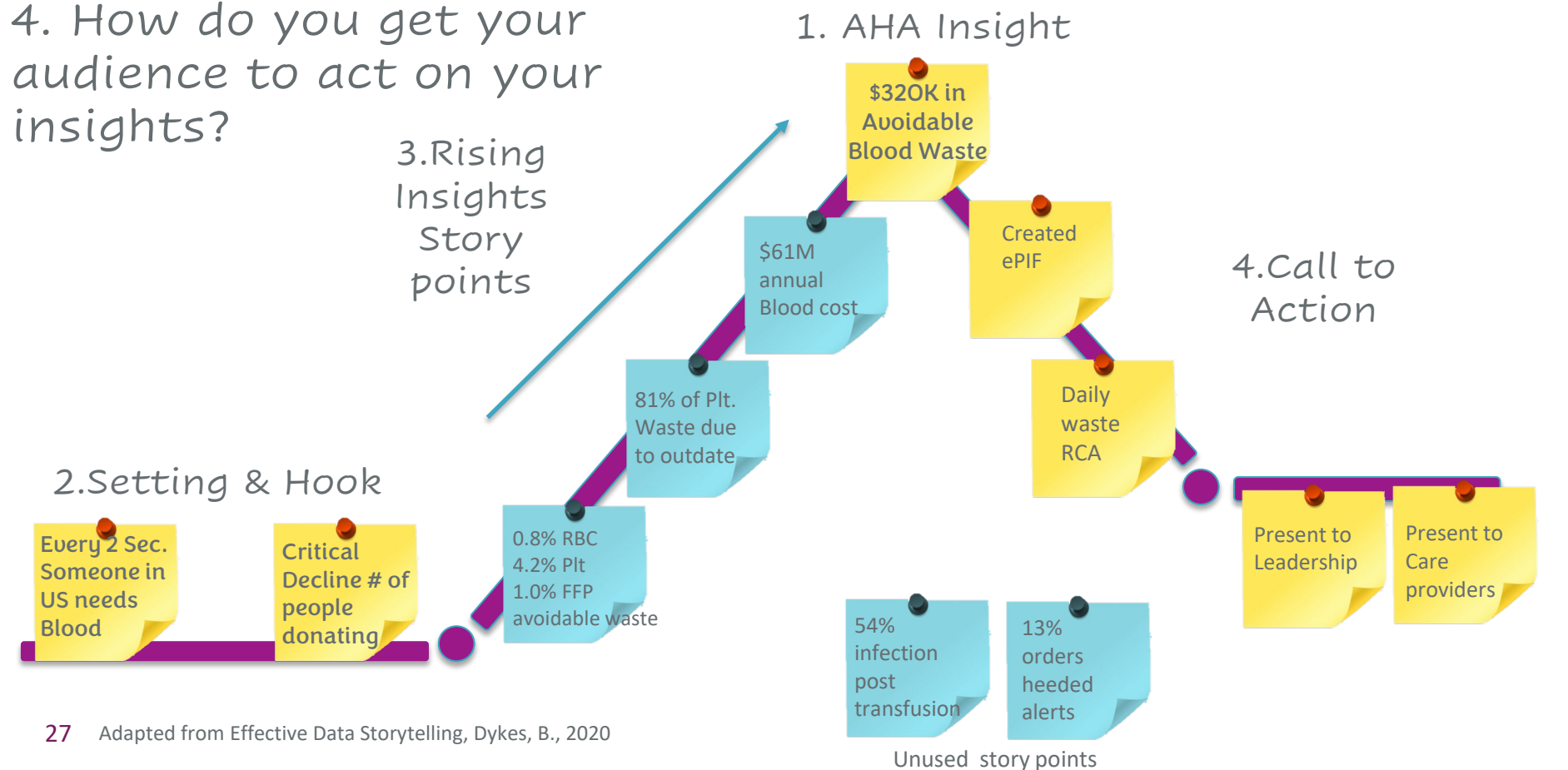
Select Your Rising Insights

3. How do you build up to the Aha moment?



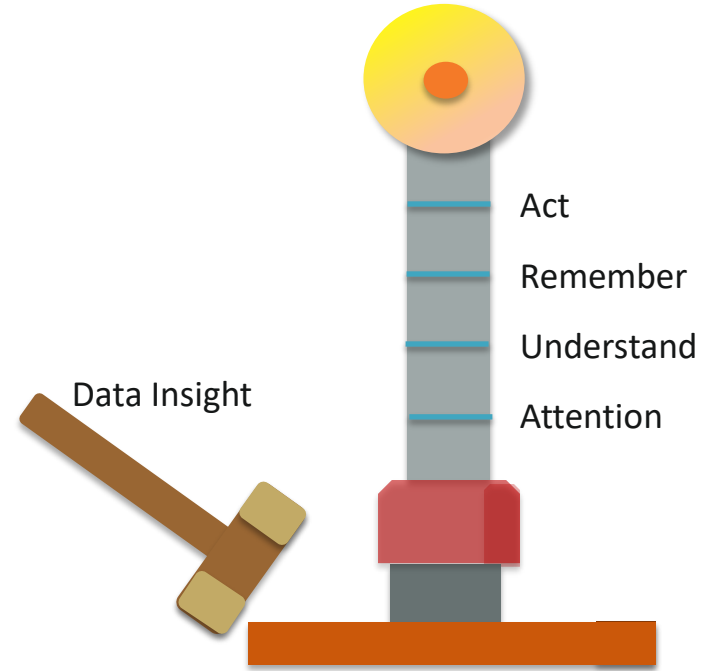
Select Your Rising Insights

4. How do you get your audience to act on your insights?





Summary of the Data Storytelling Arc



