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Data Visualization
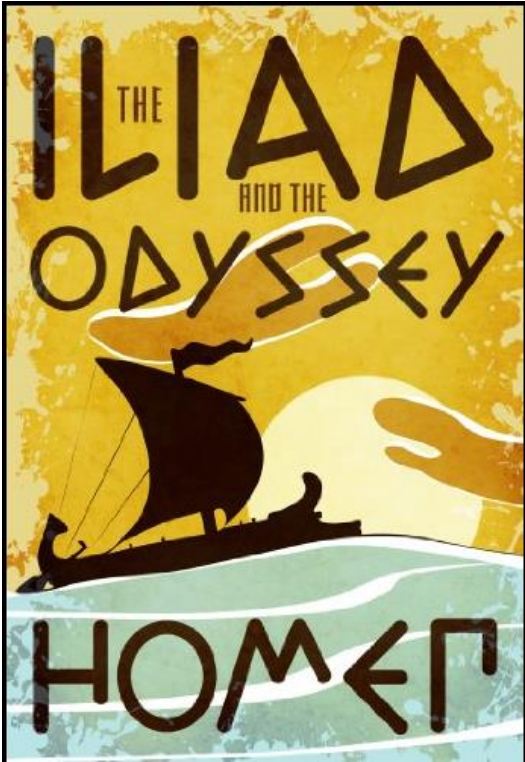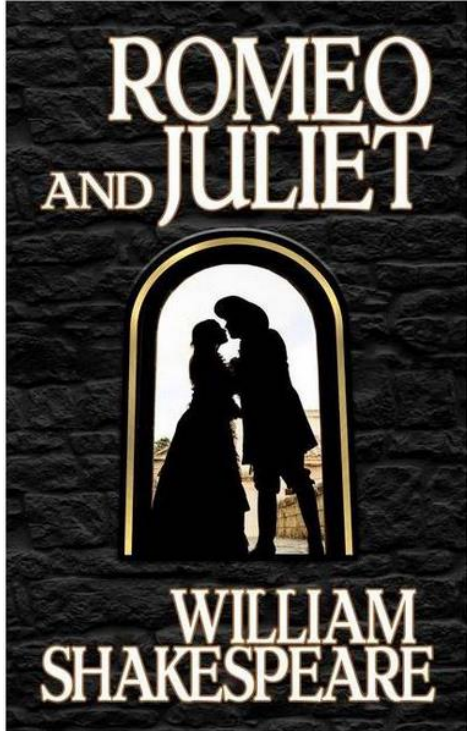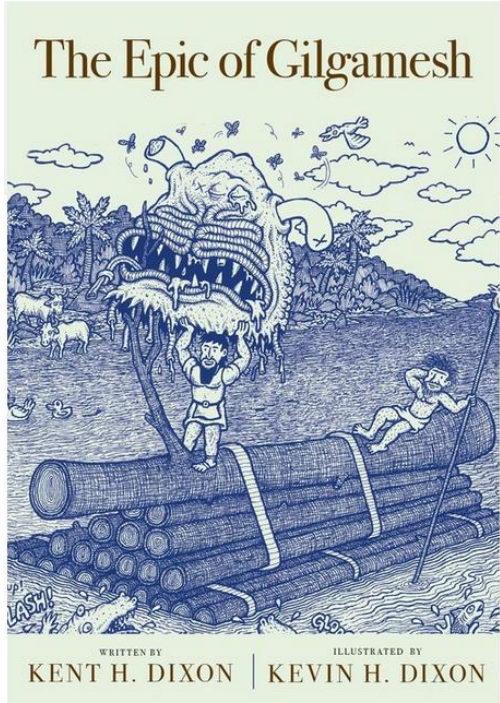## Storytelling, Tips, and Tricks

Anna Wrigley Miller, Public Service Faculty

Stories

Humans remember stories

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The Epic of Gilgamesh

WRITTEN BY KENT H. DIXON | ILLUSTRATED BY KEVIN H. DIXON

ROMEO AND JULIET

WILLIAM SHAKESPEARE

STAR WARS

THE ILIAD AND THE ODYSSEY

HOMER

Common Visualization Tools

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Visualizations can be static and dynamic

- Microsoft Office Suite
  - Excel
  - PowerPoint

- Google Suite
  - Sheets
  - Slides

- Canva

- QGIS

- ArcGIS

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Gartner Magic Quadrant

What is Data Storytelling?

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Data Storytelling

Presenting data

In a contextual narrative

To a targeted audience

Data is the **what**. Stories are the **why** and **how**.

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Data Storytelling

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Data Storytelling

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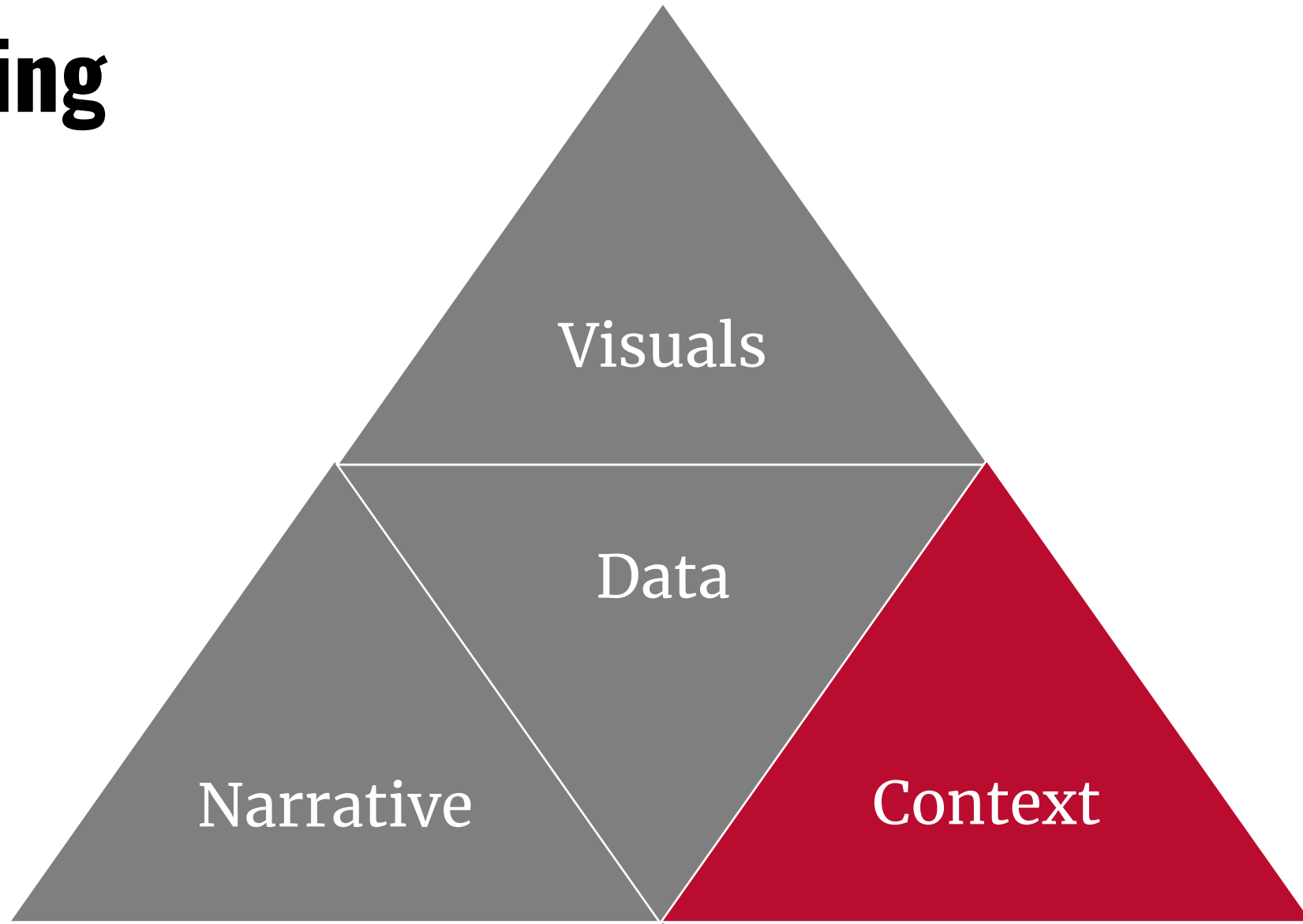UNIVERSITY OF GEORGIA
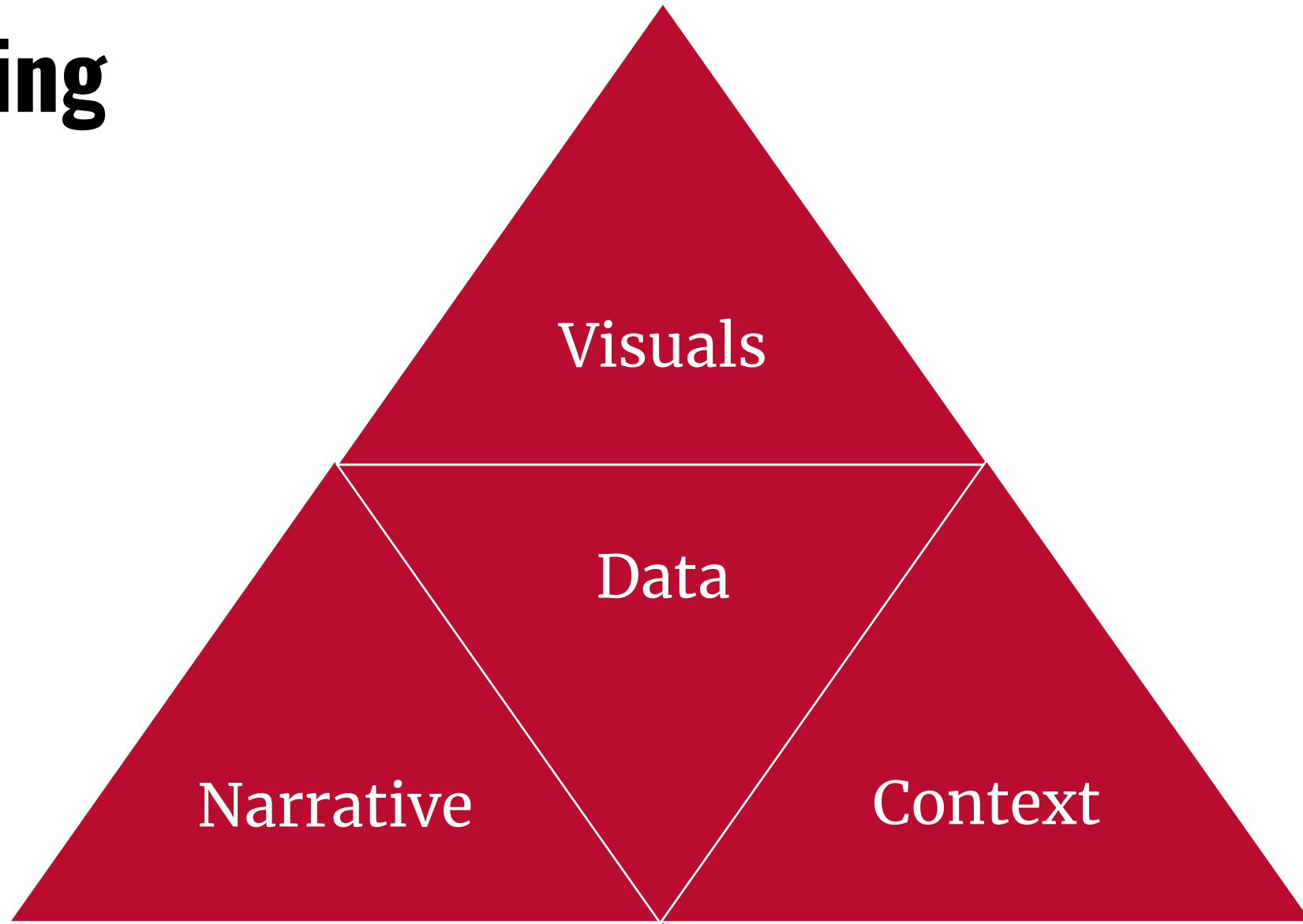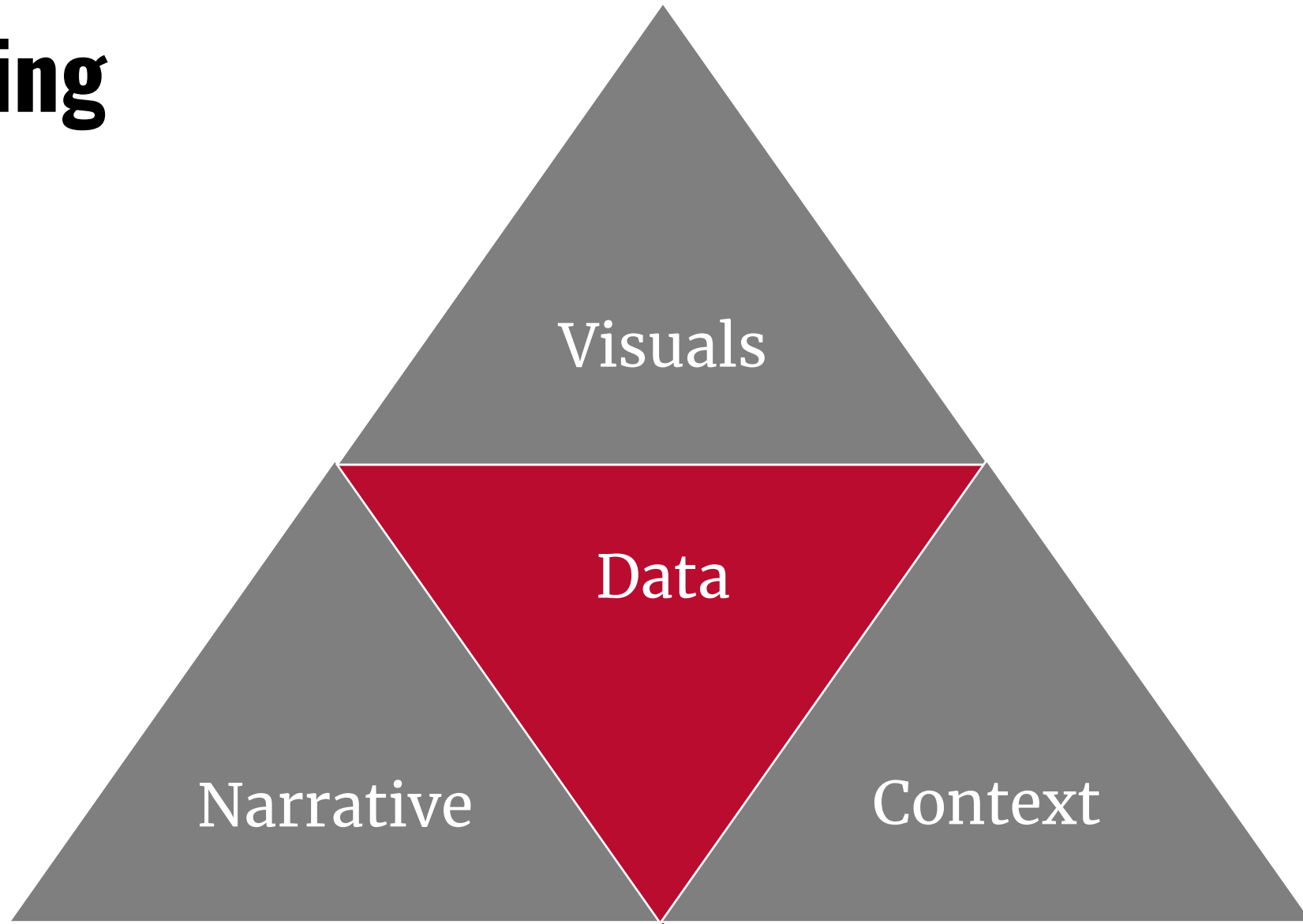
Understanding your data

