Best Practices in Data Visualization

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Agenda

- Course Objective
- Course Description
- Presentation
- Questions
Course Objective

- Gain an understanding how technology allows auditors to use data visualization to better deliver information to our clients and to the boards and senior managements of the organizations in which we work.
Course Description

The introduction of new technology allows auditors to use data visualization to better deliver information to our clients and to the boards and senior managements of the organizations in which we work. Our goal is to deliver actionable information quickly, in formats that are readily understandable, and delivered in ways that our users can easily access. We will take a look at industry best practices in visual presentation.
What is Data Visualization?

“The representation of information in the form of a chart, diagram, picture, etc.” Oxford Dictionary

“Data visualization transforms analytical output into visual formats, such as bubble charts, heat maps, and interactive graphs, enabling non-analysts to interpret results.” Deloitte
Why is it data visualization important?

“It is often with impotent exasperation that a person having the knowledge see some fallacious conclusion accepted, or some wrong policy adopted, just because know facts cannot be marshaled and presented in such manner as to be effective”

Willard C. Brinton, 1914
Best Practice in Data Visualization
Best Practice in Data Visualization?

- Graphical displays should:
  - Show the data
  - Introduce the viewer to think about the substance rather than about methodology, graphic design, the technology of graphic production, or something else.
  - Avoid distorting what the data have to say
  - Present many numbers in a small
  - Make large data sets coherent
  - Encourage the eye to compare different pieces of data
  - Reveal the data as several levels of detail, from a broad overview of the fine structure
  - Serve a reasonably clear purpose: description, exploration, tabulation, or decoration
  - Be closely integrated with the statistical and verbal descriptions of a data set.

What do you need for data visualization?

- Rich Content
  - Brings meaning to a graphic
- Inviting visualization
  - Interprets the content and highlights the essence of the information for the reader
- Sophisticated execution
  - Brings the content and the graphics to life

Process for Data visualization

1. Research
   - Use an independent source for disputable data
2. Edit
   - Identify your key message
3. Plot
   - Choose the right chart type to present the data
4. Review
   - Check the data against your sources

Using Charts

- Lines
- Vertical bars
- Horizontal bars
- Pies
- Tables

Using Lines

- Lines are best used to display continuous data series over a period of time.
  - Trends
  - Acceleration
  - Deceleration
  - Vitality

Using Lines

- Four or fewer lines
  - Keep the maximum numbers of lines to three or four
- Label the lines directly
  - Allows viewers to focus on message
- In black and white multiple-line chart, the darkest line should be the most important
- In a color chart, the most important line should be one color and the others a shade of another color

Using Lines

- Where could I use a line?
  - Issue Data
Using Vertical bars

- Vertical bars measure discrete (isolated) quantities, particularly for measuring distinct sets of data.

Using Vertical bars

- Where is the top of the bar?
  - Three-dimensional vertical bars are flat out wrong. The reader is left to guess where the top of the bar meets the grid.
- Let the bar stand on its own
  - The width of the bars should be about twice the width of the space between the bars
- Multiple bars and legends
  - Don’t label vertical bars with type at an angle on the x-axis. Instead, plot the data as horizontal bars.
  - The shading of the bars should move from lightest to darkest.
  - Keep multiple-bar charts to four or fewer categories.

Using Vertical bars
Using Horizontal bars

- The horizontal are chart is most useful when ranking the items by the same characteristic, such as ranking the countries by sales of a product.

Using Horizontal bars

- Left is negative, right is positive
  - Align the labels on either side of the baseline or keep them all flush left.

Using Horizontal bars

- David Carr
- Andy Thompson
- Karen Peary
- Sarah Ward
- (blank)
- Albert Lezcano
- Matt Sullivan
- Steven Zapolski
- Kristin Warner
- Brad Lowry
- Pam McCoy
- Jennifer Esterheld
- Patrick Rodriguez
- Chris Ryley
Using Pies

- Pie charts are good visual tools for showing portions of a whole

Using Pies

- Larger segments on top
  - Reading a pie chart is like reading a clock. It’s intuitive to start at 12 o’clock and go clockwise
  - Place the largest segment at 12 o’clock on the right to emphasize its importance
  - The second biggest slice will go on the left
  - The rest would follow counter clockwise

Using Pies

- Add distinction
  - White lines between slices
- Too many slices
  - No more than 5
- Highlight the important slice
- Go for a bar, instead of another pie
  - A segmented bar chart in general is more efficient than a pie chart at showing portions of a whole

Using Pies

- Closed - Verified
- Open
- Pending
- Started
- Closed - Not Verified (No Follow-up Required)
- Implemented
Using Pies

- Closed - Not Verified (No Follow-up Required): 6%
- Implemented: 4%
- Started: 6%
- Other: 16%
- Pending: 12%
- Open: 18%
- Closed - Verified: 54%

TOTAL
Using Tables

- Don’t resort to a table unless a huge amount of data has to be included and space is limited. Rows of numbers do not have any visual impact. It requires a lot of work for the reader to compare and contrast the data.

Using Tables

- Unhelpful grids
  - The busy grid lines distract the reader from the data
- Optimal visual guides
  - Use thin rules after every three to five entries to help the reader follow the numbers across a table
- Align whole numbers flush to the right
- Align decimal numbers numbers of the decimal point.

Using Tables

- Where would I use a table?

References:

- Congressional Budget Office
- The Visual Display of Quantitative Information, Dr. Edward Tufte
- Show Me the Numbers, Stephen Few
- Data Visualization Basics, David Doney
Questions?