Creating Powerful Visualizations
Yogi Schulz
Biography

- Corvelle Consulting
- Information technology related management consulting
- Microsoft Canada columnist & CBC Radio guest
- PPDM Association board member
- Industry presenter:
  - Project World - 6 years
  - PMI – SAC - 3 years
  - CIPS – many years
  - PPDM Association - several years
Percent Change in deaths per 100,000 from 1980 to 2014, by county

- Cancer
- Nutritional deficiencies
- Common infectious diseases
- Digestive diseases
- Musculoskeletal disorders
- Neglected tropical diseases & malaria

It appears that the regions with a high growth in Nutritional Deficiencies related deaths, are predominately the areas with a decline in fatal Musculoskeletal Disorders. Lack of physical activity could be a leading factor to explain this phenomenon.
Presentation Outline

- Introduction
- Learning objectives
- Powerful visualizations:
  - Understand visualizations
  - Create visualizations
  - Refine visualizations
  - Present and practice visualizations
- Recommendations & actions
Learning Objectives

- Understand design considerations that lead to powerful visualizations
- Understand effective techniques to create visualizations
- Understand best practice tips for presenting visualizations
Understand Visualizations

A Brief History of Data Visualization
When a Chart hits our Eyes
Whirlwind Tour of the History of Visualization

Charles Minard
1861
Florence Nightingale's 'Coxcombs'

1858

The diagram represents the causes of mortality in the army in the East from April 1855 to March 1856. The areas of the blue, red, and black wedges are each measured from the centre as the common vertex. The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, and the black wedges measured from the centre the deaths from all other causes. The black line across the red triangle in November 1854 marks the boundary of the deaths from all other causes during the month. In October 1854 and April 1855, the black area coincides with the red, in January and February 1856 the blue coincides with the black.
Willard C. Brinton, 1914

First business book about visualization

- Rules for presenting data
- American consulting engineer
Mary Eleanor Spear
1952, 1969

- Commonsensical advice
- Invented box plot
- Worked for various US government agencies
Jacques Bertin  
1967

- Principle of expressiveness:
  - Say everything you want to say
    - no more, no less
  - Don’t mislead

- Principle of effectiveness:
  - Use the best method available for showing your data

- Cartographer
Jacques Bertin
Seven Visual Variables

<table>
<thead>
<tr>
<th>Visual Variable</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Changes in the x, y location</td>
</tr>
<tr>
<td>Size</td>
<td>Change in length, area or repetition</td>
</tr>
<tr>
<td>Shape</td>
<td>Infinite number of shapes</td>
</tr>
<tr>
<td>Value</td>
<td>Changes from light to dark</td>
</tr>
<tr>
<td>Colour</td>
<td>Changes in hue at a given value</td>
</tr>
<tr>
<td>Orientation</td>
<td>Changes in alignment</td>
</tr>
<tr>
<td>Texture</td>
<td>Variation in ‘grain’</td>
</tr>
</tbody>
</table>
Edward Tufte
1983 -

- Disciplined design principles
- Minimalist approach
- Professor emeritus at Yale University
Automatically encode data with software
Enable people to focus on ideas, concepts
Added eighth variable to Bertin’s list: motion
VP of Research and Design, Tableau Software
When a Chart hits our Eyes

1. Visuals aren’t read in a predictable, linear way
   - Create charts spatially, from the visual outward

2. We see first what stands out
   - Whatever stands out should support idea

3. We see only a few visuals at once
   - Plot as few visual elements as possible

4. We seek meaning and make connection
   - Relate visual elements in a meaningful way

5. We rely on conventions and metaphors
   - Embrace deeply ingrained conventions
Example: USA Energy Resources

Corvelle Drives Concepts to Completion
Do you want me to put the chart on one page, which would make the text too small for your audience to see?

It's probably better if no one can read it.

I won't bother using real words.

Or do you prefer a multiple-page approach that is confusing and unpersuasive?
Create Visualizations

What kind of visual communication do you want to create?
Better Charts in an Hour
What kind of visual communication do you want to create?

1. Is my information conceptual or data-driven?
   - Conceptual information is qualitative.
   - Data-driven information is quantitative.

2. Are my visuals meant to be declarative or exploratory?
   - A declarative purpose is to make a statement.
   - An exploratory purpose is to look for new ideas.
Four Types of Visualizations

Declarative

Exploratory
1. Better Charts in an Hour

Preparation: 5 minutes

- Create a workspace
- Put aside your data
- Write down basics as constant reminders
2. Better Charts in an Hour
Talk and listen: 15 minutes

- Enlist a colleague
- Capture words, phrases, and statements
Better Charts in an Hour

Sketch: 20 minutes

- Match keywords to chart types
- Start sketching, try out multiple visuals
Better Charts in an Hour
Prototype: 20 minutes

Prototype approach

Corvelle Drives Concepts to Completion
Example: Capital Exposure and Risk
I don’t have anything useful to say so I made this pie chart.