- 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?

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Data Storytelling

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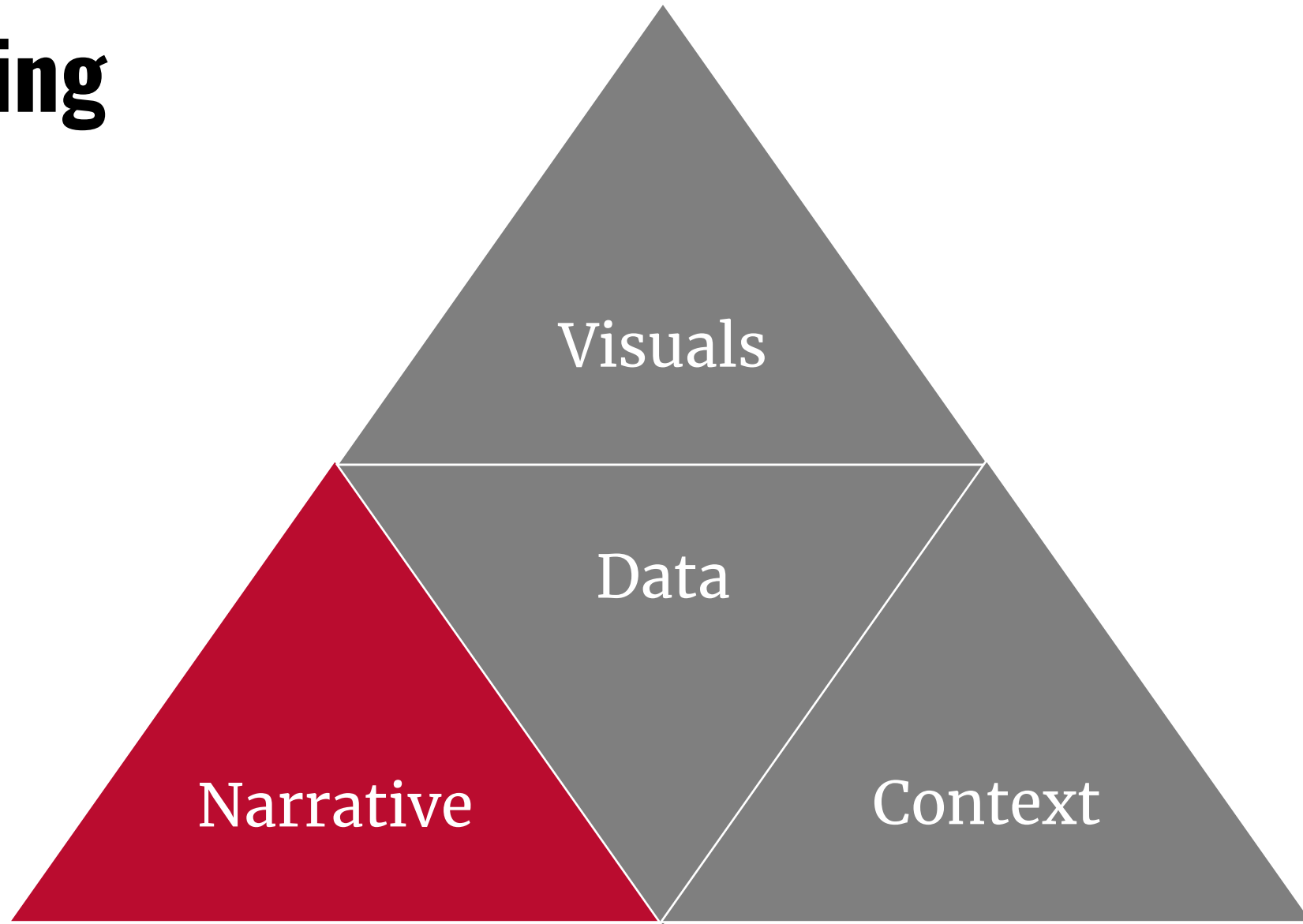*Carl Vinson Institute of Government*
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Context

- 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**.

