Data Visualization:
Clear and Concise Ways to Present Complex Information

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Agenda

1. Gathering Data
   - What resources are available?
   - What questions are you hoping to answer?
2. Choosing your visualization
   - Most common (and for a reason – they are effective!)
   - A few new ideas to try
     - Combo Chart
     - Decomposition Tree
3. Additional considerations
   - Color
   - Slicers & Gauges
   - Cards

Where did you get your data?

- What questions are you hoping to answer?
  - Avoid looking for specific results
- Description of data collection
  - Original research
  - Surveys
  - Site downloads
  - Limitations
- Data interpretation
  - Measurement definitions

Choosing Your Visualization

Visualizations

People are often looking for…

- Comparisons
- Percentages
- Trends
- Concentrations

So they frequently use…

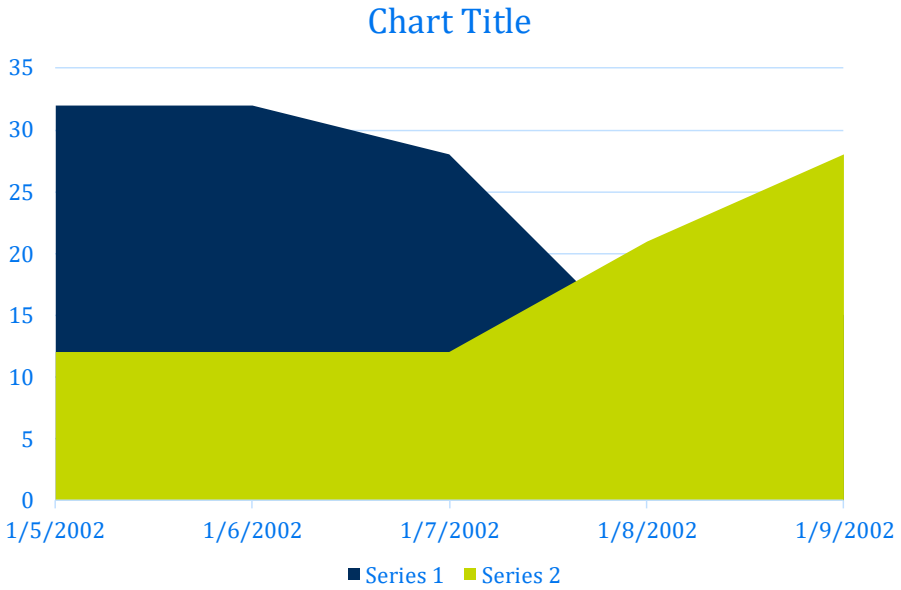
- Area Charts
- Bar and Column Charts
- Doughnut and Pie Charts
- Funnel Charts
- Line Charts
- Maps
- Table or Matrix
- Scatter/Bubble Chart

Other Options

- Cards
- Combo Charts
- Gauge Charts
- Ribbon Chart
- Treemaps
- Waterfall Chart

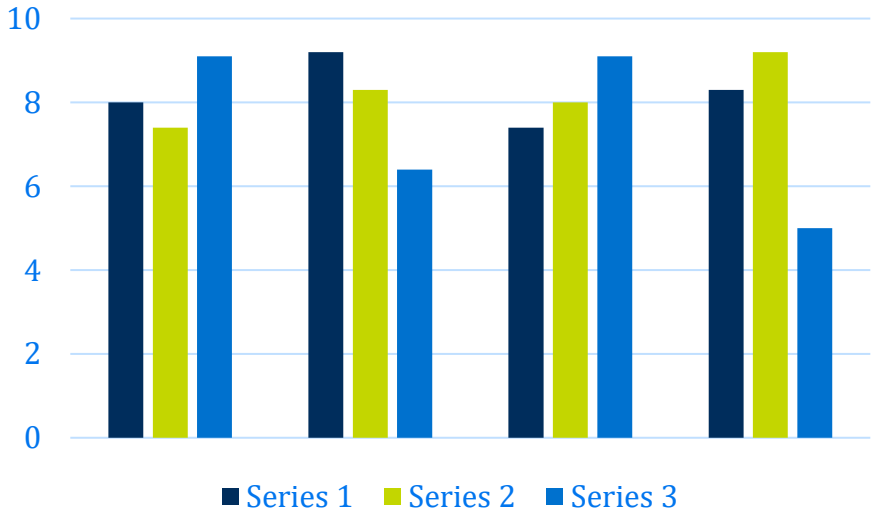
Area Chart

Area charts emphasize the magnitude of change over time and can be used to draw attention to the total value across a trend.



Bar and Column Charts

Bar charts are the standard for looking at a specific value across different categories.



Confirm how people will be experiencing your data!

Verify all of the ways your data will be viewed (in print, on a mobile device, on a screen, etc.).

- Are the details they need to see able to be easily read?
- Are there unnecessary data points that distract from the rest of your message?

