

Introduction to Data Visualization

Office of Assessment &
APR

Presentation Overview

Best Practices in...

- Data Visualization
- Reporting

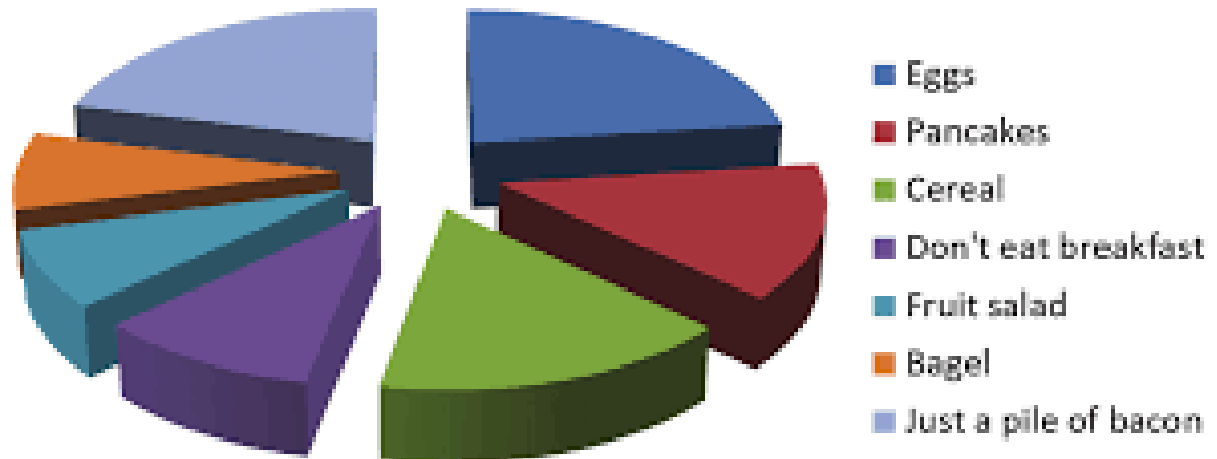
Creating Visuals

- Pivot Tables & Charts
- Dashboards

Before we start...

Let's talk
about this
graphic

Attendee Breakfast Preferences



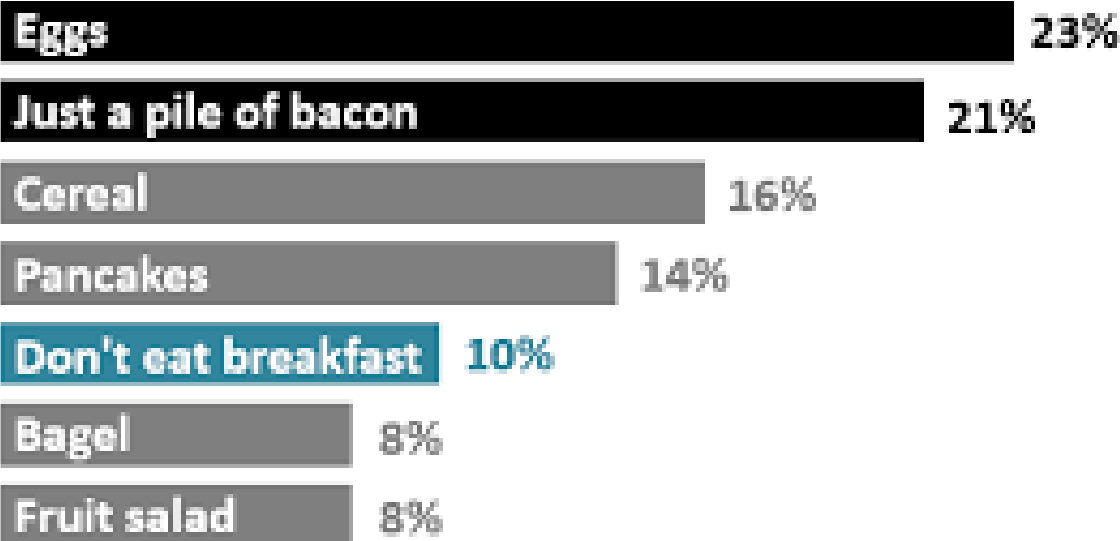
Turns out humans are super bad at interpreting area, volume, and curvature... pie charts produce the most errors.



Dr. Stephanie Evergreen
Visualization Expert

Breakfast preferences focus on protein.

One in ten fellow attendees **do not consume** adequate energy for their first meal of the day.