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Data Storytelling

Storytelling elements

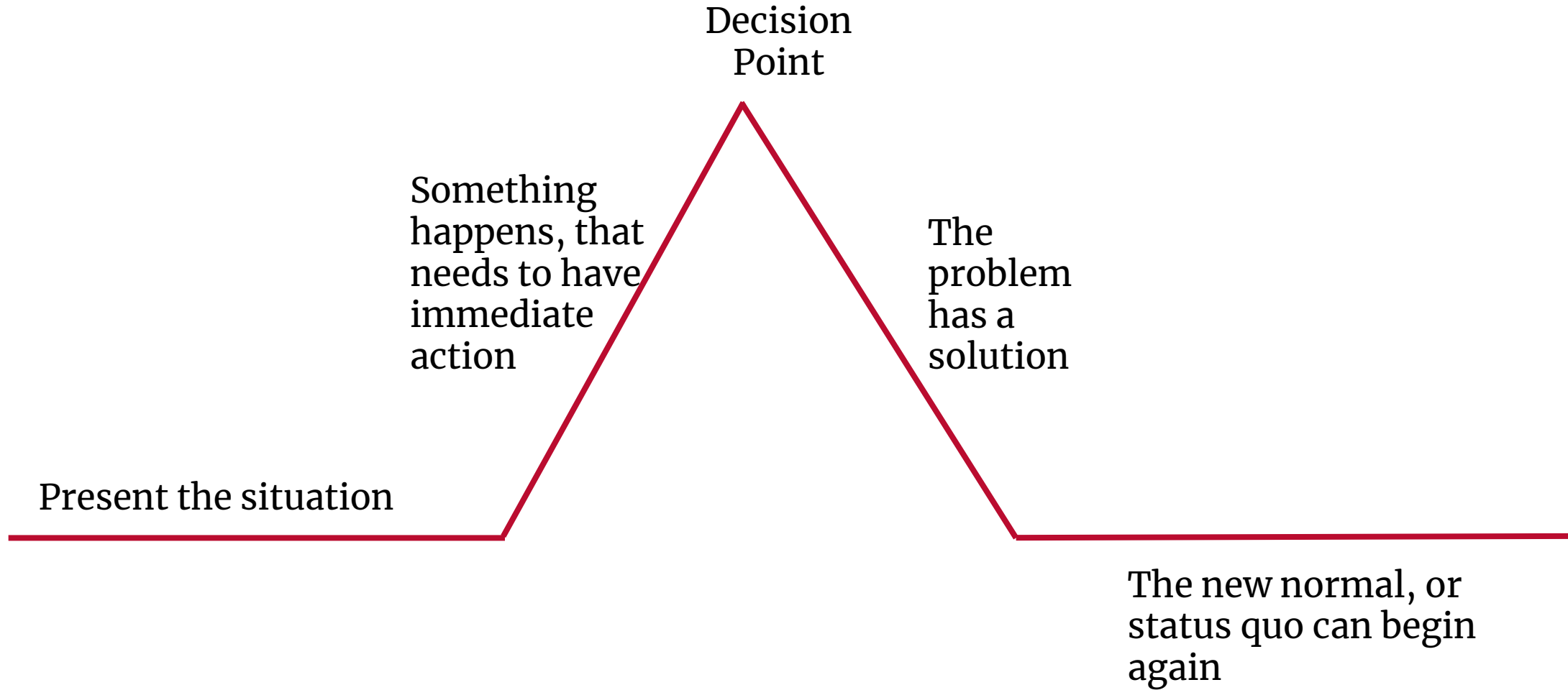|	
Theme/ Purpose (Why)	What is the story about?
Setting (Where and When)	Time and location
Characters (Who)	Protagonist- central character with clear goal or conflict
	Antagonist – opposition or conflict. Can be a person, place or thing
Plot (How)	Sequence of events
Conflict (What)	What needs to be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

Story Arc

Decision
Point

Something
happens, that
needs to have
immediate
action

The
problem
has a
solution

Present the situation

The new normal, or
status quo can begin
again

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Data Story Arc

Decision Point

What needs to change?

The problem has a measurable solution

What is the problem?

The new normal, or status quo can begin again

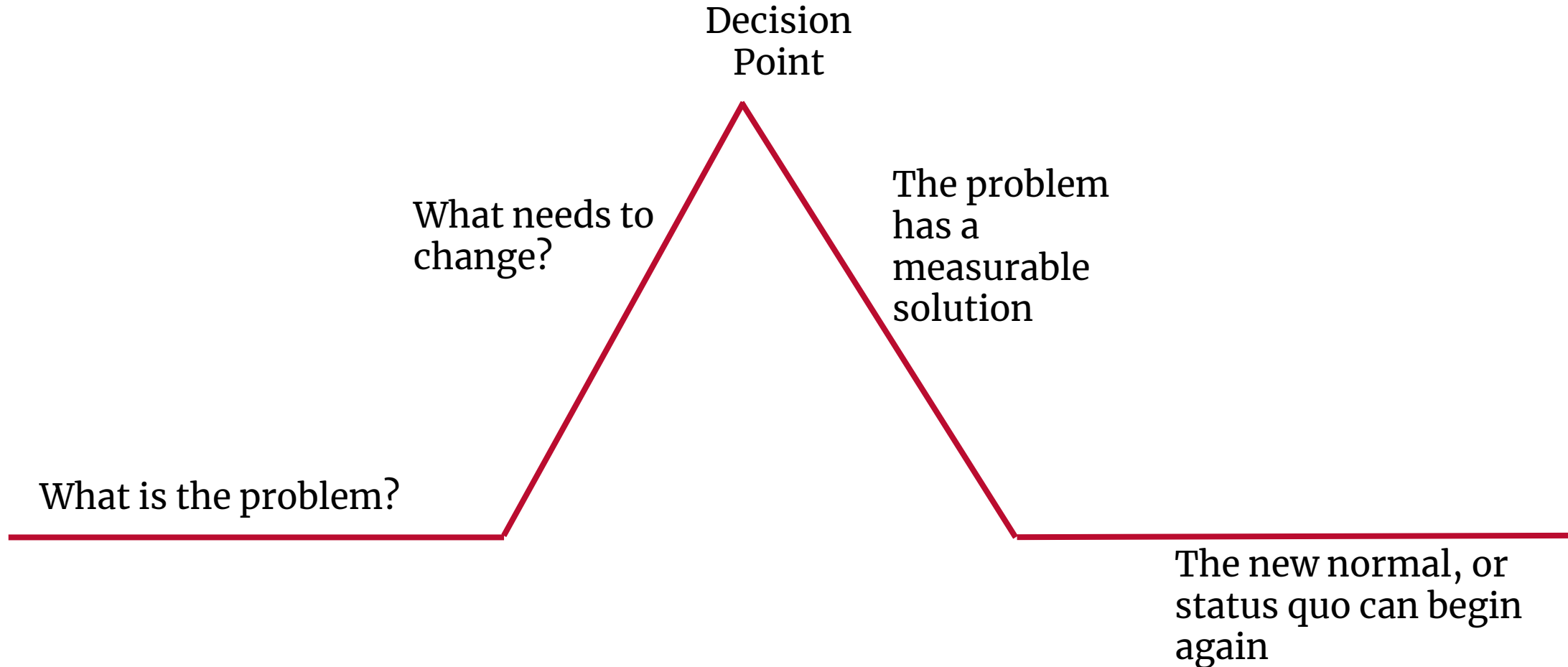**Georgia Data Innovation Hub**
Carl Vinson Institute of Government
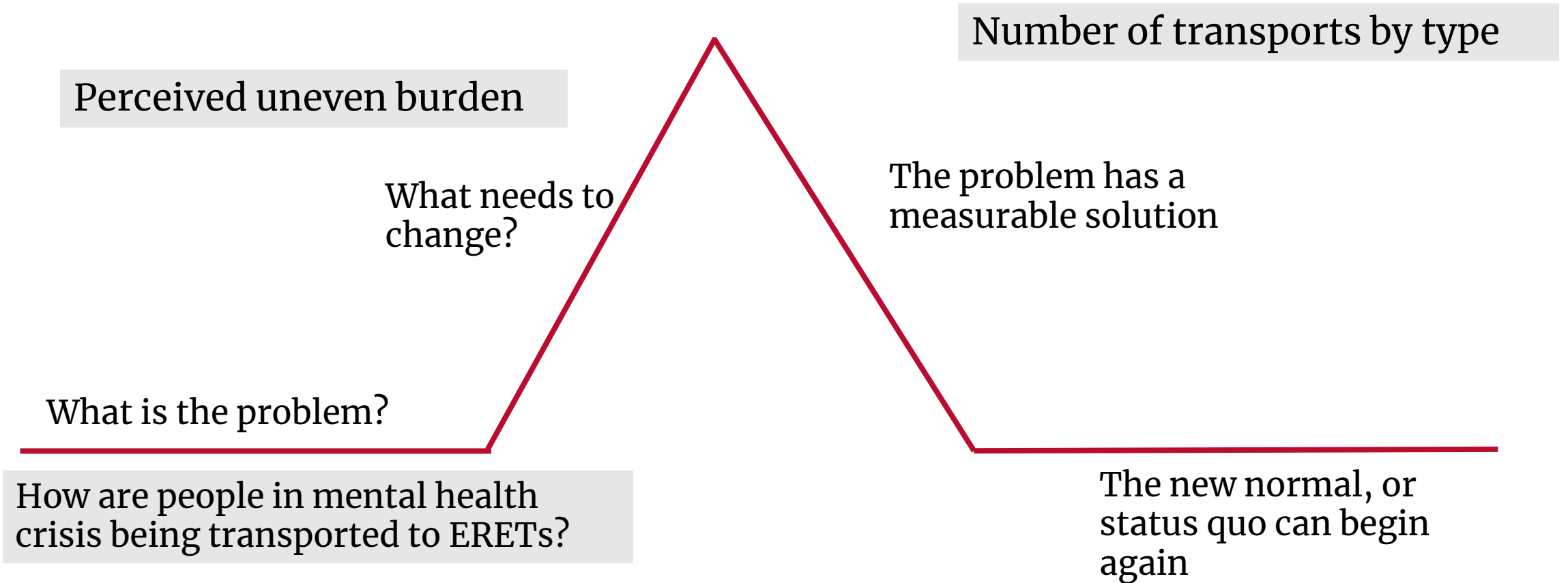UNIVERSITY OF GEORGIA