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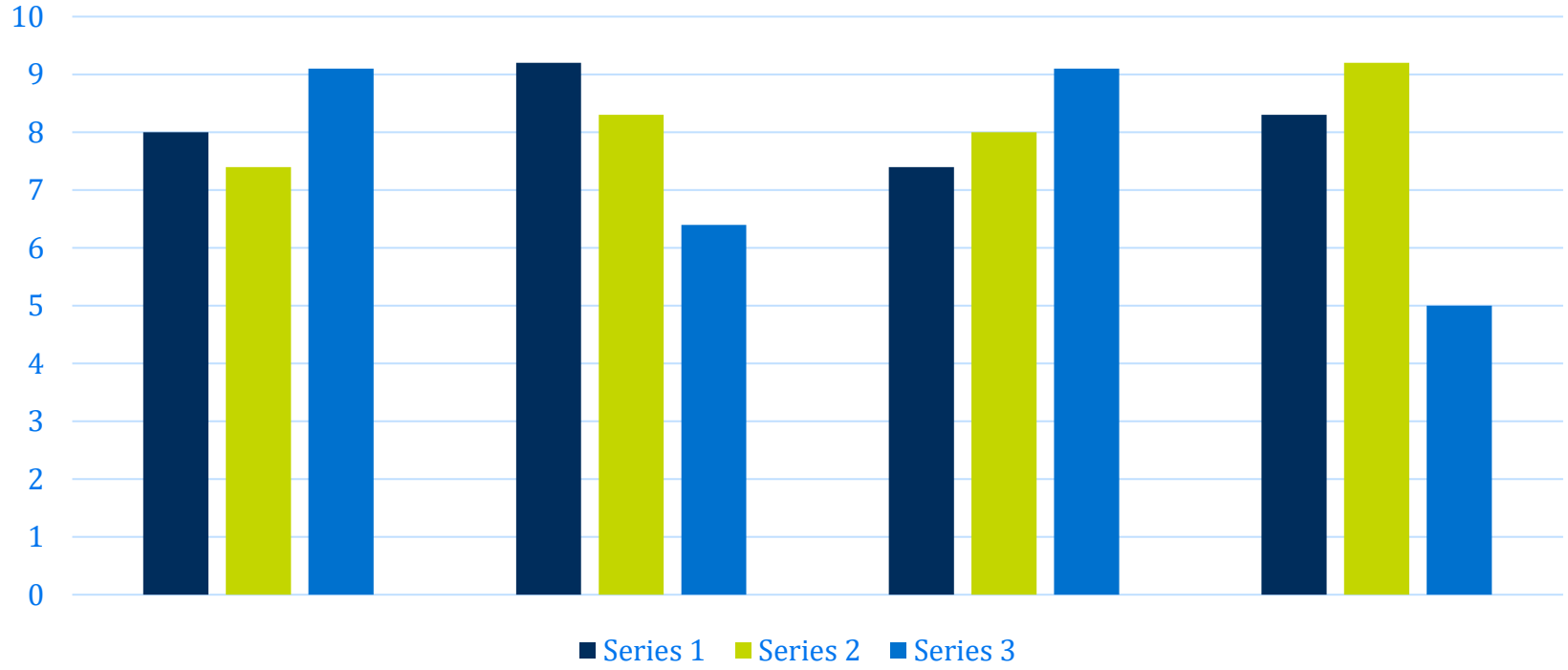
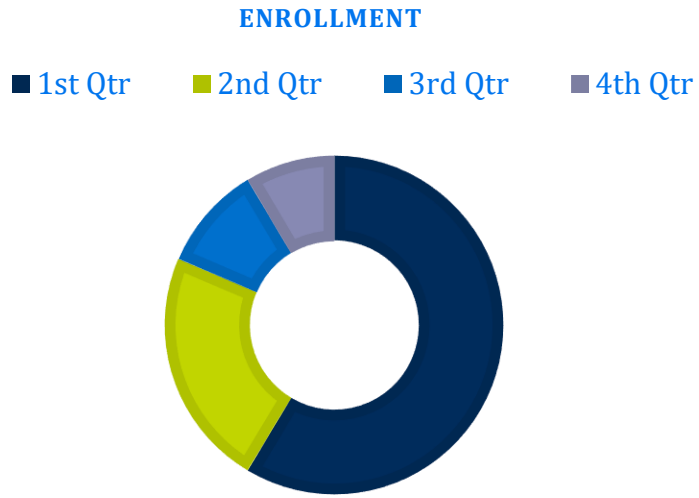


https://learn.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-types-for-reports-and-q-and-a

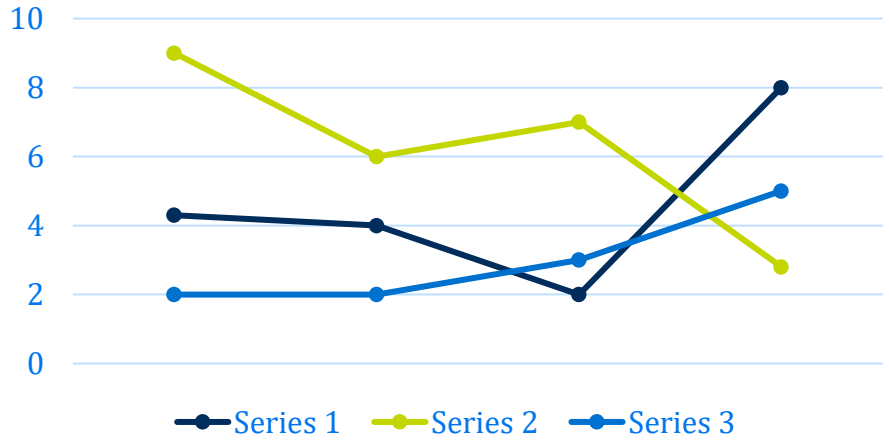
Doughnut and Pie Charts

Doughnut and pie charts show the relationship of parts in a whole.



Line Charts

Line charts emphasize the overall shape of an entire series of values, usually over time.



Be aware of color vision deficiency

- Choose color palettes that are friendly to all levels of color vision deficiency/color blindness.
- Add text (redundancy) as appropriate for clarity/emphasis.
- Add contrast.