Now this
one

Data Visualization Best Practices

Text

Arrangement

Color

Lines

Other

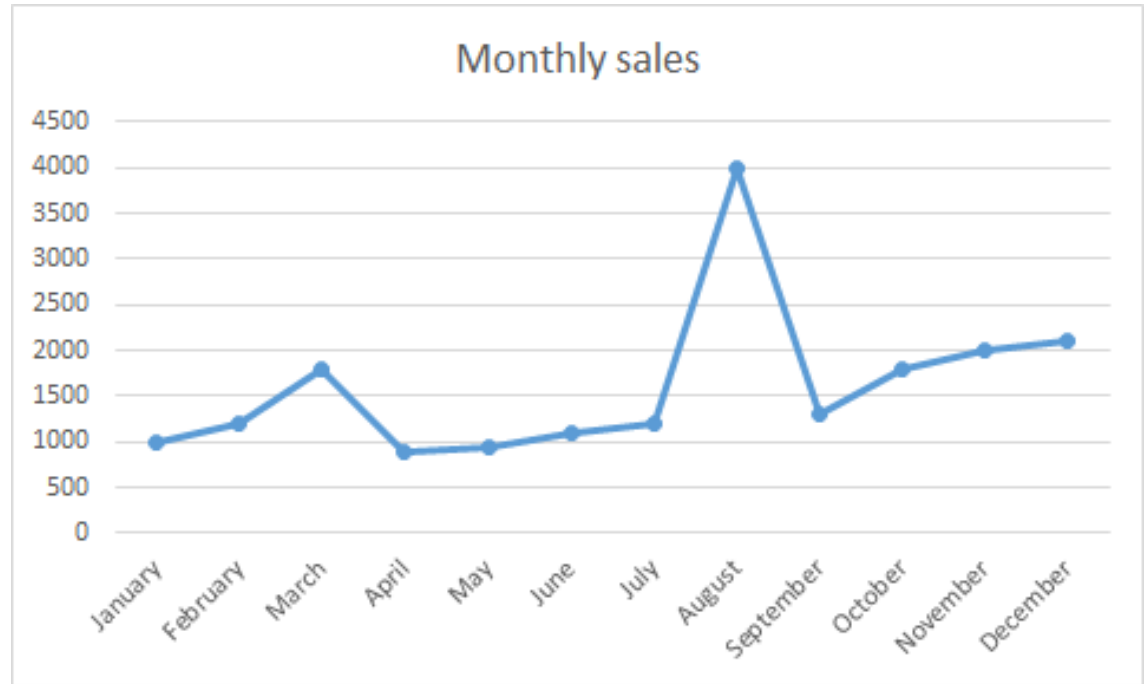
Text

Graphs don't contain much text

Text must highlight a message

"Pack a punch"

Example



- What can you discern from the text on this graphic?
- What does the title tell you?
- What's the point?