The strength of how you communicate the data story insights can be measured by what effect it has on your audience.

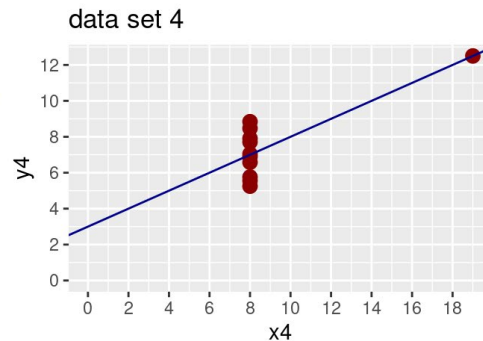
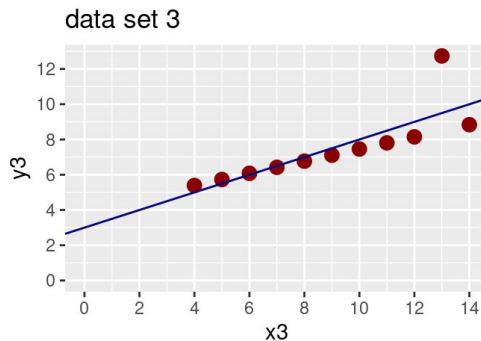
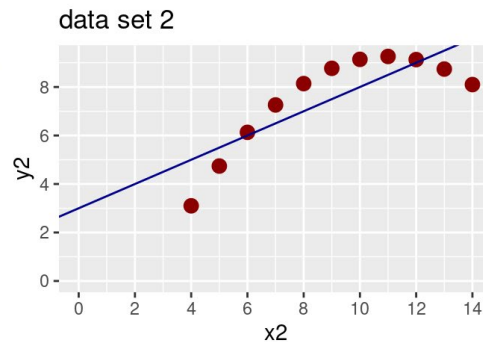
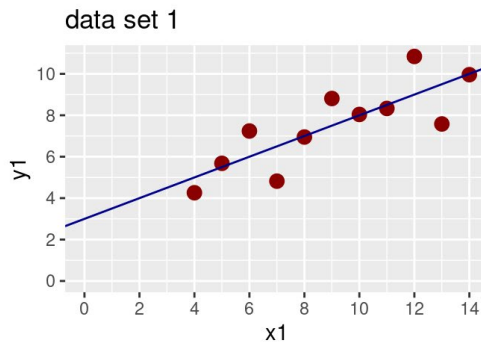