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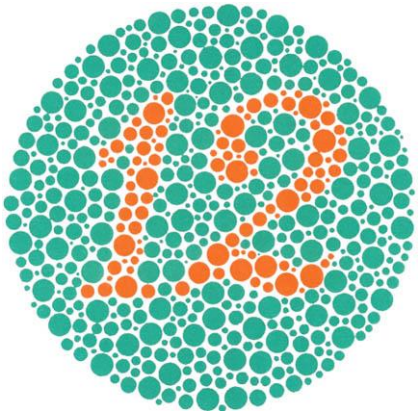


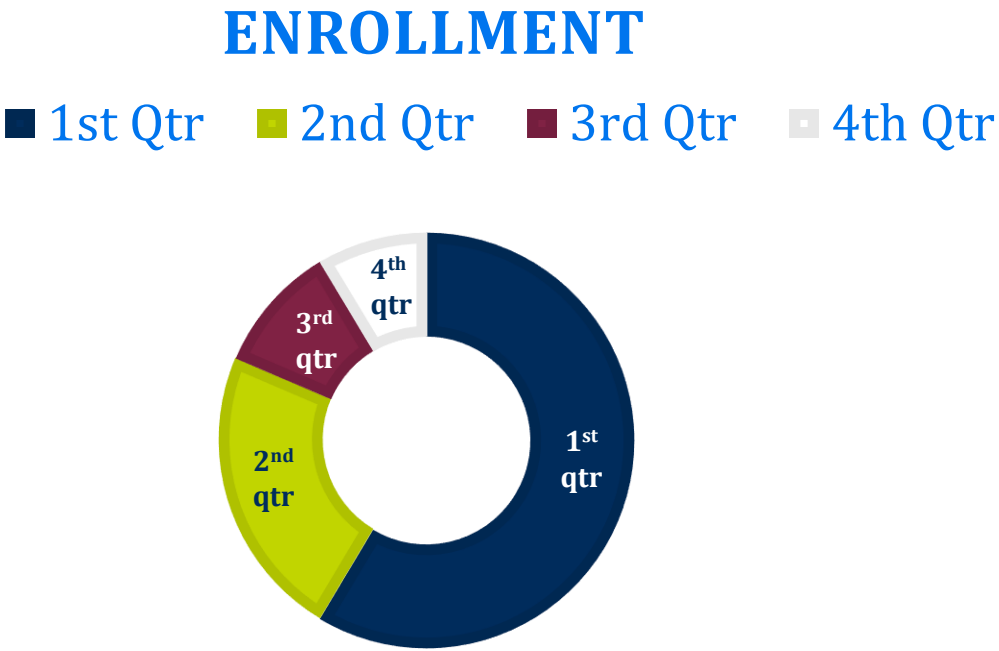
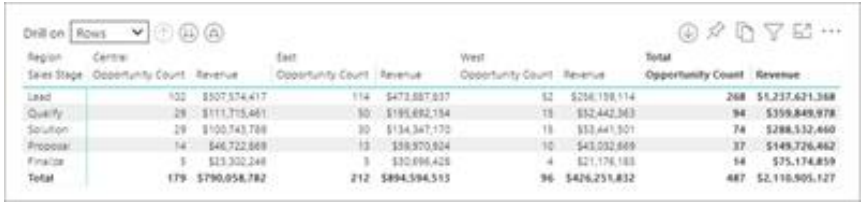


Table or Matrix

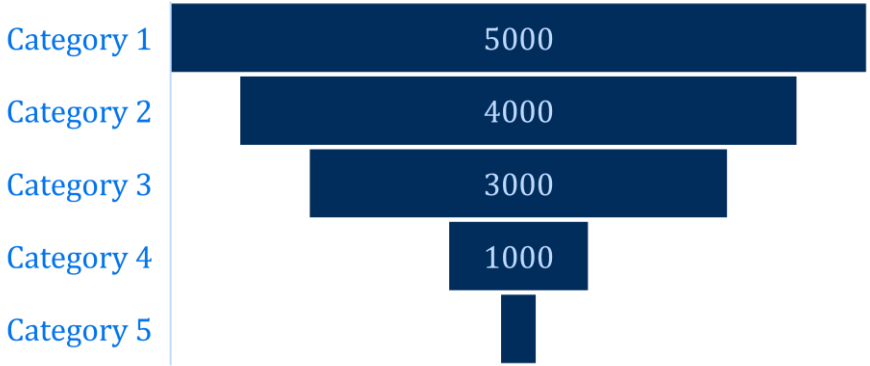
Tables are a great choice to see and compare detailed data and exact values (instead of visual representations). display data in a tabular format, and/or display numerical data by categories.



Region	Central		East		West		Total	
Sales Stage	Opportunity Count	Revenue	Opportunity Count	Revenue	Opportunity Count	Revenue	Opportunity Count	Revenue
Lead	102	$507,574,417	114	$473,887,837	52	$256,198,114	268	$1,237,621,368
Qualify	29	$111,715,461	50	$195,692,154	15	$52,442,363	94	$359,849,978
Solution	29	$100,743,788	30	$134,347,170	15	$53,441,501	74	$288,532,460
Propose	14	$46,722,869	13	$59,970,924	10	$43,032,669	37	$149,726,462
Finalize	5	$23,302,248	3	$30,696,426	4	$21,176,183	14	$75,174,859
Total	179	$790,058,782	212	$894,594,513	96	$426,251,832	487	$2,110,905,127