Improper arrangement

Confuses
readers at best

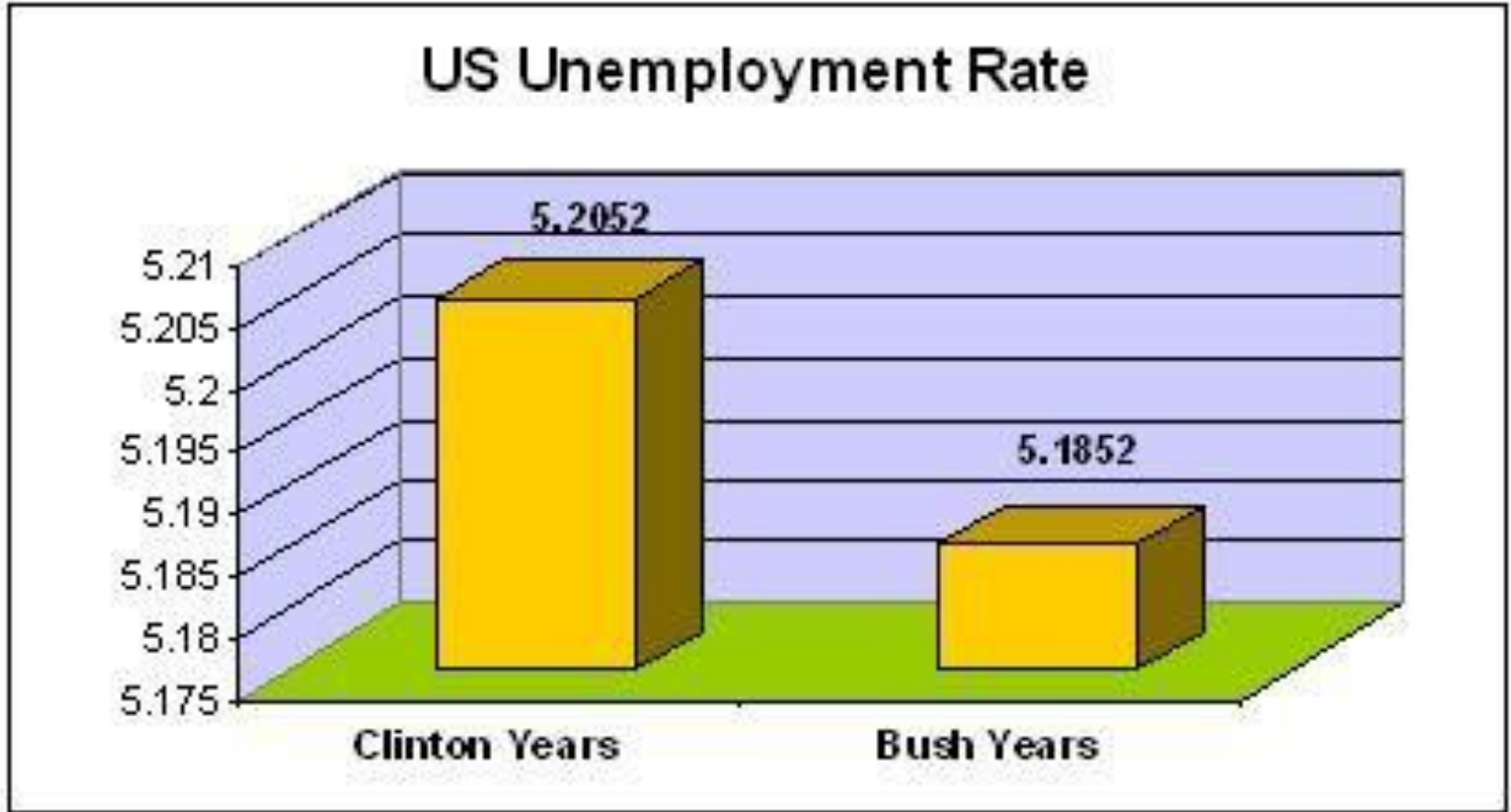
Misleads
readers at worst



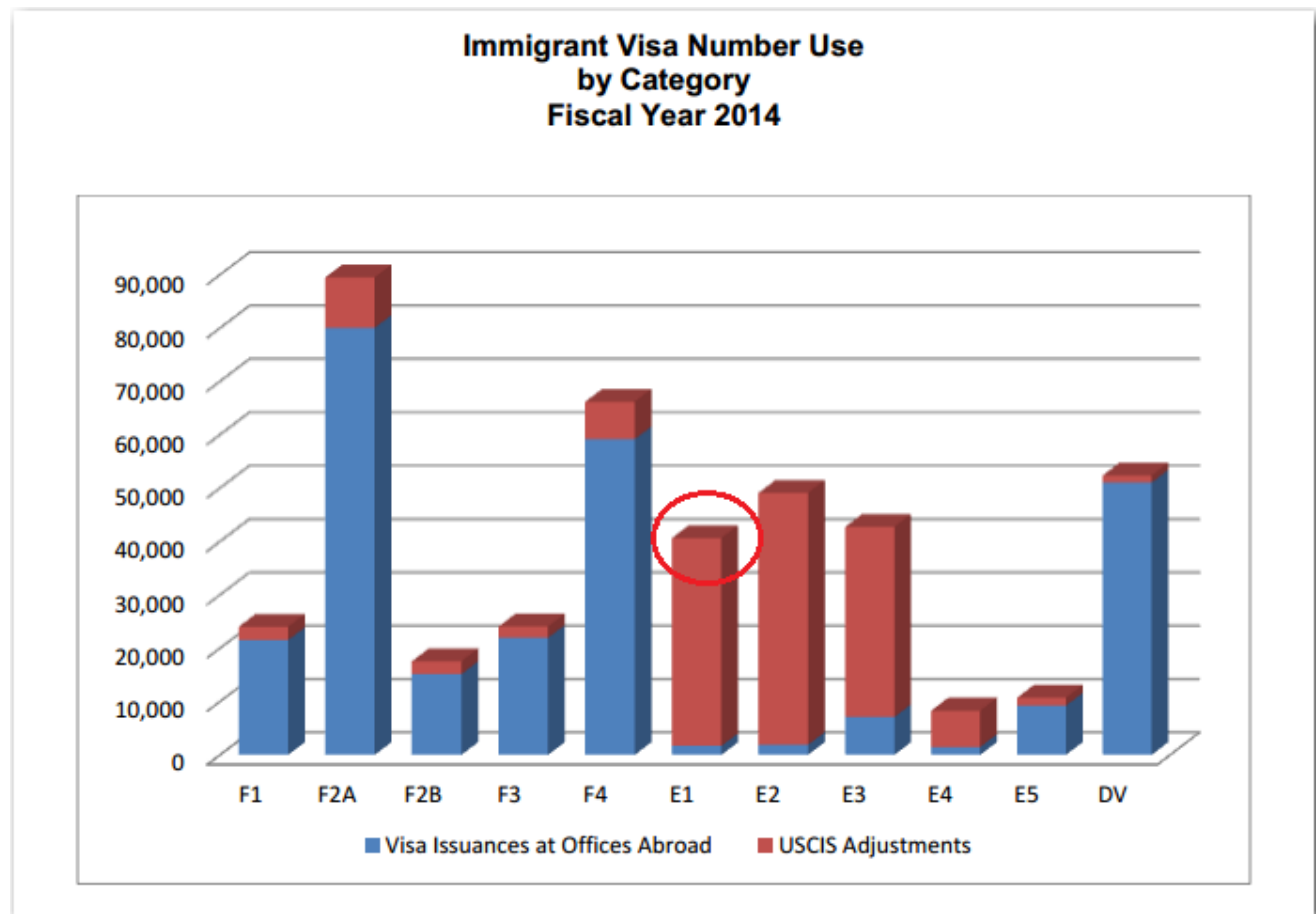
Thoughtful
arrangement = easier
interpretation

Arrangement

Example 1 – Axis scale



Example 2 – Poorly arranged data points



Color

Use

sites like [Color Brewer](#) to find color schemes suitable for reprinting in black-and-white and for colorblindness.

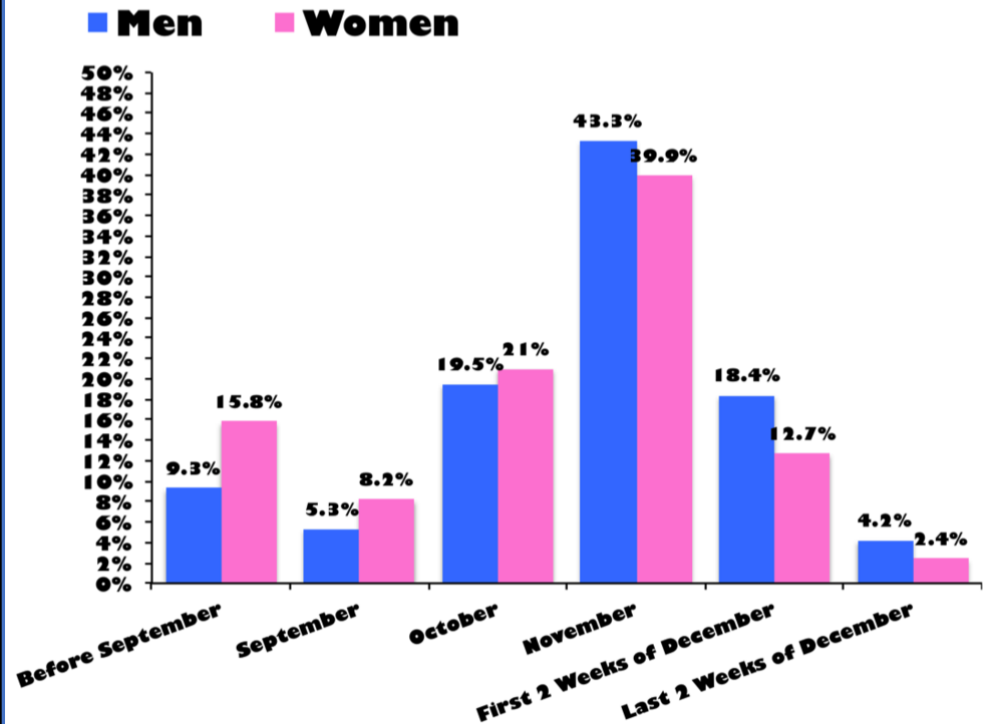
Consider

cultural connotations for colors:

- pink = girl
- blue = boy

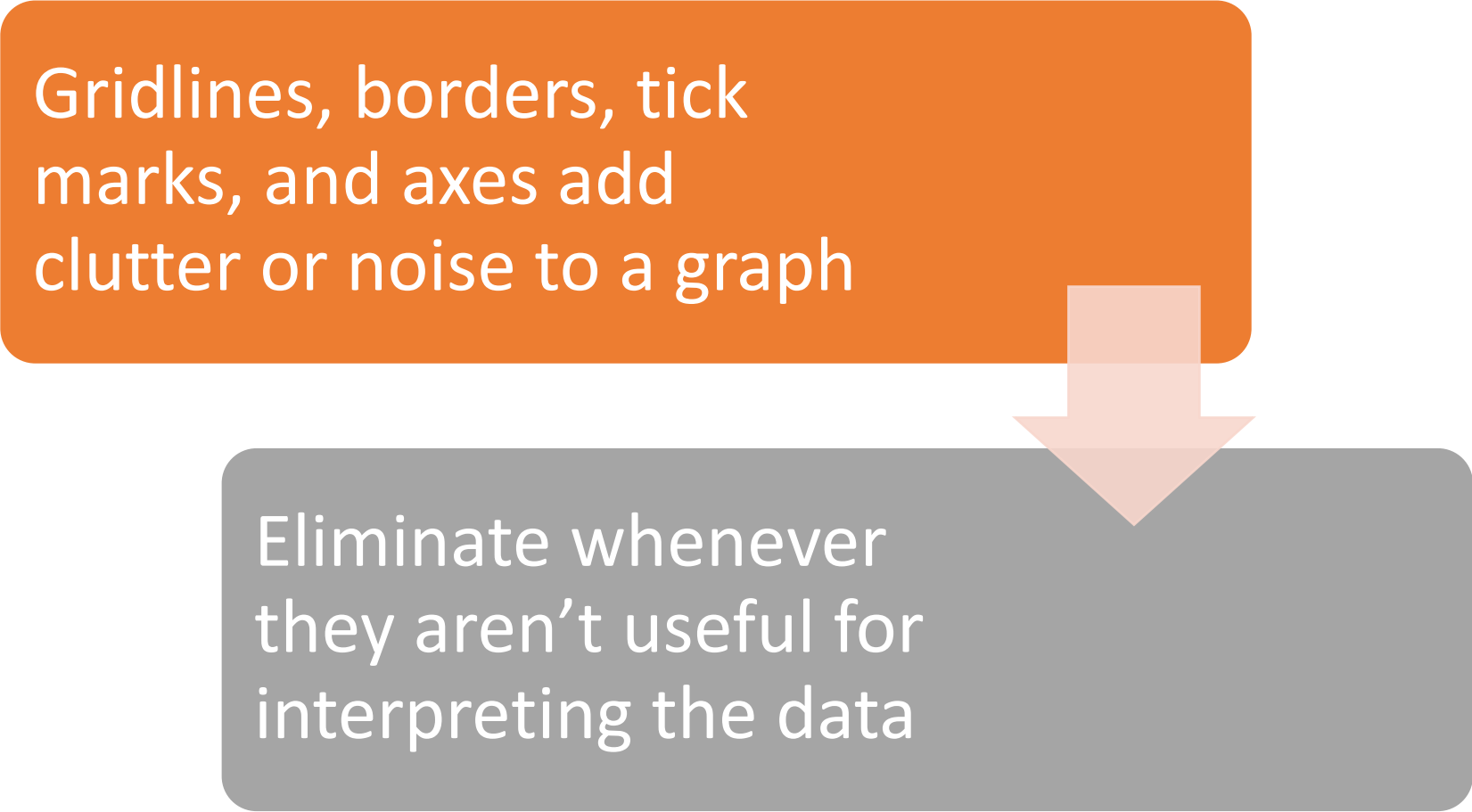
Example – Uses color to denote male vs. female

Shoppers Begins Shopping for Holidays



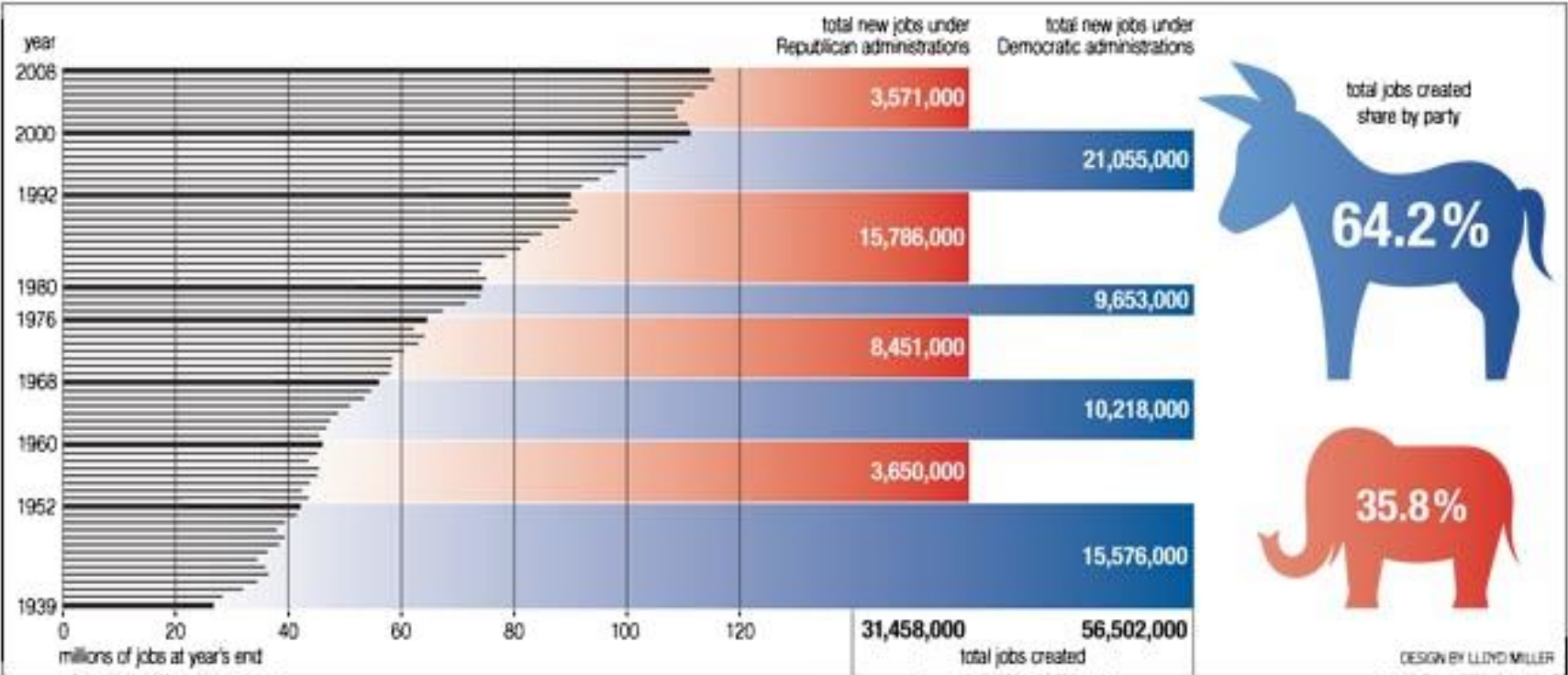
Lines – no unnecessary lines!