Anscombe's Quartet

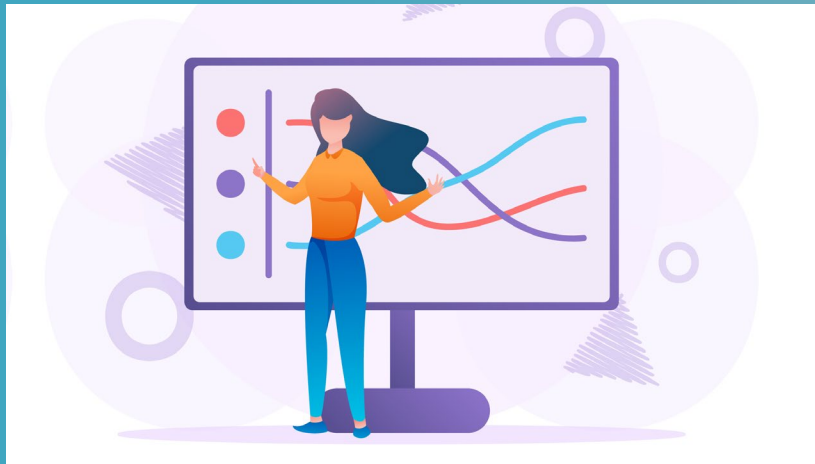
Use raw data or pre-existing dashboards to explore data and generate visualizations to identify ideas and begin crafting your story.

There's more to the numbers!

Francis Anscombe



Anscombe's quartet [Anscombe, F. J. \(1973\). "Graphs in Statistical Analysis". *American Statistician*. 27\(1\): 17–21. doi:10.1080/00031305.1973.10478966. JSTOR 2682899.](#)



Objective 5

Implement the 7 Principles of Effective Data Visualization



7 Principles for Better Visual Storytelling

The Set-Up

1.  Right Data

2.  Right Visualizations

3.  Right Configuration

The Polish

4.  Remove Noise

5.  Focus Attention

6.  Make Approachable

7.  Instill Trust



Setting Up the Scenes of Your Data Story



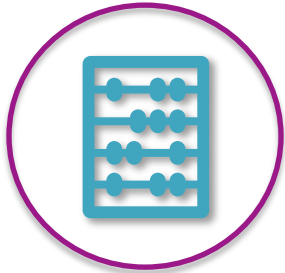
The Set-Up

1.  Right Data
2.  Right Visualizations
3.  Right Configuration

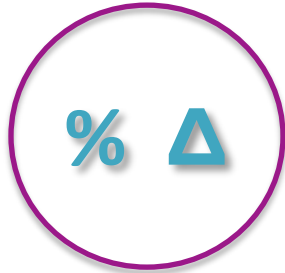


Principle #1: Visualize the Right Data

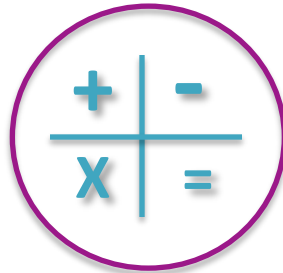
Excellence in statistical graphics consists of complex ideas communicated with clarity, precision, and efficiency. Edward Tufte