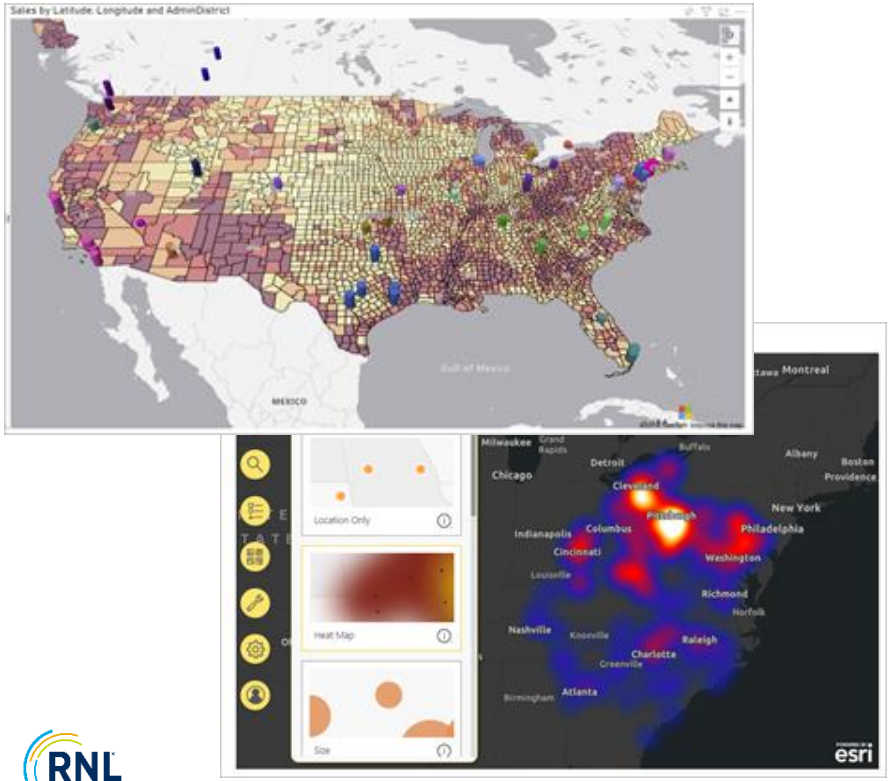
Funnel Charts

Funnels help visualize a process that has stages, and items flow sequentially from one stage to the next.



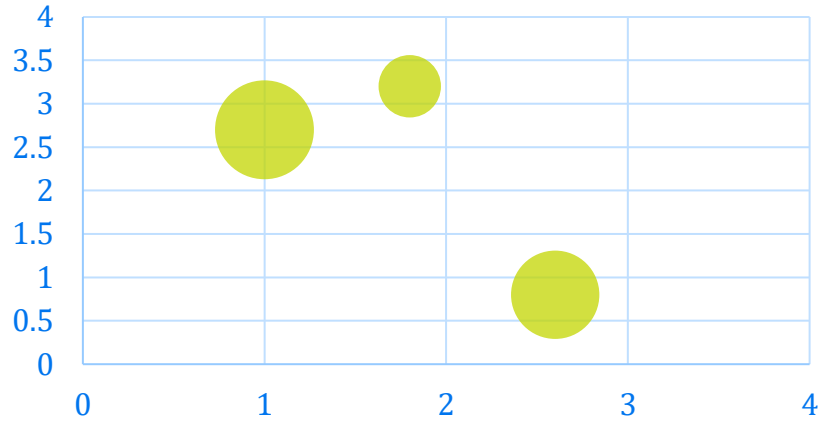
Maps

Maps allow users to visualize data and spatial relationships using geographical points.



Scatter/Bubble Chart

If you have two variables that pair well together, plotting them on a scatter diagram is a great way to view their relationship and see if it's a positive or negative correlation.



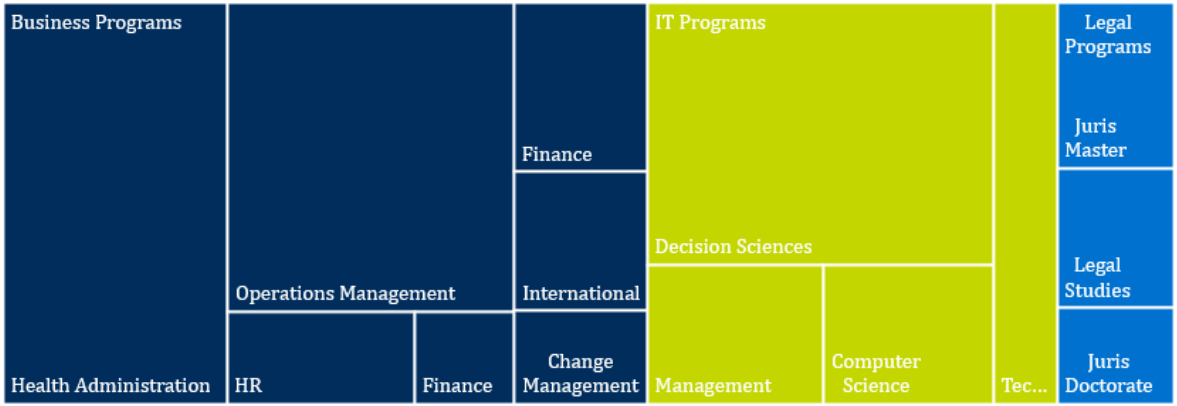
Pros and Cons

- People may feel more comfortable reading charts they see all the time…
  - And you are definitely more likely to be more comfortable making them!
- But what you are used to…
  - May bore your audience and lose their attention.
  - Might not be the best option for the message you're sharing.