Gridlines, borders, tick marks, and axes add clutter or noise to a graph



Eliminate whenever they aren't useful for interpreting the data

Example 1 – Unnecessary Lines



Example 2 –
Ink to data
ratio

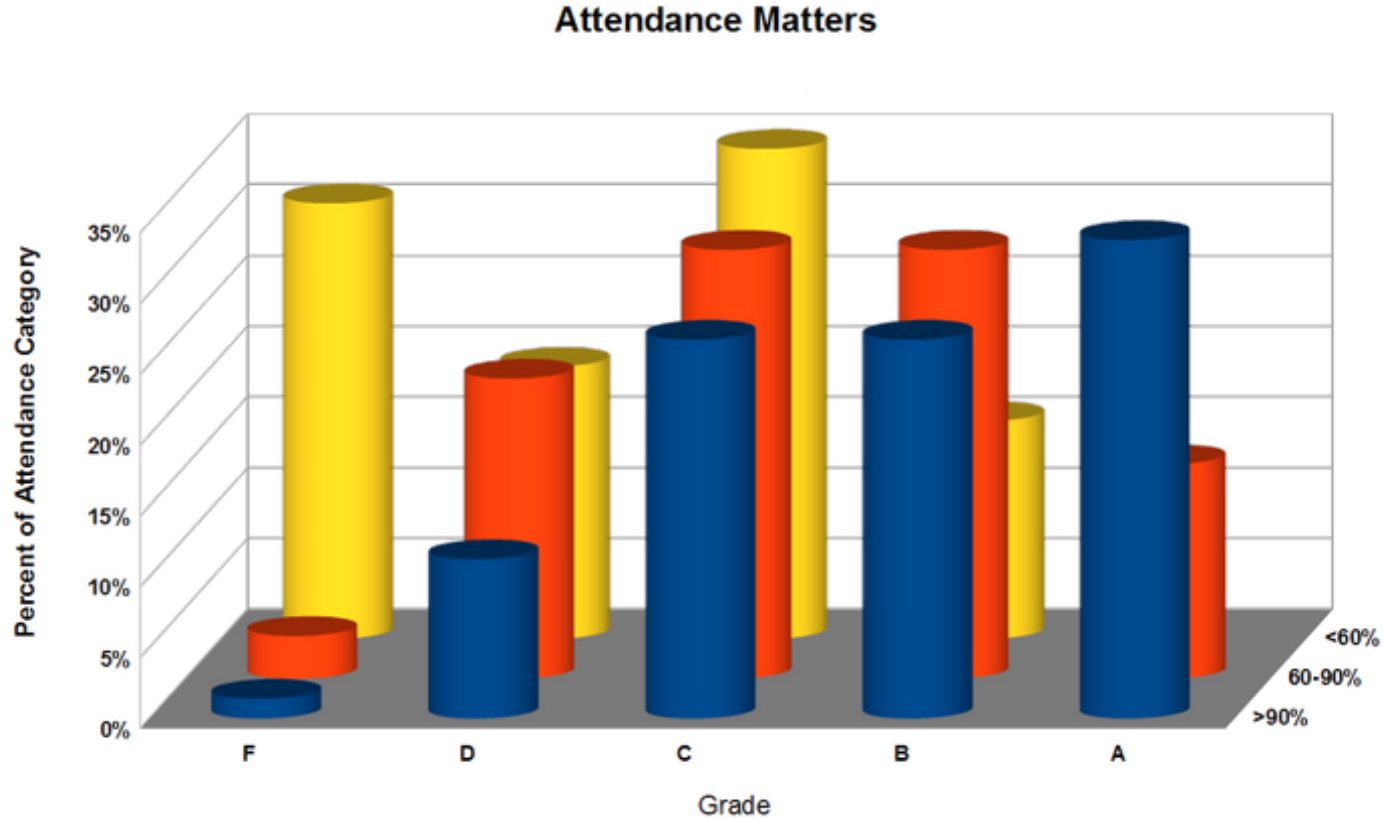


Only visualize data that
needs attention

Too many graphics of
unimportant information
dilute the power of
visualization



Example



How can I tell if it's just right?