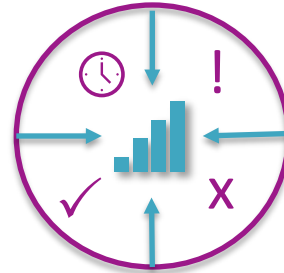
Totals



% Change



Calculated
Metric



Added
Context

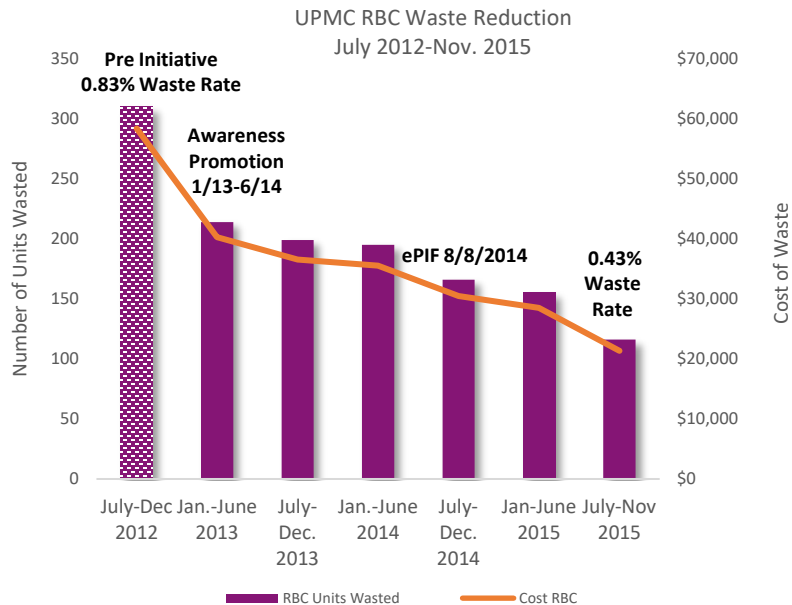


Variation

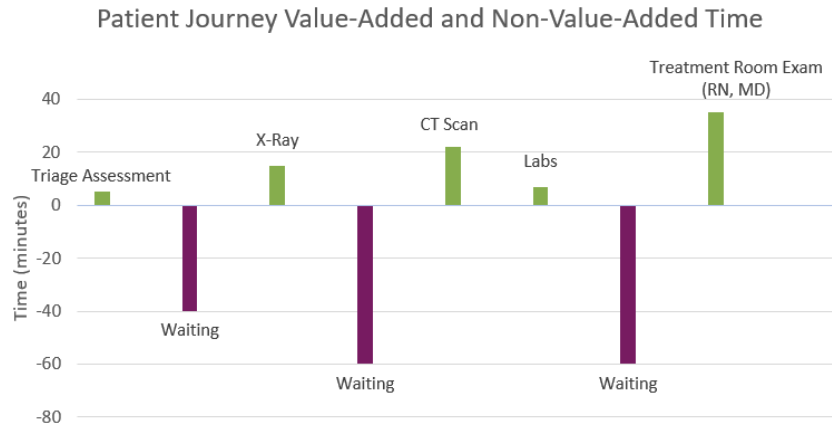


Principle #1 (cont.)

Added Context

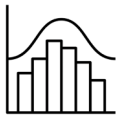
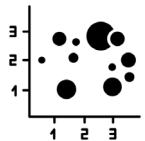


Variance





Principle #2 Choose the Right Visualization

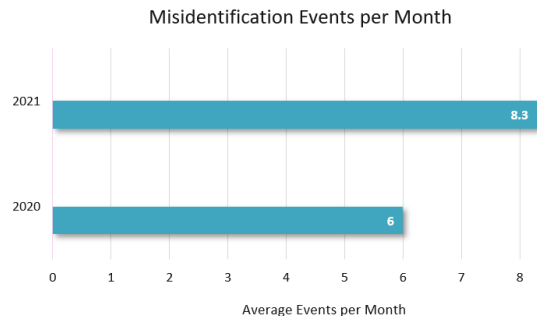
Comparison	Trend	Composition	Relationship	Distribution
Use Display similarities and differences between discrete values.	Use Plot behavior or performance over time.	Use Show relative sizes of parts of a whole.	Use Show relationship between variables to identify outliers, correlation, clusters.	Use Show the frequency in which values are distributed across a range and reveal central tendency.
 Horizontal/ vertical bar graph	 Line graph	 Pie Chart	 Scatterplot	 Histogram
 Dumbbell Graph	 Stacked Area	 Donut Chart	 Bubble Graph	 Box Plot