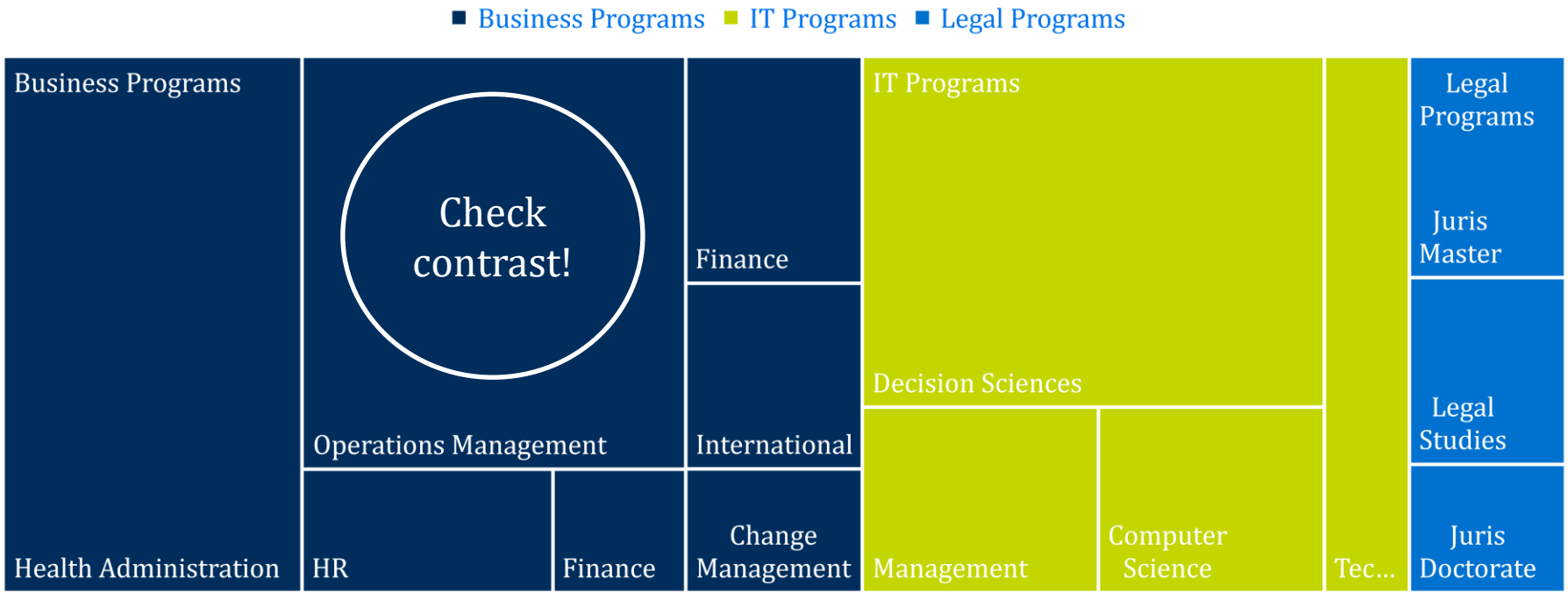
Tree Map

Tree Maps are a great choice:

- For quantities and patterns that need to be compared.
- To represent part to whole relationships.



Student Distribution by Department and Program

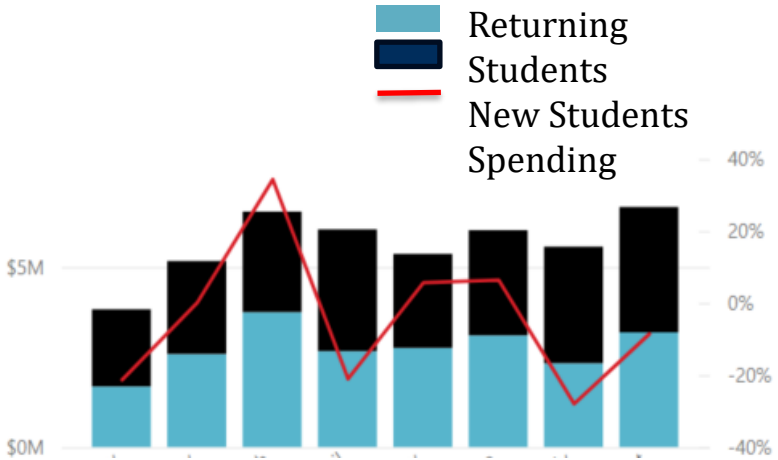


You may choose a tree map to show relative size of departments and programs within departments.

Combo Charts

Combo charts are a great choice:

- When you have a line chart and a column chart with the same X axis.
- To compare multiple measures with different value ranges.
- To check whether one measure meets the target which is defined by another measure.



Application: Budget Analysis

Multiple measures, potential relationship

- In 2018, a university was considering how higher spending in 2015 affected the enrollment of new students and overall retention.
- Instead of creating three separate charts, they created a combo chart.
  - The two-tone bar chart demonstrated returning students on the bottom and new students on the top.
  - The line chart represented total spending related to enrollment.

- In one chart, they were able to see:
  - What percentage of the population were new/returning students.
  - How spending correlated with new, returning, and total student enrollment.
  - How enrollment and spending changed over time.

