Data Visualization
Storytelling, Tips, and Tricks

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Stories

Humans remember stories
Common Visualization Tools
Visualizations can be static and dynamic

- Microsoft Office Suite
  - Excel
  - PowerPoint
- Google Suite
  - Sheets
  - Slides
- Canva
- QGIS
- ArcGIS
Gartner Magic Quadrant
What is Data Storytelling?
Data Storytelling

Presenting data

In a contextual narrative

To a targeted audience
Data is the **what**. Stories are the **why** and **how**.
Data Storytelling

Visuals

Data

Narrative

Context
Understanding your data

• Prior to doing any storytelling or analysis, it is critical to understand your data and its limitations
  • How was the information collected?
  • What is the source?
  • What is missing from the data?
Data Storytelling

Visuals

Data

Narrative

Context
Context

- Where are you giving the presentation and what is the purpose?
- What do you want the audience to learn from the presentation?
- What’s in it for me?
  - Think about the decision maker, their motivations and their decision environment.
Data Storytelling

- Visuals
- Data
- Narrative
- Context
## Storytelling elements

<table>
<thead>
<tr>
<th>Theme/ Purpose (Why)</th>
<th>What is the story about?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting (Where and When)</td>
<td>Time and location</td>
</tr>
<tr>
<td>Characters (Who)</td>
<td>Protagonist - central character with clear goal or conflict</td>
</tr>
<tr>
<td></td>
<td>Antagonist – opposition or conflict. Can be a person, place or thing</td>
</tr>
<tr>
<td>Plot (How)</td>
<td>Sequence of events</td>
</tr>
<tr>
<td>Conflict (What)</td>
<td>What needs to be overcome?</td>
</tr>
<tr>
<td></td>
<td>What is at stake and why does it matter?</td>
</tr>
</tbody>
</table>
Story Arc

Present the situation

Decision Point

Something happens, that needs to have immediate action

The problem has a solution

The new normal, or status quo can begin again
Data Story Arc

What is the problem?

What needs to change?

The problem has a measurable solution

Decision Point

The new normal, or status quo can begin again
Case Study - ERET

HB 1013 included a provision for the state to study how people with mental health crisis are transported to and from ERETs.

Question: Who is doing the most transports?
ERETs Story Arc

What is the problem?

How are people in mental health crisis being transported to ERETs?

Perceived uneven burden

What needs to change?

The problem has a measurable solution

Number of transports by type

The new normal, or status quo can begin again
Data Storytelling

- Visuals
- Data
- Narrative
- Context
Focused visualizations

• Complex visuals will confuse the audience and distract them from the point of the presentation

• Remove clutter, like unnecessary text and labels
### Method of transport to ERETs

<table>
<thead>
<tr>
<th>Transportation Method</th>
<th>Frequency</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulance</td>
<td>2,174</td>
<td>32.3%</td>
</tr>
<tr>
<td>Family/Friend</td>
<td>1,859</td>
<td>27.6%</td>
</tr>
<tr>
<td>Non-Emergency Medical Transport</td>
<td>602</td>
<td>8.9%</td>
</tr>
<tr>
<td>Sheriff</td>
<td>585</td>
<td>8.7%</td>
</tr>
<tr>
<td>Police</td>
<td>522</td>
<td>7.8%</td>
</tr>
<tr>
<td>Self Transport</td>
<td>508</td>
<td>7.5%</td>
</tr>
<tr>
<td>Agency-Owned Vehicle</td>
<td>323</td>
<td>4.8%</td>
</tr>
<tr>
<td>Internal Facility Transfer</td>
<td>45</td>
<td>0.7%</td>
</tr>
<tr>
<td>Other Institution-Owned Vehicle</td>
<td>45</td>
<td>0.7%</td>
</tr>
<tr>
<td>Co-Responder Unit</td>
<td>28</td>
<td>0.4%</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>26</td>
<td>0.4%</td>
</tr>
<tr>
<td>Taxi/Uber</td>
<td>13</td>
<td>0.2%</td>
</tr>
</tbody>
</table>
Method of Transport to ERETs

- Ambulance: 32.3%
- Family/Friend: 7.5%
- Non-Emergency Medical Transport: 7.8%
- Sheriff: 8.7%
- Police: 8.9%
- Self Transport: 4.8%
- Agency-Owned Vehicle: 0.5%
- Internal Facility Transfer: 0.4%
- Other Institution-Owned Vehicle: 0.2%
- Co-Responder Unit: 0.4%
- Public Transportation: 0.4%
- Taxi/Uber: 0.7%
- Other: 0.7%
Method of Transport to ERETs

- Ambulance: 32.3%
- Family/Friend: 27.6%
- Non-Emergency Medical Transport: 8.9%
- Sheriff: 8.7%
- Police: 7.8%
- Self Transport: 7.5%
- Agency-Owned Vehicle: 4.8%
- Internal Facility Transfer: 0.7%
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- Co-Responder Unit: 0.4%
- Public Transportation: 0.4%
- Taxi/Uber: 0.2%
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In 2022, 59.9% of transports to ERETs were through Ambulance and Family/Friend.

<table>
<thead>
<tr>
<th>Transportation Type</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Ambulance</td>
<td>32.3%</td>
</tr>
<tr>
<td>Family/Friend</td>
<td>27.6%</td>
</tr>
<tr>
<td>Sheriff/Police</td>
<td>16.5%</td>
</tr>
<tr>
<td>Non-Emergency Medical Transport</td>
<td>8.9%</td>
</tr>
<tr>
<td>Self Transport</td>
<td>7.5%</td>
</tr>
<tr>
<td>Agency-Owned Vehicle</td>
<td>4.8%</td>
</tr>
<tr>
<td>Other</td>
<td>2.4%</td>
</tr>
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</table>

Note: “Other” includes taxi/uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
In 2022, **Ambulance** was the most used method of transport to ERETs.