Identify a Valuable Message

That worked too well.

I pledge my life and my fortune to the pie!

Ohoh! It must be true because it’s pie.

Ohoh!
Refine

Visualizations

Refine to Impress
Refine to Persuade
Persuasion or Manipulation?
Creating that sense of good design

1. Focus on design structure and hierarchy:
   – Include: title, subtitle, visual field, source line
   – Align elements

2. Focus on design clarity
   – Make all elements support visual
   – Remove ambiguity
   – Use conventions and metaphors

3. Focus on design simplicity
   – Show only what’s needed
   – Minimize the number of colors
Refine to Persuade

Making an accurate chart not enough

1. Hone the main idea
   – Start by saying I need to convince the audience that . . .

2. Make main idea stand out
   – Use simple design techniques to reinforce your main idea
   – Emphasize the main idea
   – Isolate the main idea

3. Adjust what’s around main idea
   – Manipulate variables that complement main point
   – Eliminate data that distracts or dilutes
   – Add data to expose hidden context
   – Change data to create new context
1. **Truncated Y-axis**
   - A chart removes valid value ranges from the y-axis, thereby removing data from the visual field.

2. **Double Y-axis**
   - A chart includes two vertical scales for different data sets in the visual field.

3. **Map**
   - A map uses geographical boundaries to encode values related to that location.
Crossing the Line between Persuasion and Manipulation

- Does my chart make it easier to see the idea, or is it actively changing the idea?
- Does the new idea contradict or fight with the idea in the less persuasive chart?
- Does eliminating information hide something that would challenge the idea I’m showing?
- Would I feel duped if someone else presented me with a chart like this?
Example: Charting the Wrong Variable

Cumulative Annual Revenue

Annual Revenue
“We’re out of crayons . . .”
Present and Practice Visualizations

Present to Persuade
Visual Critique
Present to Persuade
Presentation Tips

- Show the chart and stop talking
- Talk about the ideas in the chart
- Guide the audience for unusual visual forms
- Use reference charts
- Turn off your chart when you have something important to say
- Show something simple
Present to Persuade

Engagement Tips

- Create tension
- Use time
- Zoom in or out
- Bait and switch
- Deconstruct and reconstruct
- Tell stories

I still have 37 more slides to go!
Visual Critique

- Make a note of the first few things you see
- Make a note of the first idea that forms in your mind and then search for more
- Make notes on likes, dislikes, and wish-saws
- Find three things you'd change
- Sketch and prototype your own version, and critique yourself
Example: Energy Flow

Energy Flow Chart 2012 (million tonnes of oil equivalent)
As requested, I fit my presentation on one PowerPoint slide.

I had to use all of the white space, but I think it was worth it to fit everything on one page.

It's actually only one bullet point, but it's a long one.
Recommendations

- Understand visualizations
  - Enhance your understanding of visualizations

- Create visualizations
- Refine visualizations
  - Never be satisfied with the first version of a visualization
- Present and practice visualizations
  - Invest time to practice the presentation
Can you help us create powerful visualizations?

Please fill out evaluation form

Questions & Discussion
Creating Powerful Visualizations

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Analytics time has come, so learn how your business can unlock the value
  – [http://www.itworldcanada.com/blog/analytics-time-has-come-so-learn-how-your-business-can-unlock-the-value/394348](http://www.itworldcanada.com/blog/analytics-time-has-come-so-learn-how-your-business-can-unlock-the-value/394348)

Analytics trends for 2016

Big data is useless without visual analytics

Business Intelligence – experiencing more hype than value?

Business value of data modeling

Can visual analytics be the savior of the oil and gas industry?

Channeling the cynicism of BI practitioners
Corvelle Bibliography

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- How Project Management is Shaping the Future Of Visual Analytics

- Is data modelling really dead?

- Is your company data-driven?
  – http://www.itworldcanada.com/blog/is-your-company-data-driven/385732

- What data can’t be expected to do

- Why you need visual analytics
A Good Example of Misleading Visualization

The analysis of visual variables for use in the cartographic design of point symbols for mobile Augmented Reality applications
– Łukasz Halik, Adam Mickiewicz University Poznan
– http://www.iag-aig.org/attach/30dee1f85f7bd479367f1f933d48b701/V61N1_2FT.pdf

The Benefits and Future of Data Visualization
– StatSilk founder Frank van Cappelle

Charting Statistics
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– Steve Proctor, March 17, 2017
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  - Mark Monmonier
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  - Infographics are all over the place nowadays. How do you know which ones to trust? Follow these three easy steps to save yourself from getting duped.
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Misleading with pictures: The pitfalls of data visualization
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