Insert Chris graph link

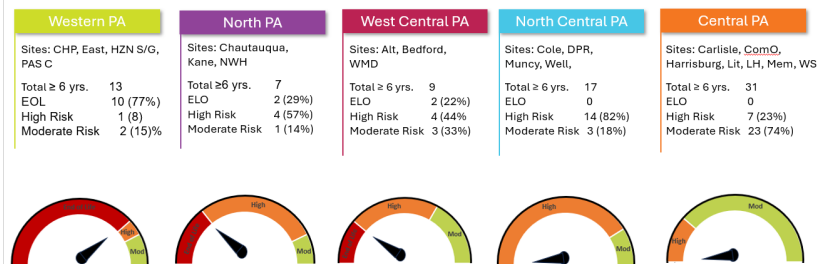


Principle #3 Calibrate the Visuals to the Message

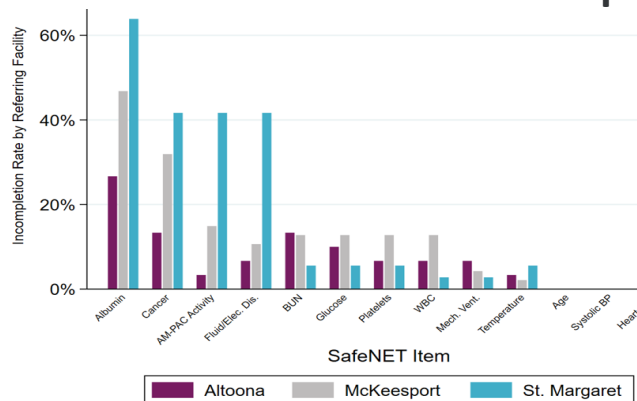
Keep comparisons in close proximity



Provide a common baseline for comparisons



Ensure charts are consistent for comparisons





Polishing the Scenes of Your Data Story



The Polish

4.  Remove Noise

5.  Focus Attention

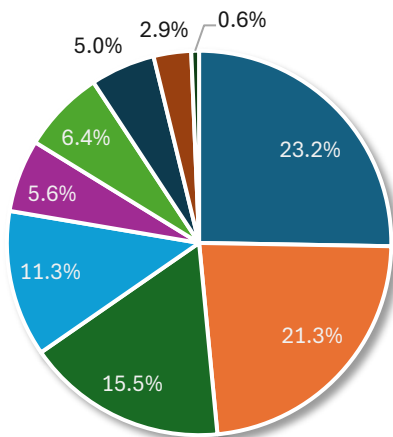
6.  Make Approachable

7.  Instill Trust



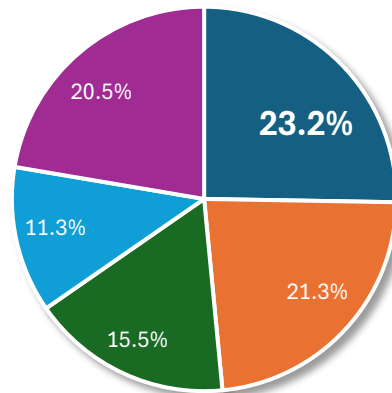
Both Charts Share the Same Flaw

ICU Patient Ventilator Days



- Patient A
- Patient B
- Patient C
- Patient D
- Patient E
- Patient F
- Patient G
- Patient H
- Patient I

ICU Patient Ventilator Days



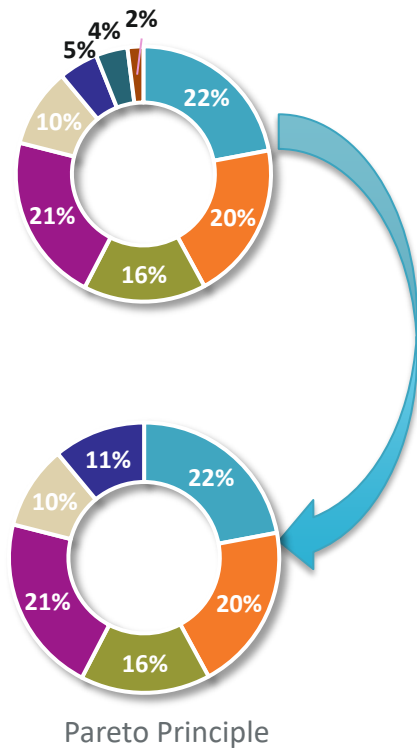
- Patient A
- Patient B
- Patient C
- Patient D
- Other



Principle #4 *Remove Unnecessary Noise*

Keys to Strength Signal to Noise Ratio

- 🔑 Remove surplus data
 - If visualized information is not directly tied to your message remove it.
- 🔑 Aggregate less important data
 - Use the Pareto Principle (80/20)
- 🔑 Use a Panel Chart to separate layers of noise
 - Separate overlapping data

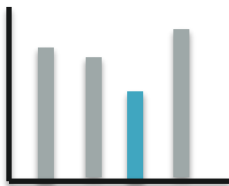




Principle #5 *Focus Attention on What's Important*

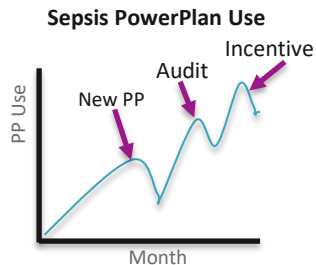
Color Contrast

- Colors encode chart information
- Too many colors can lead to noise
- Use bold colors sparingly



Text

- Text drives attention
- Capitalize titles to reinforce main point
- Annotations guide audience down path



Typography

- Used to highlight essential information
- Font type, size, weight, and color emphasizes text to create noticeable contrast

China has a 35% higher rate

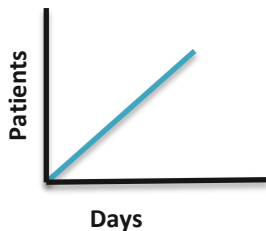




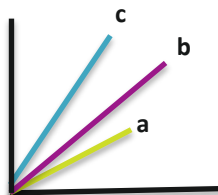
Principle #6 *Make Your Data Approachable and Engaging*