- **Ambulance**: 32.3%
- **Family/Friend**: 27.6%
- **Sheriff/ Police**: 16.5%
- **Non-Emergency Medical Transport**: 8.9%
- **Self Transport**: 7.5%
- **Agency-Owned Vehicle**: 4.8%
- **Other**: 2.4%

Note: “Other” includes taxi/uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
In 2022, Sheriff and Police completed the third-most transports to ERETs.

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Note: “Other” includes taxi/uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
Icon Array

Ambulance  32%
Family/Friend  28%
Sherriff/Police  17%
Non-Emergency Medical Transport  9%
Self-Transport  7%
Agency-Owned Vehicle  5%
Other  2%

Note: “Other” includes taxi/uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
Icon Array

Ambulance 32%
Family/Friend 28%
Sherriff/ Police 17%
Non-Emergency Medical Transport 9%
Self-Transport 7%
Agency-Owned Vehicle 5%
Other 2%

Note: “Other” includes taxi/uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
In 2022, transports by **Ambulances** made up **32%** of all transports to ERETs.
Membership Growth
Total membership grew by 308 from 2016-2023
Learning Recap
Data Storytelling

- Visuals
- Data
- Narrative
- Context
How can you apply the elements of Data Storytelling to a current project?
Chart-making tips
How many 7 do you see below?

8 5 7 4 9 3 2 5 1 4 7 9 6 5 6 5 1 4
2 3 2 5 8 4 1 3 5 6 7 4 6 9 2 5 8 7
4 1 2 3 6 5 8 9 7 5 6 3 2 1 4 5 8 9
6 2 3 4 8 5 6 9 3 2 1 7 8 9 6 5 7 2
3 8 4 6 8 4 9 7
How many 7 do you see below?

8 5 7 4 9 3 2 5 1 4 7 9 6 5 6 5 1
4 2 3 2 5 8 4 1 3 5 6 7 4 6 9 2 5 8
7 4 1 2 3 6 5 8 9 7 5 6 3 2 1 4 5 8
9 6 2 3 4 8 5 6 9 3 2 1 7 8 9 6 5 7
2 3 8 4 6 8 4 9 7
Pre-attentive processing

1. Height
2. Angle
3. Area
4. Length
Psychology of Color

• Color can have cultural influence
  • White: purity and mourning

• Color can have societal connotations
  • Red = bad
  • Green = good

• Be aware of implicit correlations with color combinations
  • Pink and Blue
  • Red and Black
  • Red and Blue
Using Color

• Be consistent in the usage

• Use color to bring attention to parts of the visualization

• Depending on what the visualization is showing using different palates
  • Sequential
  • Divergent
  • Categorical
Sequential Color Pallets

Use when showing intensity

Source: U. S. Census Bureau

Towardsdatascience.com
Divergent Color Pallets

Use when showing data of opposing directions

Source: U. S. Census Bureau
Categorical Color Pallets

Use for ordinal data

Source: ESRI

Towardsdatascience.com
Accessibility

• Check colors for colorblind readability
  • Test color combinations using ColorBrewer or ColourCode
  • Use WebAIM to check color contrasts

• Add Alt-text to visualizations to aid screen readers

• Check that visualizations are still readable when printed in black and white
Choosing the right chart

- What is the story?
- Who is the audience?
- How large is the data set?
- How does the data relate?
Bar/ Column

When to use:

• Comparing data between groups or over time

Tips:

• Don’t overload on categories
• Always use horizontal labels
Bar/ Column variations

**Grouped**
When to use:
- Focus is on comparisons of the subgroups

**Stacked**
When to use:
- To show part-to-whole relationships

**Histogram**
When to use:
- To show frequency distribution
Line

When to use:

• To show trends over time

Tips:

• Works well with large data sets
• Use color to highlight when multiple lines are used
Line Variations

Area

When to use:

• Show the volume in addition to change over time

Slope

When to use:

• Illustrate change between two points
Pie/ doughnut

When to use:

• Showing parts of a whole
• Smaller datasets

Tips:

• 3–5 slices max
• Organize slices by size
Scatter

When to use:

• To show correlation and clusters in large data sets

• To highlight outliers

Tips:

• Trendlines can be helpful additions

• Beware causation and correlation inferences here
No chart

When to use:

• When a chart is more complex than the purpose

Tips:

• Not charting can be very effective

• Use larger fonts and color to highlight the text
General tips

• 3 Second Rule
  • Chart should be interpretable in 3 seconds or less
• Pay attention to the scale of the axis
• All labels should be clear
• Text should always be horizontal
Learning Recap Chart Choosing

- Use color deliberately and consistently
- All visuals support the story
- Select the correct chart for the data
1) What is your go-to chart?

2) What new chart might you use in the future?
Additional Resources:

https://www.youtube.com/c/JonSchwabish
Tutorials, design ideas, chart critiques by Jon Schwabish of the Urban Institute.
Also see - https://policyviz.com/

https://stephanieevergreen.com/how-to/
A selection of charts leading to Stephanie Evergreen’s blog posts about when to use them and how to make them in excel.

http://mkweb.bcgsc.ca/colorblind/
A detailed source of information about colorblindness, including palettes.

https://www.datavisualizationsociety.org/resources
The Data Visualization Society maintains a comprehensive list of resources in a google spreadsheet

https://flowingdata.com/chart-types/
Flowing Data provides a helpful chart selection guide