I SEE WHAT YOU MEAN:

Prospect Research & Visualization

Erin Moffatt
Prospect Research Analyst,
University of Alberta

Liz Murray
Manager, Knowledge & Systems,
Sunnybrook Foundation

SESSION DATE: October 13, 2016

SESSION TIME: 10:30 to 11:45 AM

Presentation Overview

1) **About Visualizations**
   - Visualization Defined
   - Why Visualization?
   - Classification of Visualization

2) **Designing Visualizations**
   - Process

3) **Tips & Tools**
   - Best Practices
   - Software

4) **Wrap Up**
   - Index of Examples
   - Further Reading
   - Contact Us
   - Questions?

About Visualizations

Visualization Defined

- Our definition:
  - A **communication tool** used to help an **intended audience** to **better understand the significance** of a **specific dataset** or **curated message** by placing it in a **visual context**
  - i.e. Maps, Infographics, Charts, Diagrams, Ikea Instructions, etc.

- Used for both concrete and abstract ideas

Designing Visualizations

Visualization Defined

History of Visualization

- Earliest examples:
  - ~200 BC – Geometric diagrams recording the position of stars and map creation to aid in navigation and exploration

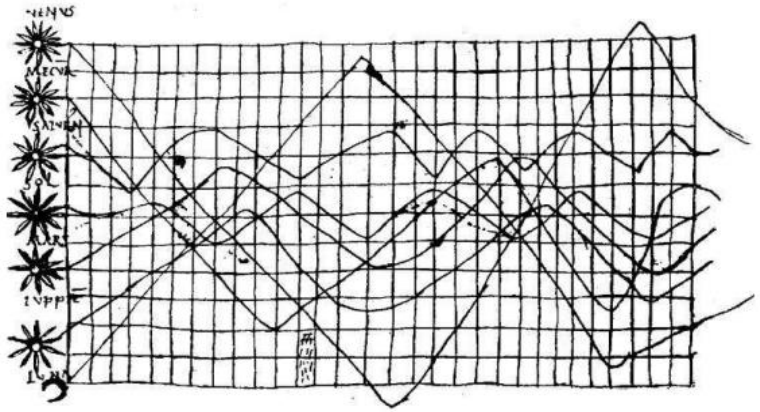

Figure 2: Planetary movements shown as cyclic inclinations over time, by an unknown astronomer, appearing in a 10th century appendix to commentaries by A. T. Macrobius on Cicero's *In Somnium Scripionus*. Source: Funkhouser (1936, p. 261).

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Designing Visualizations

Visualization Defined

History of Visualization

- 19th Century:
  - Bar and pie charts, histograms, line graphs and time-series plots, contour plots, scatterplots, etc.
  - Thematic cartography: mapping progressed from single maps to comprehensive atlases, depicting data on a wide variety of topics (economic, social, moral, medical, physical, etc.)
  - 3D visualizations

Designing Visualizations

Visualization Defined

History of Visualization

- 1759-1823 - William Playfair: first line graph, bar chart, pie chart and circle graph

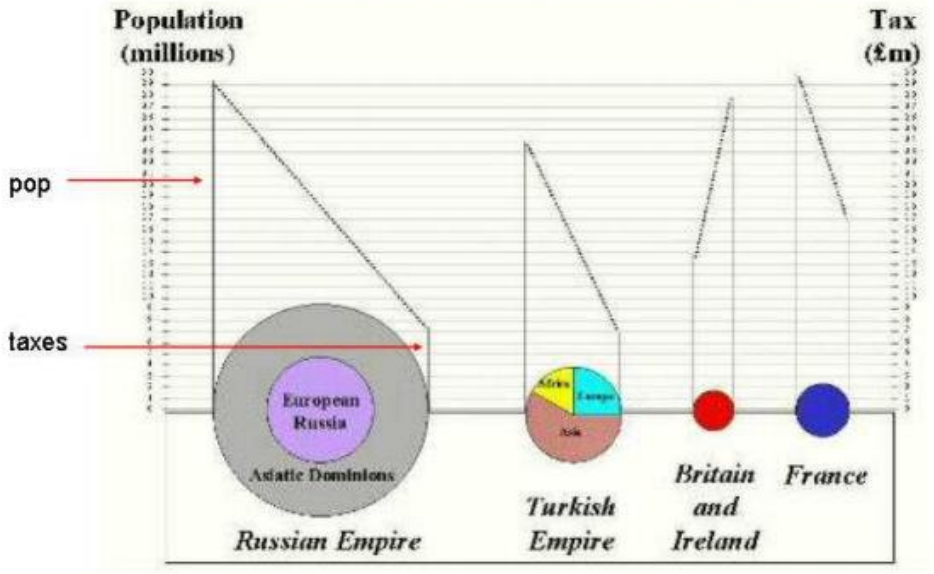

Figure 6: Re-drawn version of a portion of Playfair's 1801 pie-circle-line chart, comparing population and taxes in several nations.

