

CORVELLE CONSULTING

CALGARY GEOSCIENCE Data Managers Society

Create Powerful Data Visualizations

CGDMS Webinar
6 May 2020

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Yogi Schulz Biography

- ❑ Founder at Corvelle Consulting
- ❑ Information technology related management consulting
- ❑ IT World Canada columnist & CBC Radio guest
- ❑ Former PPDMS Association board member
- ❑ Industry presenter:
 - Project World - 6 years
 - PMI – SAC - 10 years
 - PMI - Information Systems SIG - 2 years
 - PPDMS Association - many years



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Topic Outline

- ❑ Introduction
- ❑ Learning objectives
- ❑ Powerful data visualizations:
 - Understand visualizations
 - Create visualizations
 - Refine visualizations
 - Practice and present visualizations
- ❑ Recommendations & actions



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Vast Data Visualization Choice

Percent Change in deaths per 100,000 from 1980 to 2014, by county

Cancer	Nutritional deficiencies	Common infectious diseases
Digestive diseases	Musculoskeletal disorders	Degenerative diseases & injuries

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Learning Objectives

- ❑ Understand design considerations that lead to powerful data visualizations
- ❑ Understand effective tips for presenting data visualizations
- ❑ Understand best practices for presenting data visualizations



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Understand Visualizations

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



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Whirlwind Tour of the History of Visualization

- William Playfair 1786
- Tables & Ledgers 1700's
- Data in prose
- Cave drawings BCE

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Charles Minard 1861 First Infographic

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Florence Nightingale's 'Coxcombs' 1858

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Willard C. Brinton 1914 First business book about visualization

- Rules for presenting data
- American consulting engineer

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Mary Eleanor Spear 1952, 1969

- Common-sense advice
- Invented box plot
- Worked for various US government agencies

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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

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Jacques Bertin Seven Visual Variables

- Position
- Color
- Size
- Shape
- Brightness value
- Orientation
- Texture

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Edward Tufte 1983

- Disciplined design principles
- Minimalist approach
- Professor emeritus at Yale University

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Jock Mackinlay 1986

- 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

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When a Chart hits our Eyes

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When a Chart hits our Eyes

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

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When a Chart hits our Eyes

- Visuals aren't read in a predictable, linear way
 - Create charts spatially, from the visual outward
- We see first what stands out
 - Whatever stands out should support idea

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When a Chart hits our Eyes

- ❑ Visuals aren't read in a predictable, linear way
 - Create charts spatially, from the visual outward
- ❑ We see first what stands out
 - Whatever stands out should support idea
- ❑ We see only a few visuals at once
 - Plot as few visual elements as possible

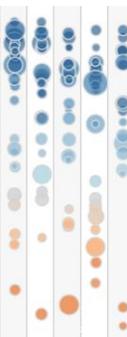


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When a Chart hits

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 - Plot as few visual elements as possible
- ❑ We seek meaning and make connection
 - Relate visual elements in a meaningful way



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When a Chart hits our Eyes

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 - Create charts spatially, from the visual outward
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- ❑ We see only a few visuals at once
 - Plot as few visual elements as possible
- ❑ We seek meaning and make connection
 - Relate visual elements in a meaningful way
- ❑ We rely on conventions and metaphors
 - Embrace deeply ingrained conventions



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Example: USA Energy Resources



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Alternative Charts



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Create Visualizations

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



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What kind of visual communication do you want to create?

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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

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Four Types of Data Visualizations

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Four Types of Data Visualizations

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Better Visualizations in an Hour

Step 1.	Preparation:	5 minutes
Step 2.	Talk and listen:	15 minutes
Step 3.	Sketch:	20 minutes
Step 4.	Prototype:	20 minutes

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1. Preparation: 5 minutes

- Create a workspace
- Put aside your data
- Write down basics as constant reminders:
 - Who is in my audience?
 - What is the setting?

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2. Talk and listen: 15 minutes

- Enlist a colleague
- Write down words, phrases, and statements



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3. Sketch: 20 minutes

- Match keywords to chart types
- Start sketching, try out multiple visuals



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Major Visualizations Types

Visualizations Type	Purpose
Comparison	To compare the magnitude of measures
Change over time	To display the changing trend of measures
Part-to-whole	To identify the parts making up a measure total
Flow	To display a flow or dynamic relations
Ranking	To rank measures in an order
Spatial	To display measures over spatial maps
Distribution	To display the distribution of values
Correlation	To show correlations between measures
Single	To present single values
Narrative	To tell a story with data
Filter	To control report filters

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Great article to read: [Microsoft Visualization types in Power BI](#)