Case Study- ERET

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

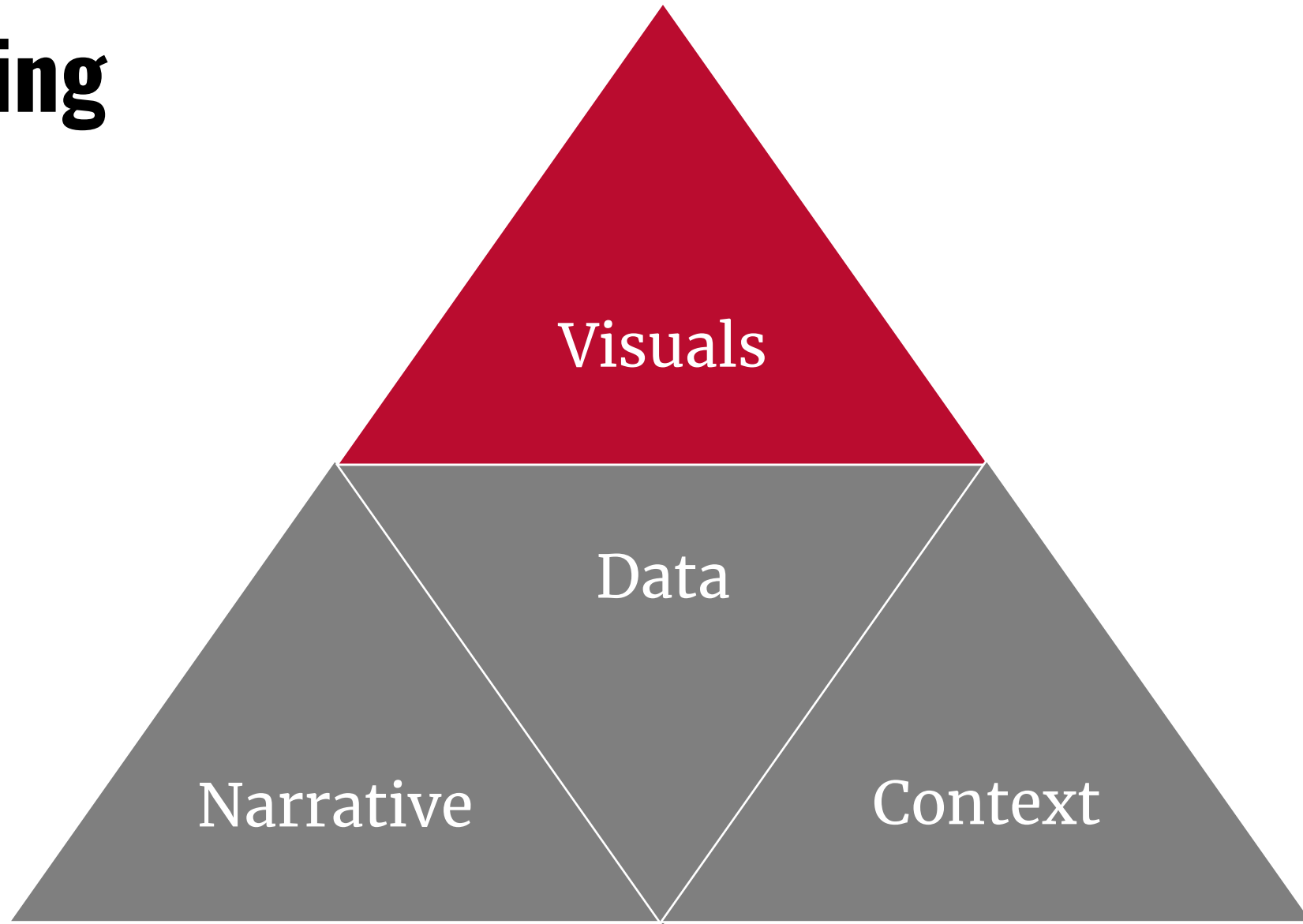Question: Who is doing the most transports?

ERETs Story Arc

Number of transports by type

Perceived uneven burden

What needs to change?

The problem has a measurable solution

What is the problem?

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

The new normal, or status quo can begin again

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Data Storytelling

Visuals

Data

Narrative

Context

Focused visualizations

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

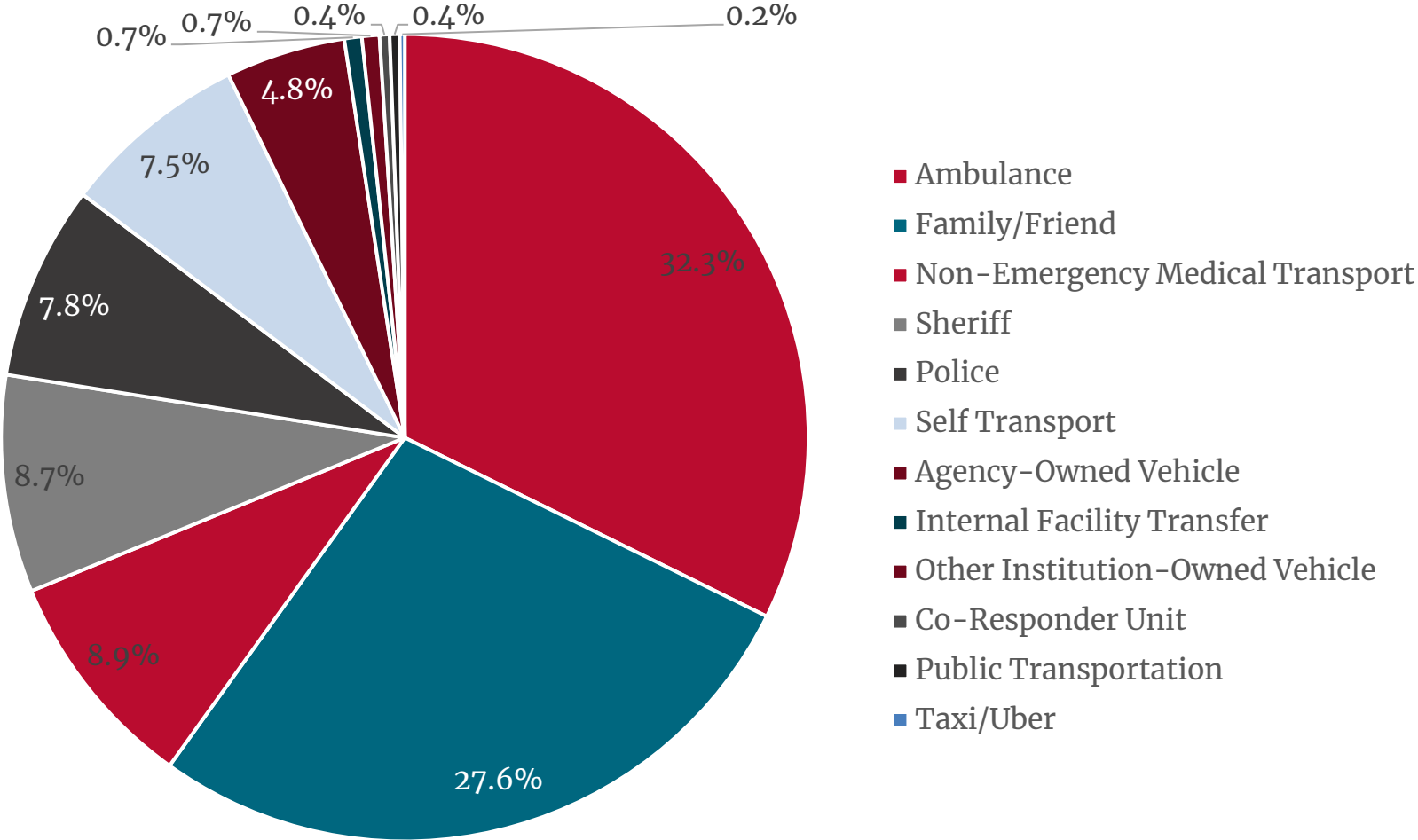- Remove clutter, like unnecessary text and labels

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Method of transport to ERETs

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

Method of Transport to ERETs

Pie chart segments:
- 32.3% Ambulance
- 27.6% Family/Friend
- 8.9% Non-Emergency Medical Transport
- 8.7% Sheriff
- 7.8% Police
- 7.5% Self Transport
- 4.8% Agency-Owned Vehicle
- 0.7% Internal Facility Transfer
- 0.7% Other Institution-Owned Vehicle
- 0.4% Co-Responder Unit
- 0.4% Public Transportation
- 0.2% Taxi/Uber

Legend:
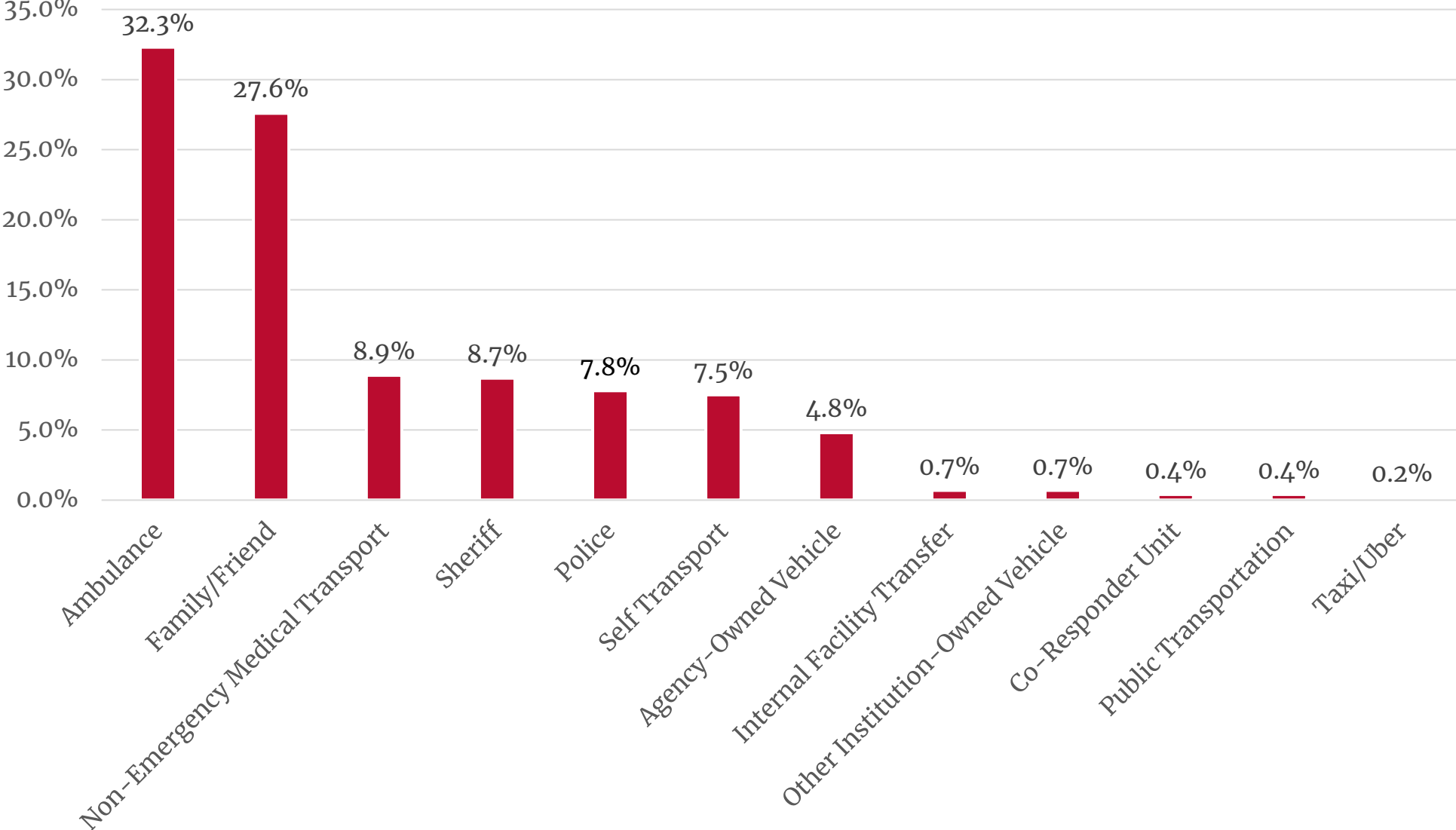- Ambulance
- Family/Friend
- Non-Emergency Medical Transport
- Sheriff
- Police
- Self Transport
- Agency-Owned Vehicle
- Internal Facility Transfer
- Other Institution-Owned Vehicle
- Co-Responder Unit
- Public Transportation
- Taxi/Uber