Labeling

Axis Labels

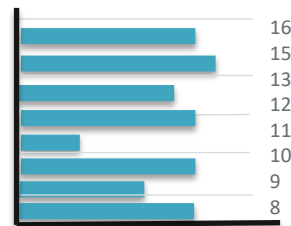


Direct Labeling

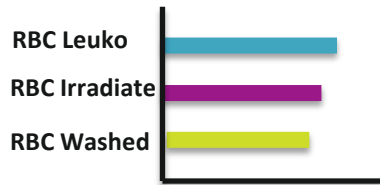


Reference Lines

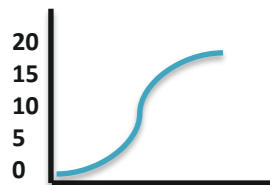
Guidelines



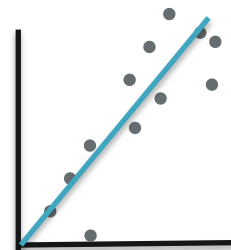
Legible Text



Simple Increments



Trendlines

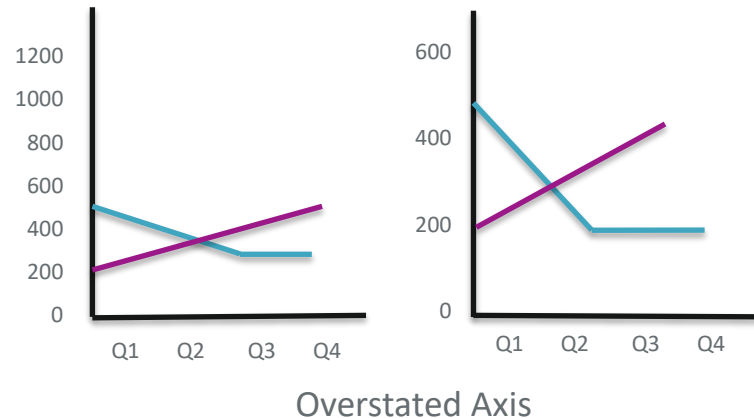




Principle #7 *Instill Trust in Your Numbers*

Potentially Misleading Practices to Avoid

- Overstated axis scale or aspect ratio
- Inconsistent date intervals
- Limited date ranges
- Erroneous proportions
- Missing sources



There are two goals when presenting data: convey your story and establish credibility. Edward Tufte

Summary Process to Create Your Data Story



1. Data Foundation

- Identify data source
- Select data to review
- Find the story in the data
- Navigate the numbers- 4-dimensional framework
- Analyze the data using the 2-Step Process:
 1. Exploratory
 2. Explanatory



2. Narrative Data Insights

- Identify central *insight* from data analysis
- Define the audience
- Craft the story using Freytag Arc model



3. Visuals Representing Data & Story

Apply the 7 Principles to create better visuals:

1. Set-up the scene
2. Apply the polish

References

Dykes, B. (2020). *Effective data storytelling: How to drive change with data, narrative, and visuals*. John Wiley & Sons.

Ahmad, M. (2023, April 27). The art of data storytelling: A key skill for the future. In. <https://www.linkedin.com/pulse/art-data-storytelling-key-skill-future-mustaquim-ahmad/>.

Mattison, R. (2023, March 14). Data storytelling: How to tell a great story with data. ThoughtSpot. <https://www.thoughtspot.com/data-trends/best-practices/data-storytelling>.

Stoy, L. (2024, May 14). Data storytelling: How to make SEO insights resonate with stakeholders. SE Ranking. <https://seranking.com/blog/data-storytelling/>.

Data Camp Team. (2021, December 7). Telling effective data stories with data, narrative, and visuals. <https://www.datacamp.com/blog/telling-effective-data-stories-with-data-narrative-and-visuals>

Data Storytelling Images. <https://www.freepik.com/free-photos-vectors/data-storytelling>

Key Takeaways

- The key Components of Data Storytelling are Data, Narrative, and visualizations.
- The human brain prefers stories over pure data information.
- The Four-Dimensional Framework to Navigate Numbers consists of: Problem, Outcome, Actions, and Measures.
- Central Insight is the key takeaway or the most important finding in your data exploration that you want your audience to understand and remember.
- To create an effective data visualization, it is important to know your audience when selecting the type of visualization and how you decide aspects of design.
- The Four Primary Story Components are: Characters: the stakeholders, Setting: set the scene, Conflict: describe the root issue, Resolution: purpose your solution or share your success.