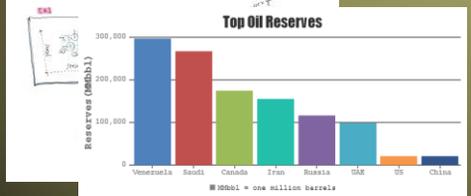


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4. Prototype: 20 minutes

- Prototype approach



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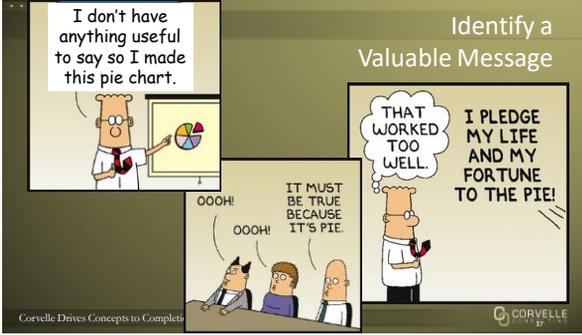
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Example: Capital Exposure and Risk



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Refine Visualizations

Refine to Impress
Refine to Persuade
Persuasion or Manipulation?

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Refine to Impress
Creating that sense of good design

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

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Refine to Impress
Creating that sense of good design

- Focus on design structure and hierarchy:
 - Include: title, subtitle, visual field, source line
 - Align elements
- Focus on design clarity:
 - Make all elements support visual
 - Remove ambiguity
 - Use conventions and metaphors

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Refine to Impress
Creating that sense of good design

- Focus on design structure and hierarchy:
 - Include: title, subtitle, visual field, source line
 - Align elements
- Focus on design clarity:
 - Make all elements support visual
 - Remove ambiguity
 - Use conventions and metaphors
- Focus on design simplicity:
 - Show only what's needed
 - Minimize the number of colors

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Refine to Persuade
Making an accurate chart not enough

- Hone main idea:
 - Start by saying I need to convince the audience
- Make main idea simple:
 - Use simple
 - Emphasize
- Adjust with:
 - Manipulate
 - Eliminate
 - Add data to

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Persuasion or Manipulation?

1. Truncated Y-axis
 - A chart removes valid value ranges from the y-axis, thereby removing data from the visual field
2. Doubled Y-axis
 - A chart uses two different scales for the same data
3. Map
 - A map to encourage a specific perspective

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Example: Charting the Wrong Variable

Total revenue generated by arcades correlates with Computer science doctorates awarded in the US

Correlation: 98.51% (r=0.985055)

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Not so Effective Design

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.

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Present and Practice Visualizations

Present to Persuade Visual Critique

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Example of bar chart

Create beautiful charts online

- Show the chart and stop talking
- Talk
- Guide
- Use
- Turn
- Pre
- Show

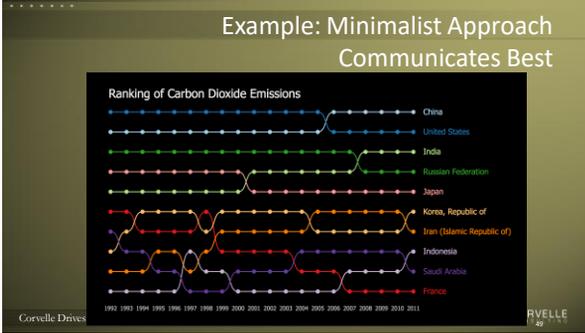
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Present to Persuade

Share of world population by region 1950 Tips

- Create tension
- Use time
- Zoom
- Deconstruct
- Tell story

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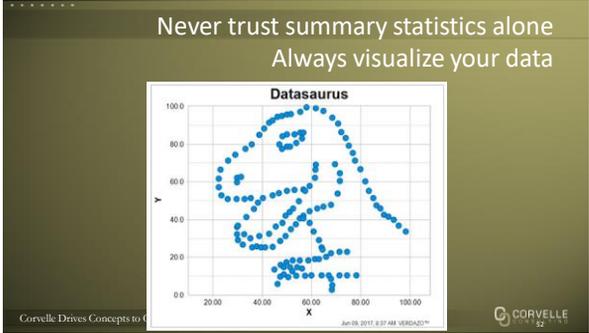
- Understand visualizations
 - Enhance
 - Create Visuals
 - Experiment

Revenue for Top Channels Oct 2012

Channel	Revenue
Direct	~\$250,000
Paid Search	~\$150,000
Organic Search	~\$100,000
Referral	~\$100,000
Social	~\$50,000
Search	~\$50,000
Affiliate	~\$200,000

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