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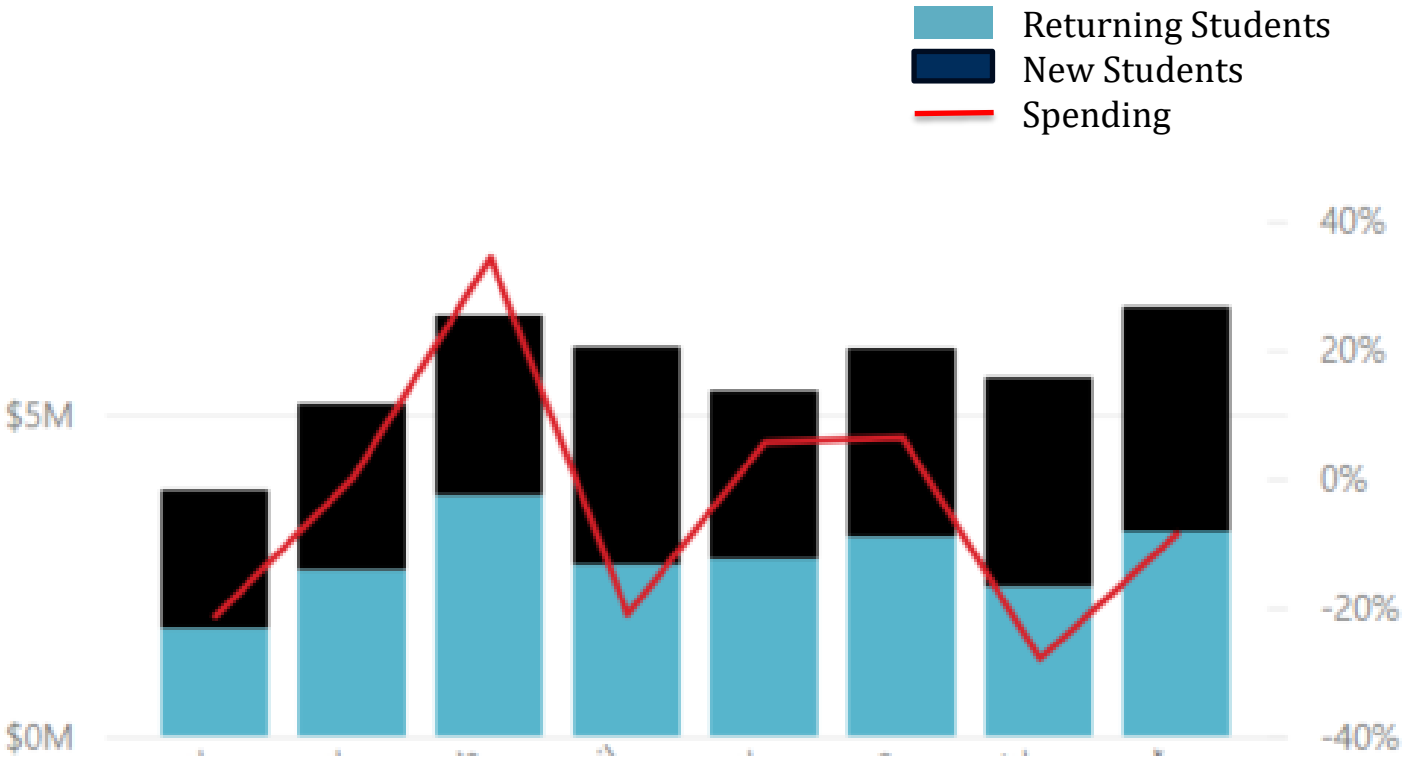
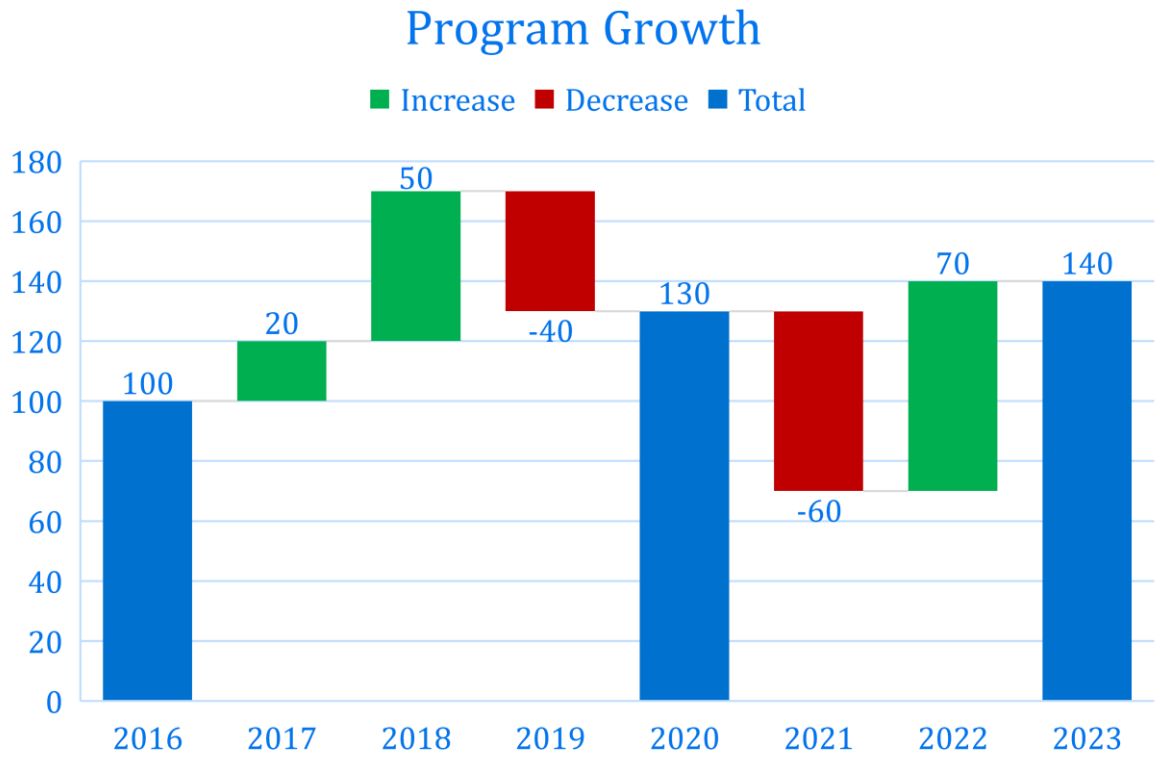
- What percentage of the population were new/returning students.
- How spending correlated with new, returning, and total student enrollment.