Use Dr. Evergreen's checklist

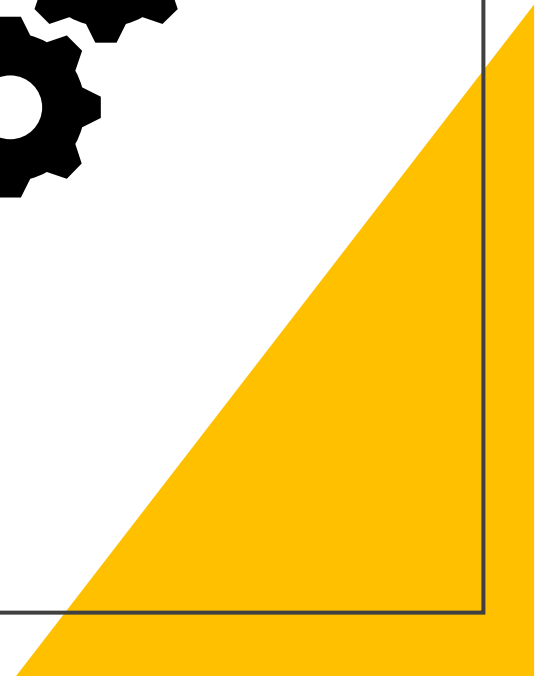
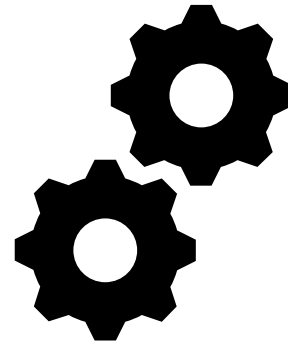
Data Visualization Checklist


by Stephanie Evergreen & Ann K. Emery
May 2016

This checklist is meant to be used as a guide for the development of high impact data visualizations. Rate each aspect of the data visualization by circling the most appropriate number, where 2 points means the guideline was fully met, 1 means it was partially met, and 0 means it was not met at all. n/a should not be used frequently, but reserved for when the guideline truly does not apply. For example, a pie chart has no axes lines or tick marks to rate. If the guidelines have been broken intentionally to make a point, rate it n/a and deduct those points from the total possible. Refer to the Data Visualization Anatomy Chart on the last page for guidance on vocabulary and the Resources at the end for more details.

	Guideline	Rating
Text		
Graphs don't contain much text, so existing text must encapsulate your message and pack a punch.	6-12 word descriptive title is left-justified in upper left corner Short titles enable readers to comprehend takeaway messages even while quickly skimming the graph. Rather than a generic phrase, use a descriptive sentence that encapsulates the graph's finding or "so what?" Western cultures start reading in the upper left, so locate the title there.	2 1 0 n/a
	Subtitle and/or annotations provide additional information Subtitles and annotations (call-out text within the graph) can add explanatory and interpretive power to a graph. Use them to answer questions a viewer might have or to highlight specific data points.	2 1 0 n/a
	Text size is hierarchical and readable Titles are in a larger size than subtitles or annotations, which are larger than labels, which are larger than axis labels, which are larger than source information. The smallest text - axis labels - are at least 9 point font size on paper, at least 20 on screen.	2 1 0 n/a
	Text is horizontal Titles, subtitles, annotations, and data labels are horizontal (not vertical or diagonal). Line labels and axis labels can deviate from this rule and still receive full points. Consider switching graph orientation (e.g., from column to bar chart) to make text horizontal.	2 1 0 n/a
	Data are labeled directly Position data labels near the data rather than in a separate legend (e.g., on top of or next to bars and next to lines). Eliminate/embed legends when possible because eye movement back and forth between the legend and the data can interrupt the brain's attempts to interpret the graph.	2 1 0 n/a
	Labels are used sparingly	2 1 0 n/a

Applying
these
practices!





What is a pivot table/chart?

- "...a pivot table provides an [interactive view of your data](#). With very **little effort** (and no formulas) you can look at the **same data from many different perspectives**. You can group data into categories, break down data into years and months, **filter data** to include or **exclude categories**, and even **build charts**." - [ExcelJet](#)

Why use a pivot table or chart for data analysis?

- Easy way to make your data more approachable – very quickly see how many responses from any subset of your data.
- Charts are visually appealing (with a little editing) and easy to use in reports
- Charts can be quickly filtered for deeper analysis
- User-friendly
- Easy to share

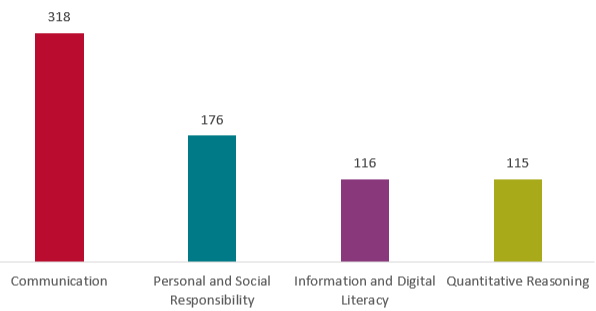
M18

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Submission Unique I	College/School/Brar	Course Pref	Level	Course Mod	Describe the way the	Essential Skill	Dimension1	Dimension2	Dimension3	Average Ratin		
2	553080076	College of Arts and Scie	ANTH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		1.75		
3	553080076	College of Arts and Scie	ANTH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		2.25		
4	553080076	College of Arts and Scie	ANTH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		3		
5	553080076	College of Arts and Scie	ANTH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		2.75		
6	554526513	College of Arts and Scie	MATH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		2		
7	554526513	College of Arts and Scie	MATH	1000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Application of Quantitative Models		2		
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15	558596287	Honors College	UHON	2000	Face to face	Assignment to an individ	Quantitative Reasoning	Communication and/or	Analysis of Quantitative	Application of Quantitat	1.67		
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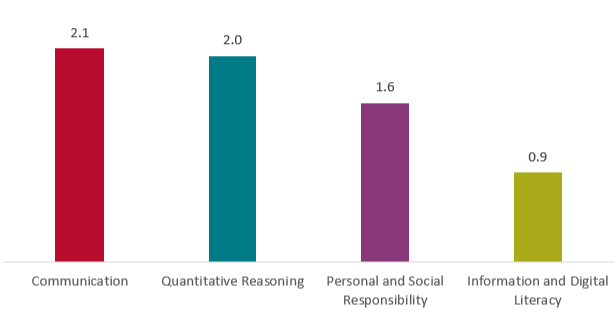
Data