Method of Transport to ERETs

Category	Percentage
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%
Other Institution-Owned Vehicle	0.7%
Co-Responder Unit	0.4%
Public Transportation	0.4%
Taxi/Uber	0.2%

Method of Transport to ERETs

Method	Percentage
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%
Other Institution-Owned Vehicle	0.7%
Internal Facility Transfer	0.7%
Public Transportation	0.4%
Co-Responder Unit	0.4%
Taxi/Uber	0.2%

In 2022, 59.9% of transports to ERETs were through Ambulance and Family/ Friend.
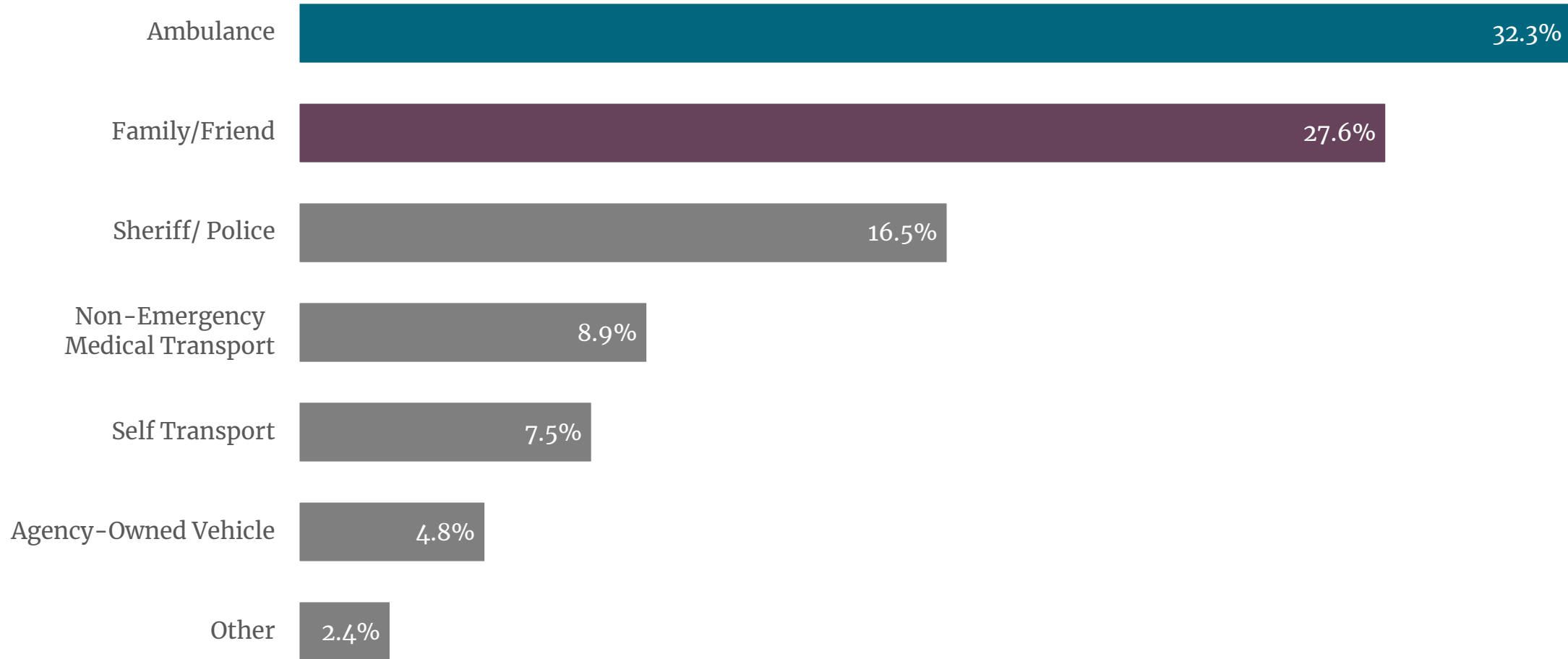
Ambulance	32.3%
Family/Friend	27.6%
Sheriff/ Police	16.5%
Non-Emergency Medical Transport	8.9%
Self Transport	7.5%
Agency-Owned Vehicle	4.8%
Other	2.4%

Note: "Other" includes taxi/ uber, co-responder unit, public transportation, internal facility transfer, and other institution owned vehicle.
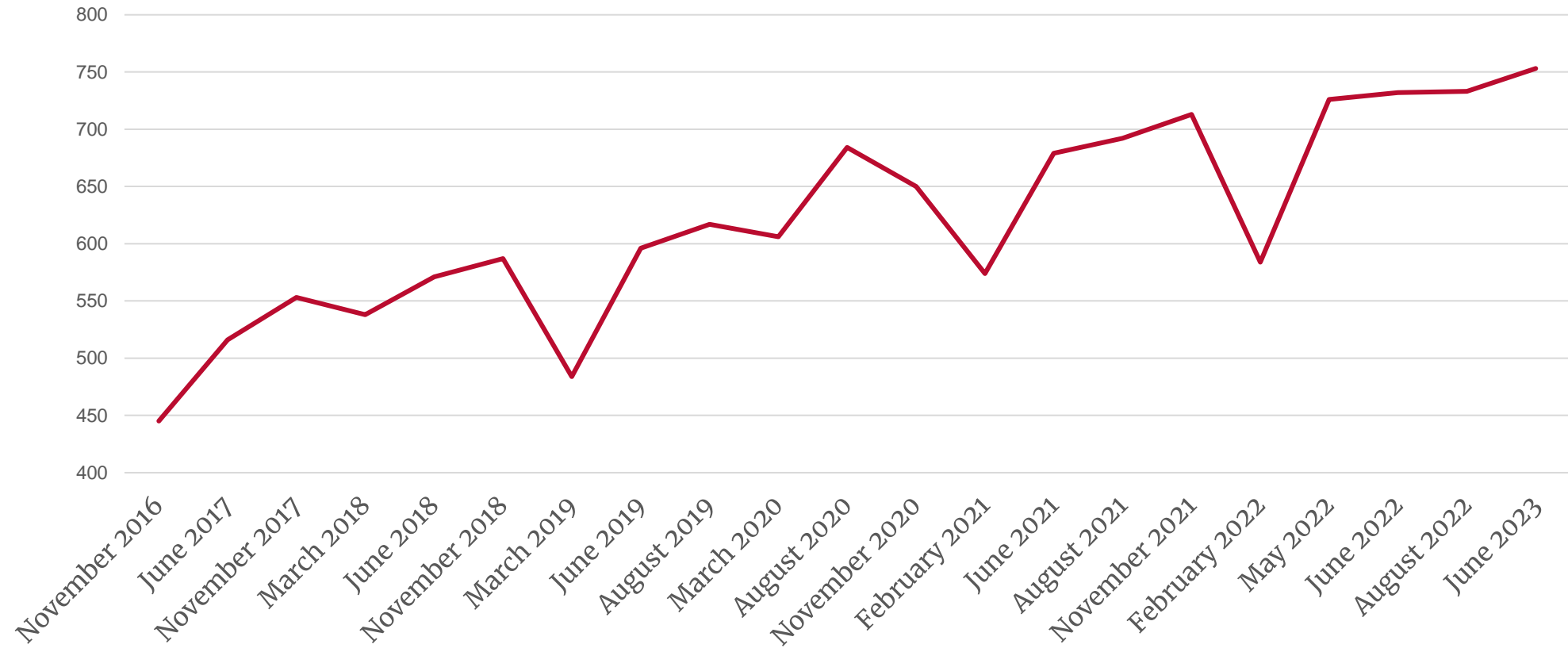
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In 2022, Ambulance was the most used method of transport to ERETs.
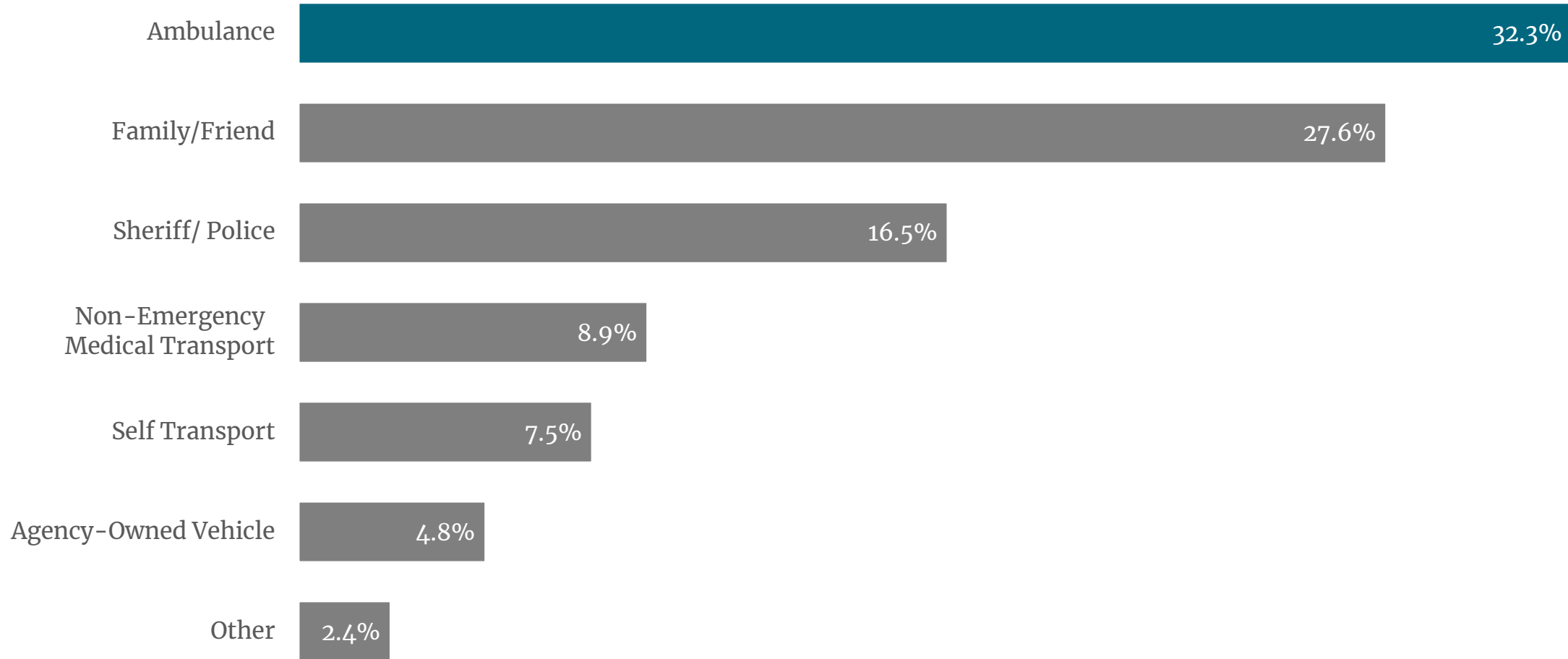
Method	Percentage
Ambulance	32.3%
Family/Friend	27.6%
Sheriff/ Police	16.5%
Non-Emergency Medical Transport	8.9%
Self Transport	7.5%
Agency-Owned Vehicle	4.8%
Other	2.4%

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

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In 2022, Sheriff and Police completed the third-most transports to ERETs.