Waterfall Charts

Waterfall charts are a great choice:

- To display a running total as values are added and subtracted.
- To show how an initial number is affected by positive and negative changes

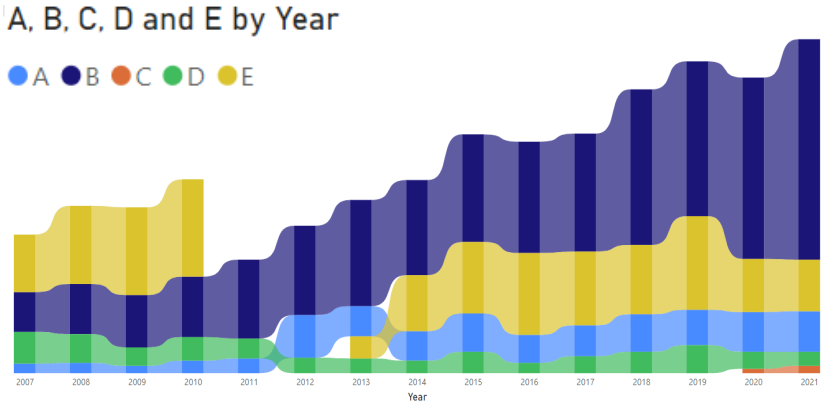


Reporting program growth and decline at three specific points – 2016, 2020, and 2023 – using color-coding and a waterfall chart, provides a quick and clear look at the activity over 7 years.

Ribbon Chart

Ribbon charts

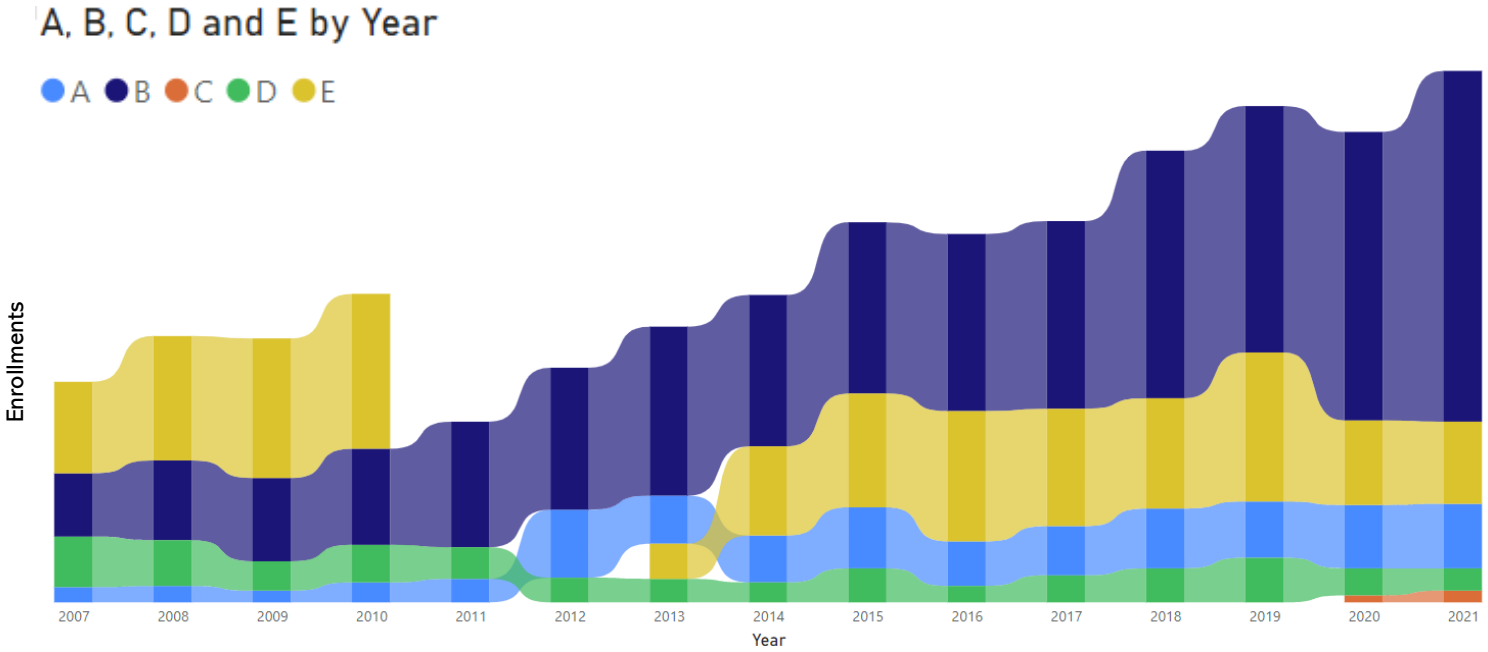
- show which data category has the highest rank (largest value).
- Ribbon charts are effective at showing rank change, with the highest range (value) always displayed on top for each time period.



Application: HR Graduate Programs in Minneapolis

Change by program, over time

- A business program director was asked about starting an HR program. One consideration was how competitors had performed in recent history.
- In one chart, they were able to analyze and share:
  - The number of competitor programs
  - How large each program was
  - When each program had been the top performer in the market
  - What years the programs collectively performed best and worst



B

Current Largest Program

C

Newest Program

A & C

Non-Profit Institutions

Additional Considerations

Choosing Color

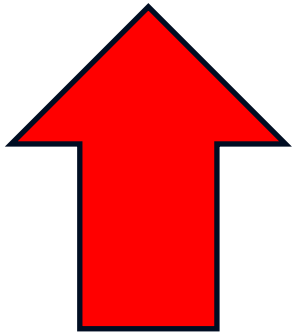
- Remember: Contrast & carefully chosen palettes
- Warm colors stand out, cool colors recede
- In addition to creating an appealing contrast, make sure you are/aren't using colors for value or emphasis
- Consider the delivery format (printed, projected, phone, etc.)