General Education Assessment Results 2019-20

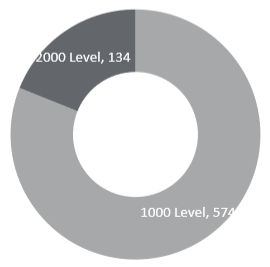
Artifacts Submitted by Essential Skill



Average Rating by Essential Skill



Artifacts Submitted by GE Course Level



Average Rating by GE Course Level



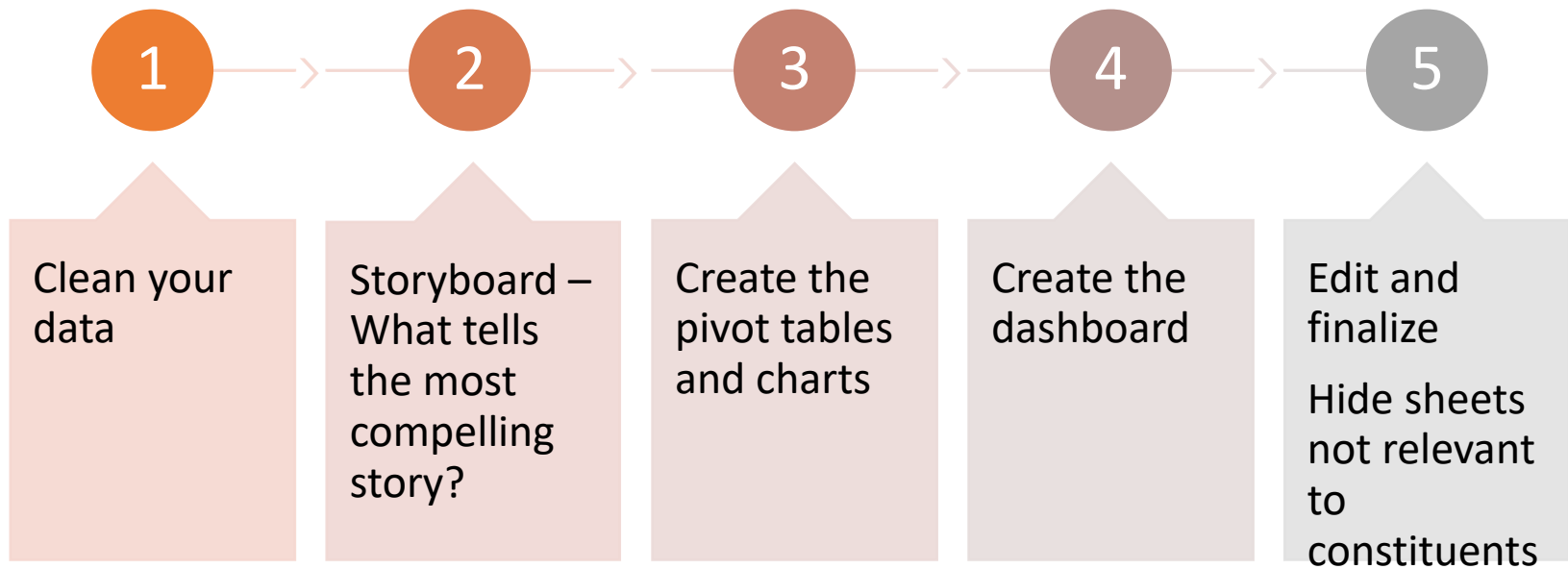
College/School/B...

- College of Arts and ...
- College of Fine Arts
- College of Populatio...
- Gallup Campus
- Honors College
- Los Alamos Campus
- School of Architect...
- School of Engineering

Course Modality

- Face to face
- Hybrid
- Online

Getting Starting:



Cleaning the Data

Organize the Source Data in a Tabular Format

Remove blank rows

Remove blank columns

Convert Value fields to numbers (not text)

Convert Date fields to dates (not text)

Make sure there are no blank dates

Rename column headers

Make sure all data you need are in the table

Practice!

The Pivot Table Source Data Checklist

The following is a list of items you should check before creating a Pivot Table.

Pivot Tables are an amazingly powerful tool and you will want to make sure your data is ready for the Pivot Table before you create it.

This includes organizing your data, formatting the numbers and text properly, removing blanks, and more.

It is best to go over this checklist each time you create a Pivot Table. It will save you time and help you get the most out of your Pivot Table by enabling features like Date Grouping.

Pivot Table Source Data Checklist

#1 - Tabular Format (one row of headers)

#2 - Remove blank rows

#3 - Convert date fields to dates

#4 - No blank cells in data columns

#5 - Rename column headers

#6 - Remove blank columns

#7 - Convert value fields to numbers

#8 - Put your data in an Excel Table

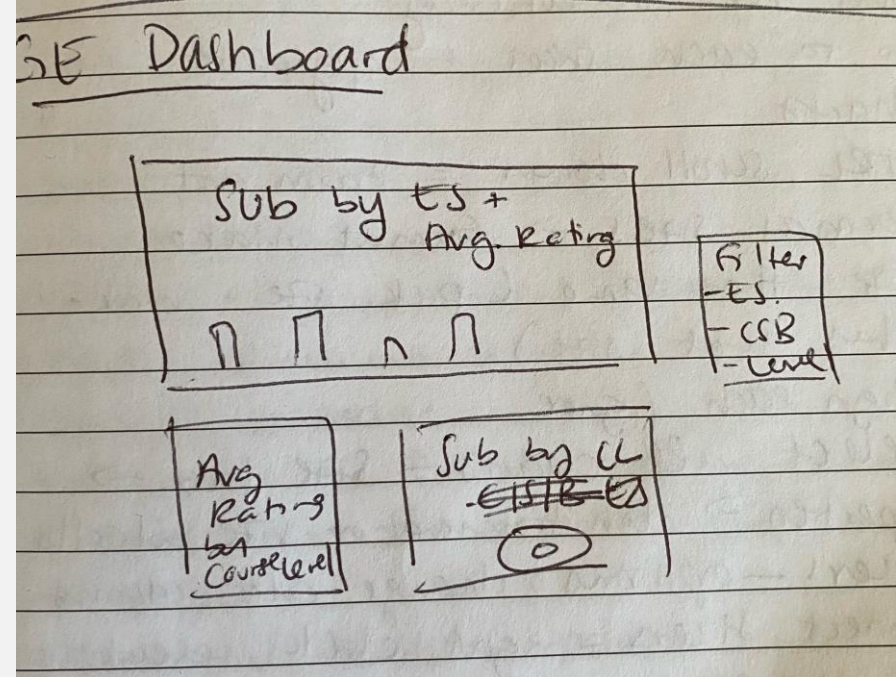
Order Date	Columns	Quantity	Revenue
Dec-1-14	Chai	64	\$1,152.00
Dec-2-14	Coffee	82	\$3,772.00
Dec-3-14	Green Tea	17	\$50.83
Dec-3-14	Cr...	88	\$680.80
Dec-5-14	Clam...	89	\$858.85
Dec-5-14	Syrup	49	\$280.00
Dec-8-14	Curry Sauce	29	\$480.00
Dec-8-14	Green Tea	12	\$296.01
Dec-9-14	Dried Pears	81	\$2,430.00