Category	Percentage
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.

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Icon Array

Ambulance — 32%

Family/Friend — 28%

Sheriff/ 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.

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Icon Array

Ambulance   **32%**

Family/Friend   28%

Sherriff/ Police   17%

Non–Emergency Medical Transport   9%

Self–Transport   7%

Agency–Owned Vehicle   5%
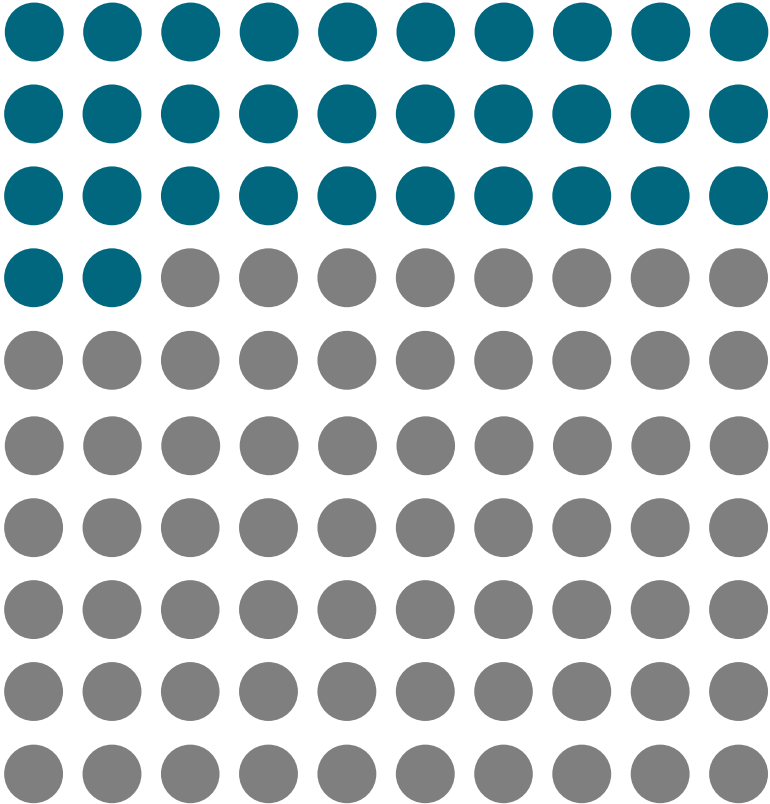
Other   2%

Note: "Other" includes taxi/ uber, co–responder unit, public transportation, internal facility transfer, and other institution owned vehicle.

Single Big Number

In 2022, transports by **Ambulances** made up **32%** of all transports to ERETs.

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Membership Growth

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Total membership grew by 308 from 2016- 2023

753

684

679

732

617

571

516

445

2016   2017   2018   2019   2020   2021   2022   2023
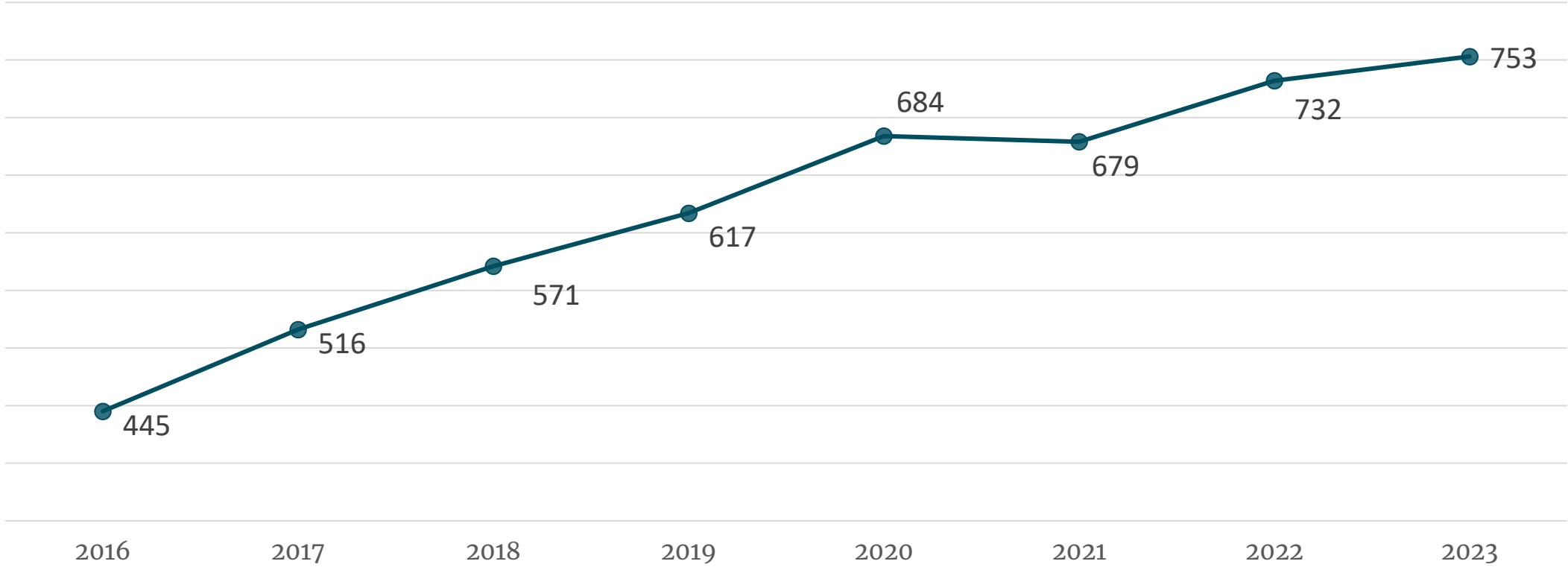
Learning Recap
Data Storytelling

Visuals

Data

Narrative

Context

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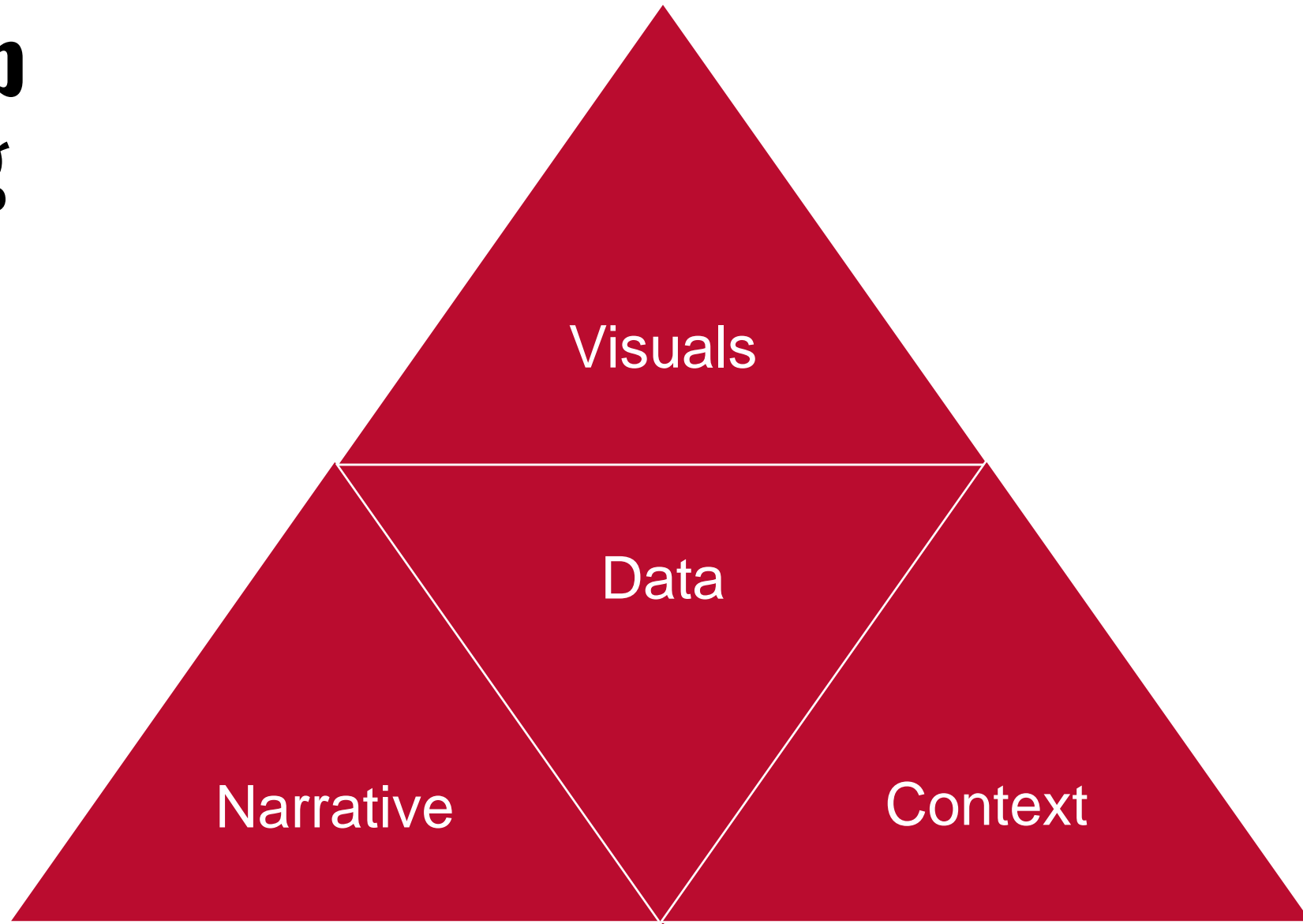
How can you apply the elements of Data Storytelling to a current project?