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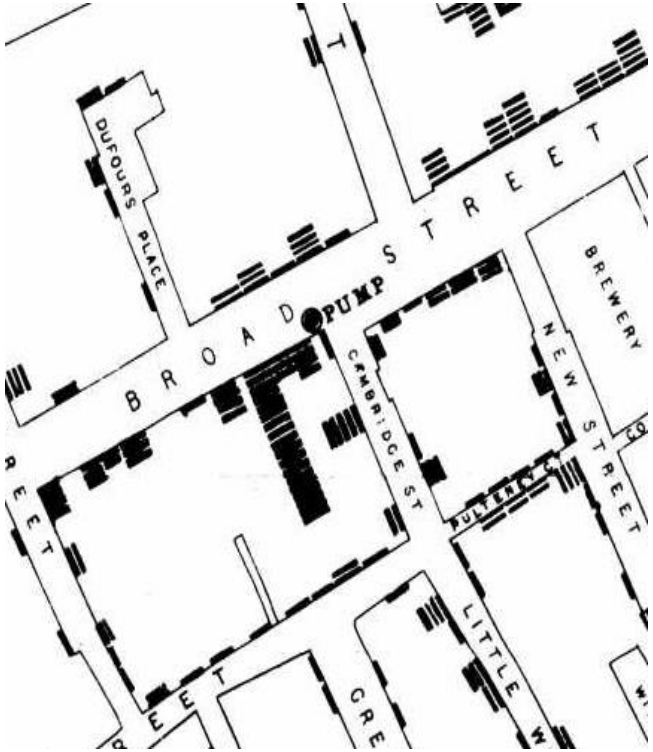
Visualization Defined