Pivot Table Checklist

ExcelCampus.com



Storyboard



Brainstorm your dashboard:

- What's the point?
- What visuals illustrate that point?
- How should the dashboard be interactive? How do I want people to be able to filter the data?

+



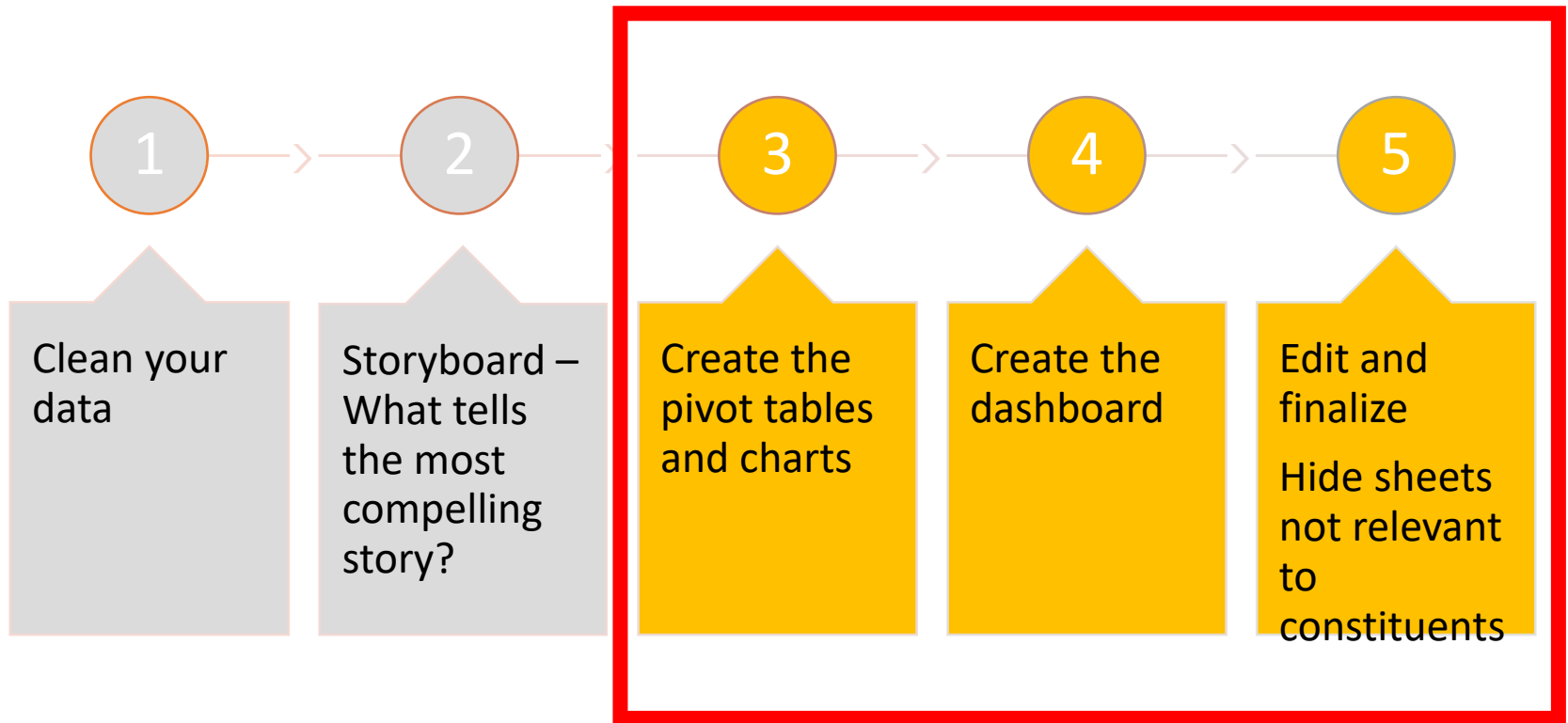
o

Storyboarding
= finding the
message!

Goal for demo dashboard:

- Be able to send dashboard to colleges, schools, and branches
- Have folks interact with the dashboard to see how their college, school, branch did with GE assessment
- Be able to view **submissions** and **ratings** by **essential skill & course level**

What's left?





Let's give it a try


Visualization Experts

Stephanie Evergreen, Ph.D.

- <https://stephanieevergreen.com/>

Edward Tufte, Ph.D.

- <https://www.edwardtufte.com/tufte/>



Pivot Table & Dashboard Resources!

- Microsoft Pivot Table How To:
 - <https://support.microsoft.com/en-us/office/create-a-pivortable-to-analyze-worksheet-data-a9a84538-bfe9-40a9-a8e9-f99134456576>
- Excel Jet Pivot Table How To:
 - <https://exceljet.net/lessons/why-pivot-tables>
- Excel Campus Pivot Table How To:
 - <https://youtu.be/9NUjHBNWe9M>
 - Data prep for Pivot Tables:
<https://www.excelcampus.com/wp-content/uploads/2016/02/Pivot-Table-Source-Data-Checklist-Excel-Campus.pdf>
 - Dashboard How To:
<https://youtu.be/9NUjHBNWe9M>

Questions?