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**

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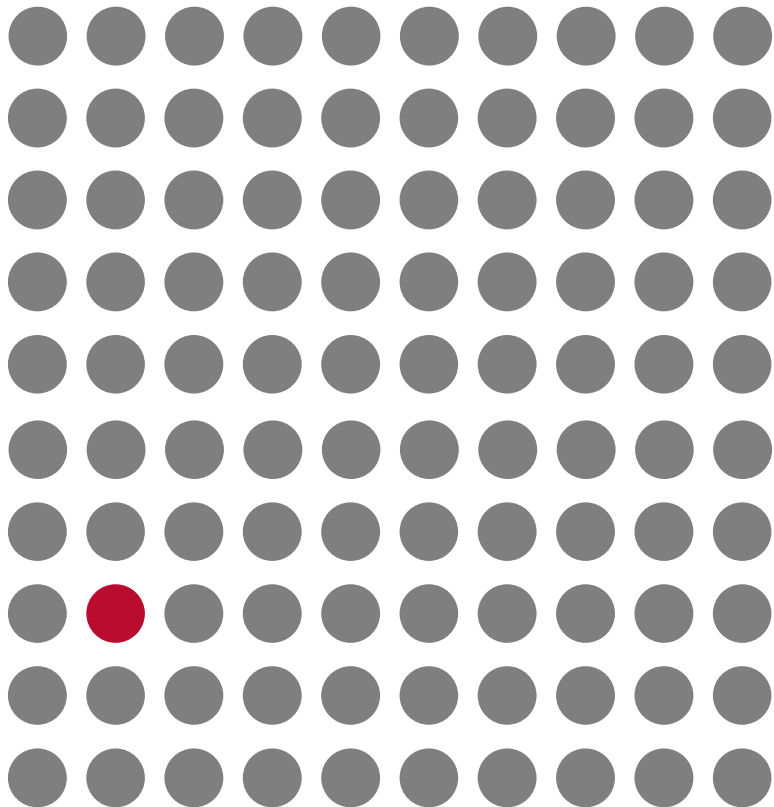
Pre-attentive processing

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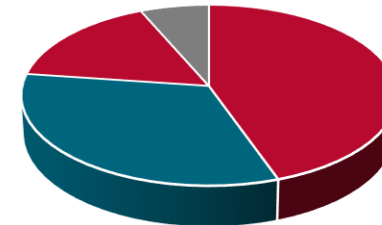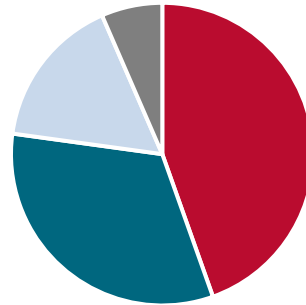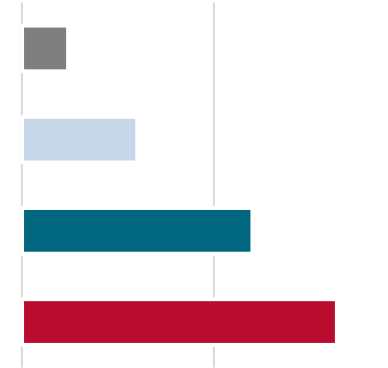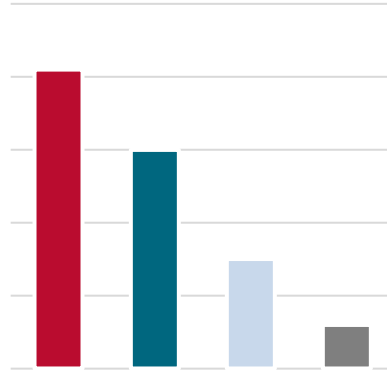
Psychology of Color

- 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

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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

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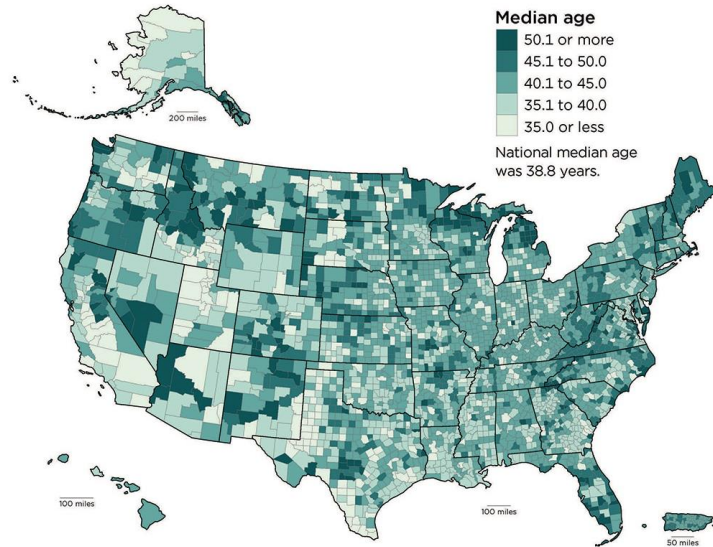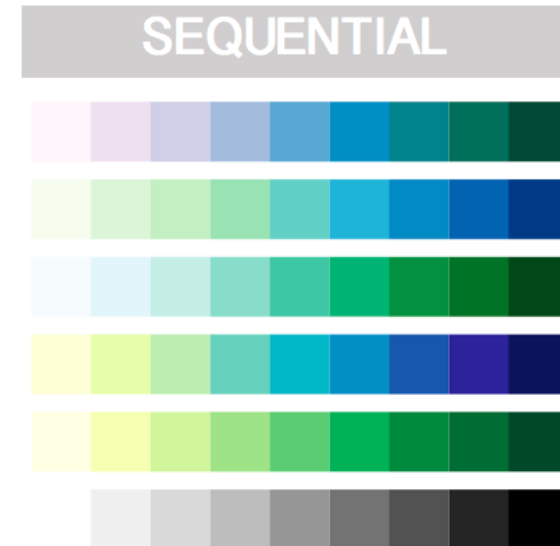
Divergent Color Pallets

Use when showing data of opposing directions

0.25%   0   +0.25%

Source: U. S. Census Bureau

DIVERGENT

Towardsdatascience.com

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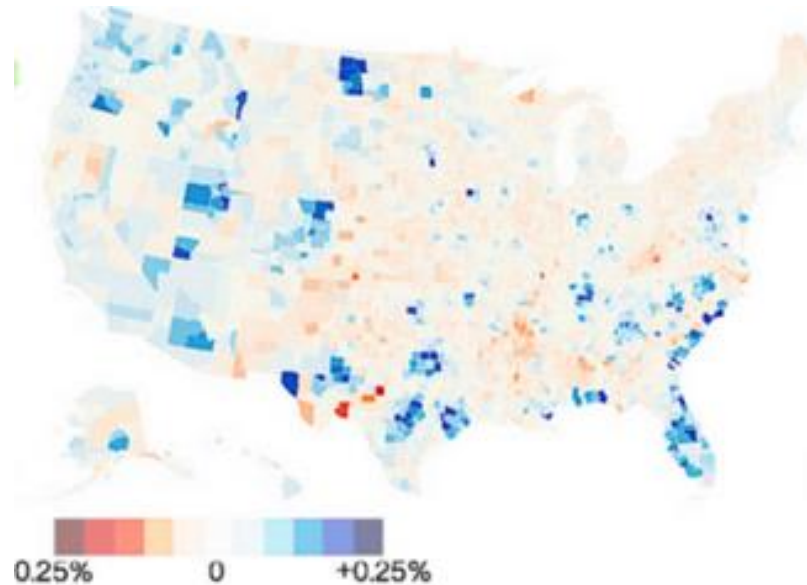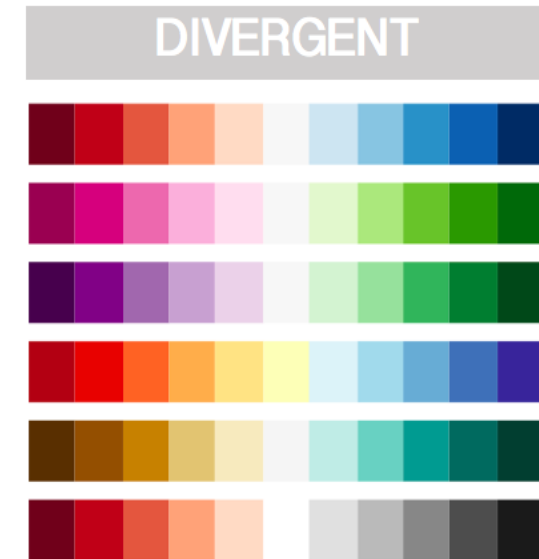
Categorical Color Pallets

Use for ordinal data

U.S. Counties - crop harvest

Dominant crop in harvested acres by county (2007)