- **January**
- **February**
- **March**
- **April**
- **May**

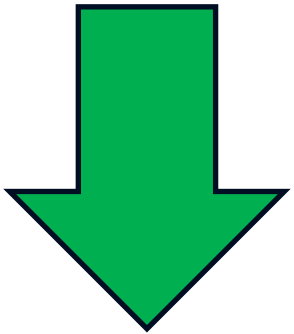
Warm Colors Stand Out

Cool Colors Recedes

Choosing Color



- Some colors and symbols already have meaning and can cause confusion
- Other colors may be hard to see



Don’t make people work
any harder than they have to
to understand your message.

Share & Completions

Will you sometimes need "too much information" in your data?

Undergraduate

Program	Completions (2021)	Market Share
Biology/Biological Sciences, General (26.0101)	36	9.2%
Finance, General (52.0801)	27	6.9%
English Language and Literature, General (23.0101)	26	6.6%
Exercise Science and Kinesiology (31.0505)	22	5.6%
Other	282	71.8%

Graduate

Program	Completions (2021)	Market Share
Biology/Biological Sciences, General (26.0101)	36	9.2%
Finance, General (52.0801)	27	6.9%
English Language and Literature, General (23.0101)	26	6.6%
Exercise Science and Kinesiology (31.0505)	22	5.6%
Other	282	71.8%

Completions refer to the number of degrees or certificates conferred for a specific course of study in a given year. Includes all award levels. May be greater than the actual number of students who graduated, as Lightcast includes both primary and secondary majors. Both primary and secondary majors are included because a graduate with a dual major in mathematics and electrical engineering should be considered part of the potential supply for occupations that map to both majors.

The reference period for a completion year is July 1 of the prior year through June 30 of the current year. For example, the 2021 Completions metric is a count of completions from 7/1/2020-6/30/2021. Source: NCES, IPEDS.

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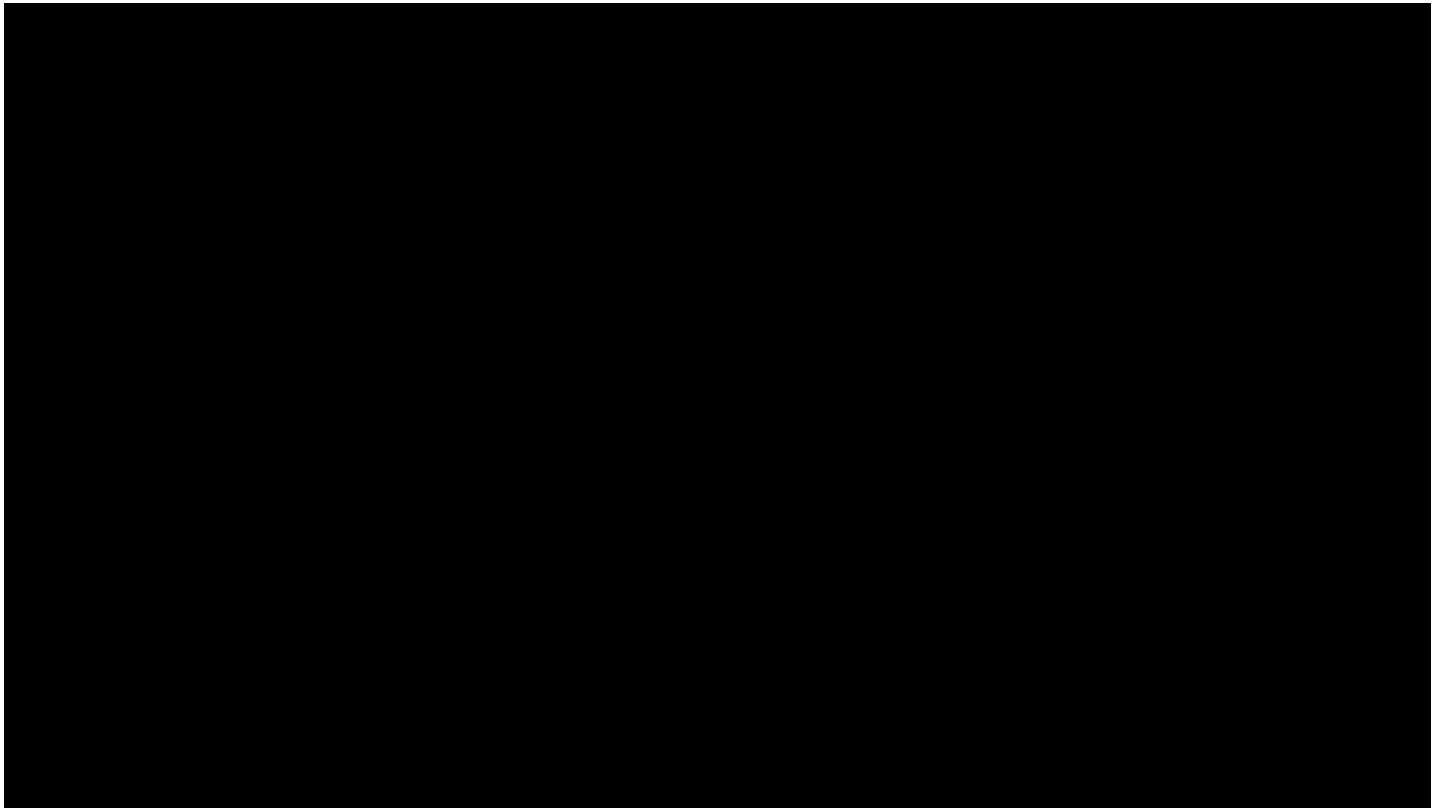
Using Slicers



Using Gauge Charts

Summary

- Gathering Data
  - What resources are available?
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- Choosing your visualization
  - Most common (and for a reason – they are effective!)
  - A few new ideas to try
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