- Wheat
- Cotton
- Soybeans
- Vegetables
- Corn
- No predominance

CATEGORICAL
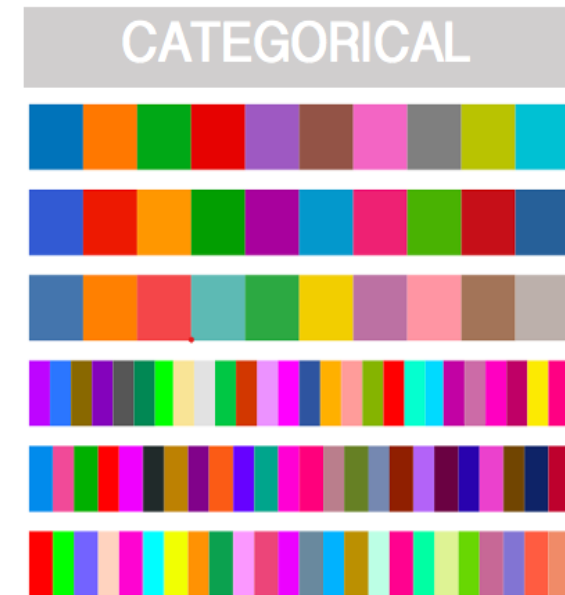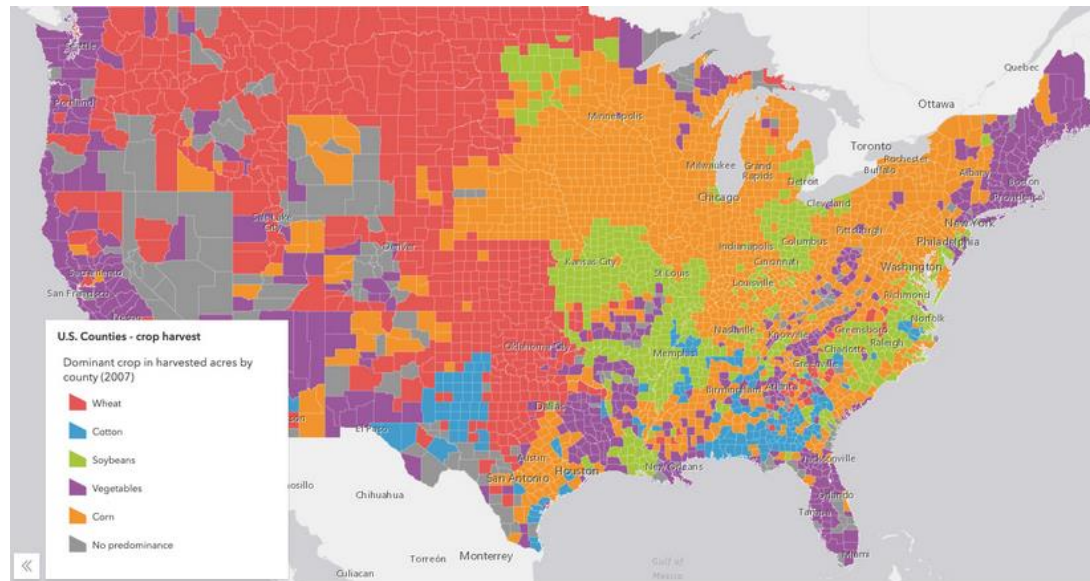
Source: ESRI

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

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Choosing the right chart

What is the story?

Who is the audience?

How large is the data set?

How does the data relate?

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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:

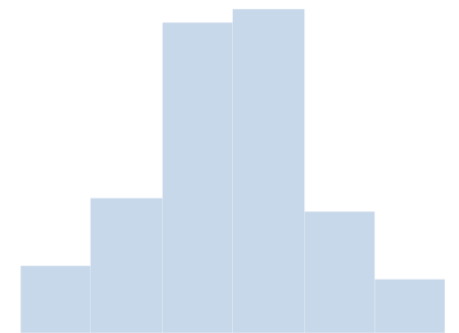- Focus is on comparisons of the subgroups
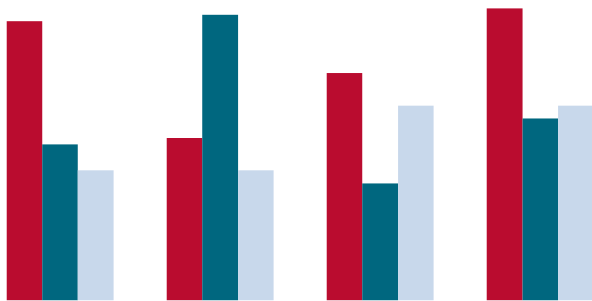
Stacked

When to use:

- To show part-to-whole relationships
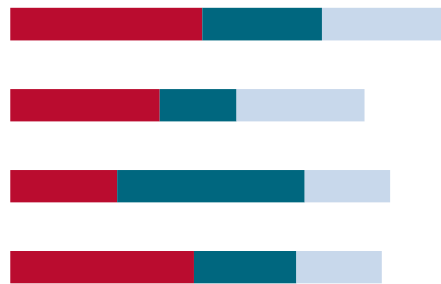
Histogram

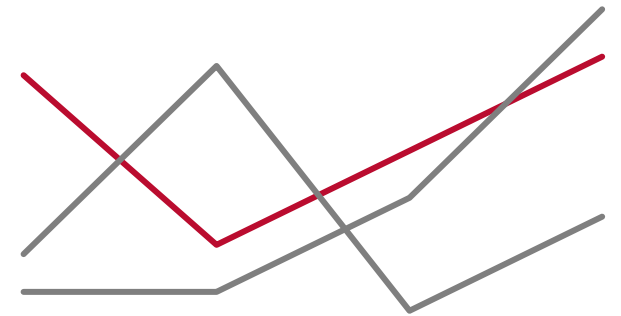**When to use:**

- To show frequency distribution

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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

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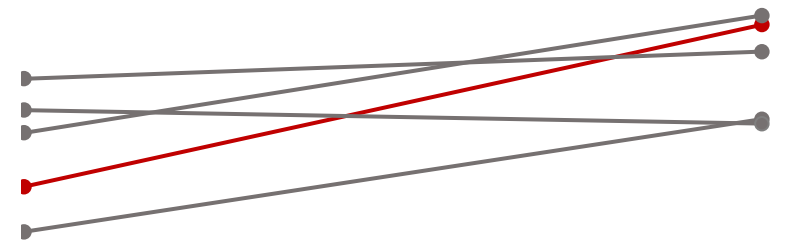UNIVERSITY OF GEORGIA

Line Variations

Area

When to use:

- Show the volume in addition to change over time

Slope

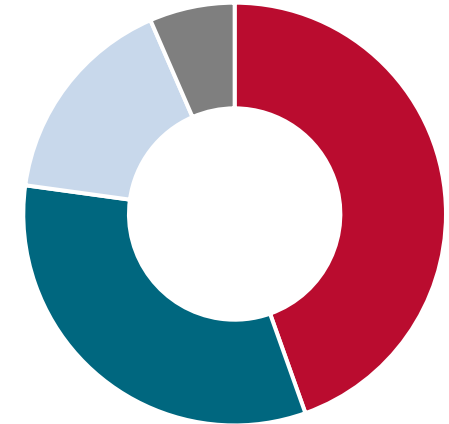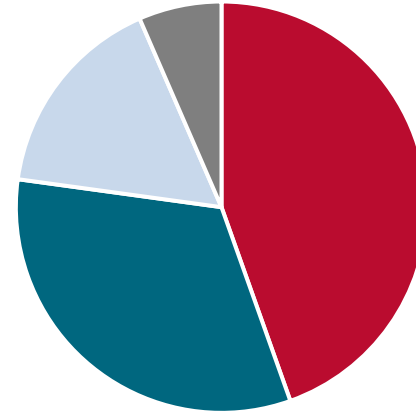**When to use:**

- Illustrate change between two points

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Pie/ doughnut

When to use:

- Showing parts of a whole

- Smaller datasets

Tips:

- 3–5 slices max

- Organize slices by size

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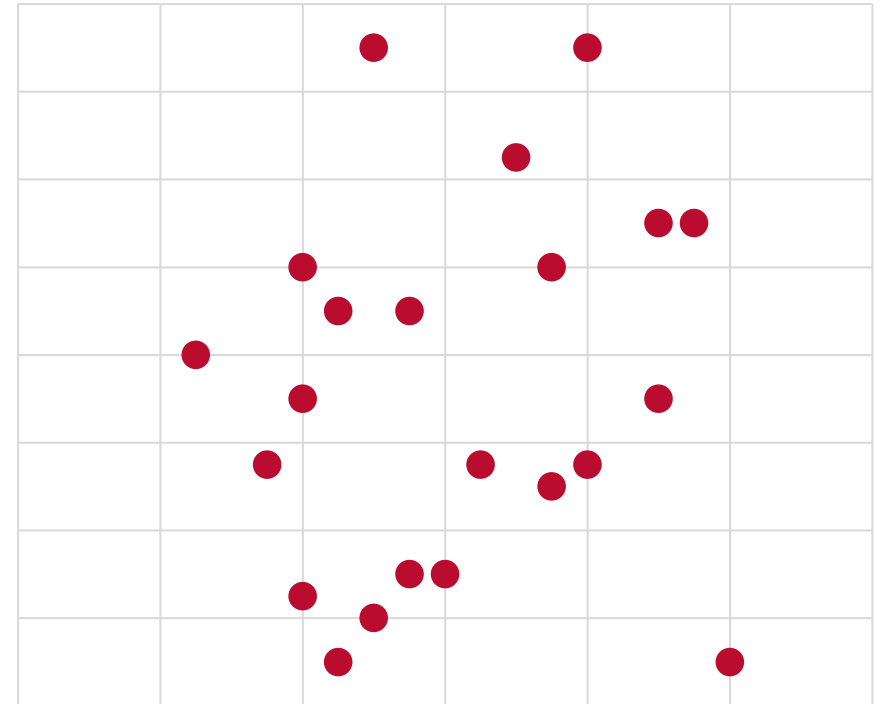*Carl Vinson Institute of Government*
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Scatter

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

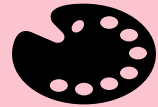- Use larger fonts and color to highlight the text

95%

General tips

- 3 Second Rule
  - Chart should be interpretable in 3 seconds or less

- Pay attention to the scale of the axis

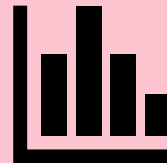- All labels should be clear

- Text should always be horizontal

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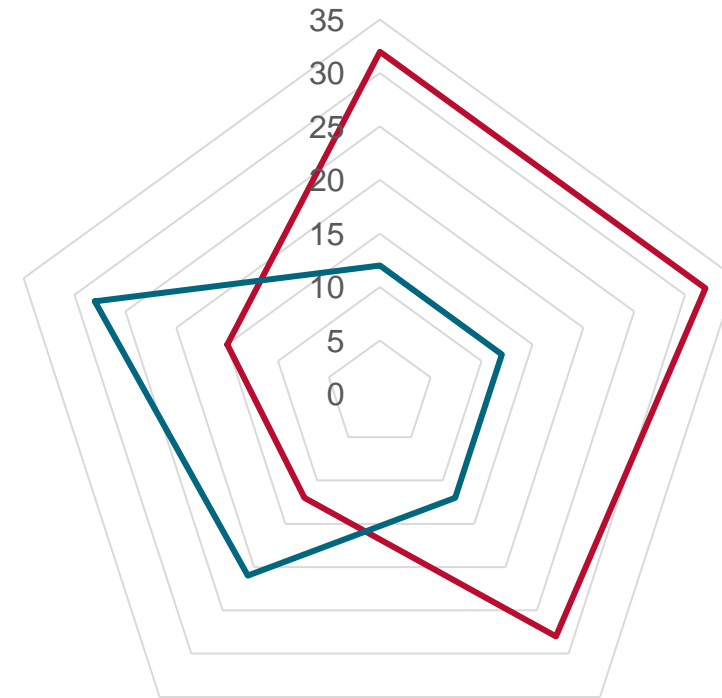
Learning Recap Chart Choosing

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?

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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