History of Visualization

- 1854 - Dr. John Snow: mapping the London Cholera Outbreak



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Visualization Defined

History of Visualization

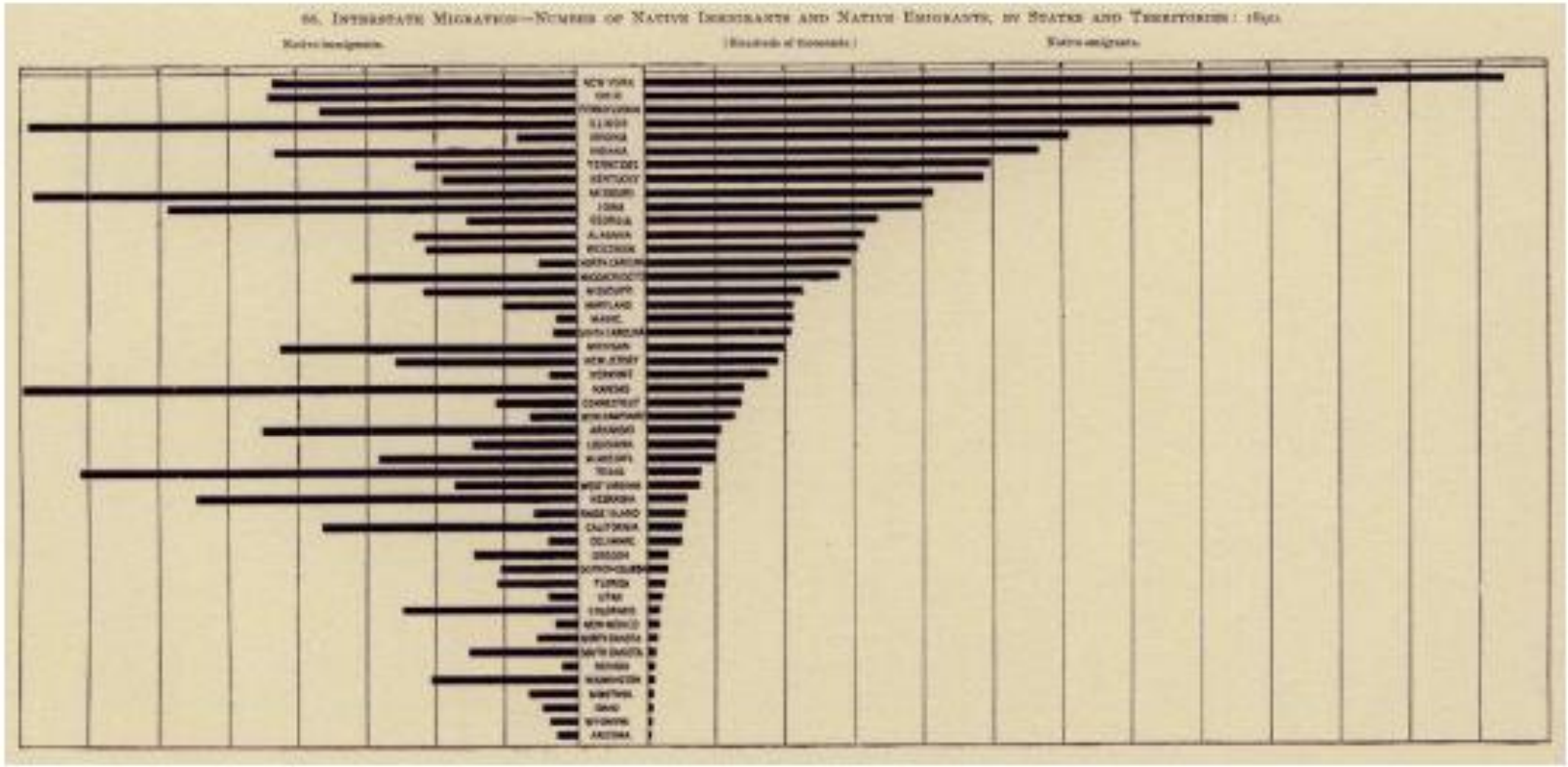

Figure 13: Interstate migration shown by back-to-back bar charts, sorted by emigration. *Source*: Statistical Atlas of the Eleventh Census, 1890, diagram 66, p. 23 (author's collection).

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Designing Visualizations

Visualization Defined

History of Visualization

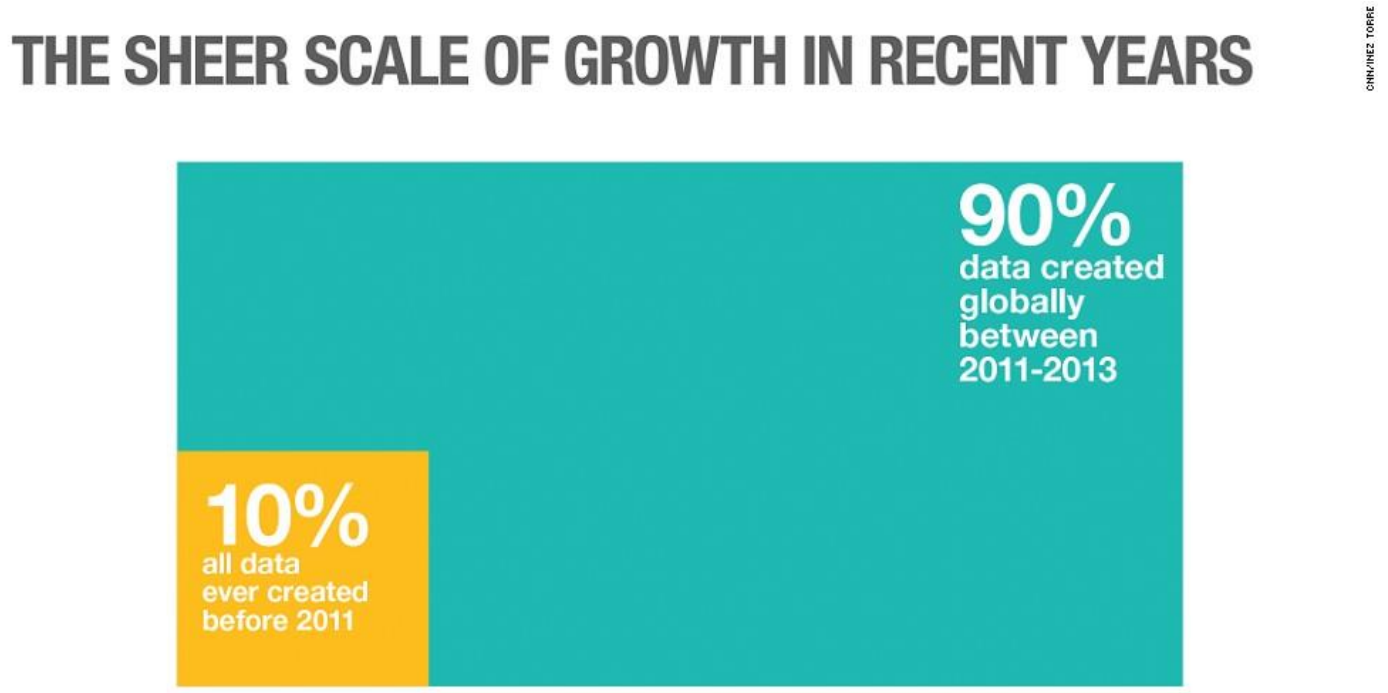
- 20th Century:
  - Statistical graphs become main stream, appearing in textbooks, curriculum, and standard use in government, commerce and science
  - Computer science, data analysis and display and input technology
  - Information presentation and interaction

Designing Visualizations

Visualization Defined

History of Visualization

- 21st Century:
  - Rise of big data



Designing Visualizations

Visualization Defined

History of Visualization

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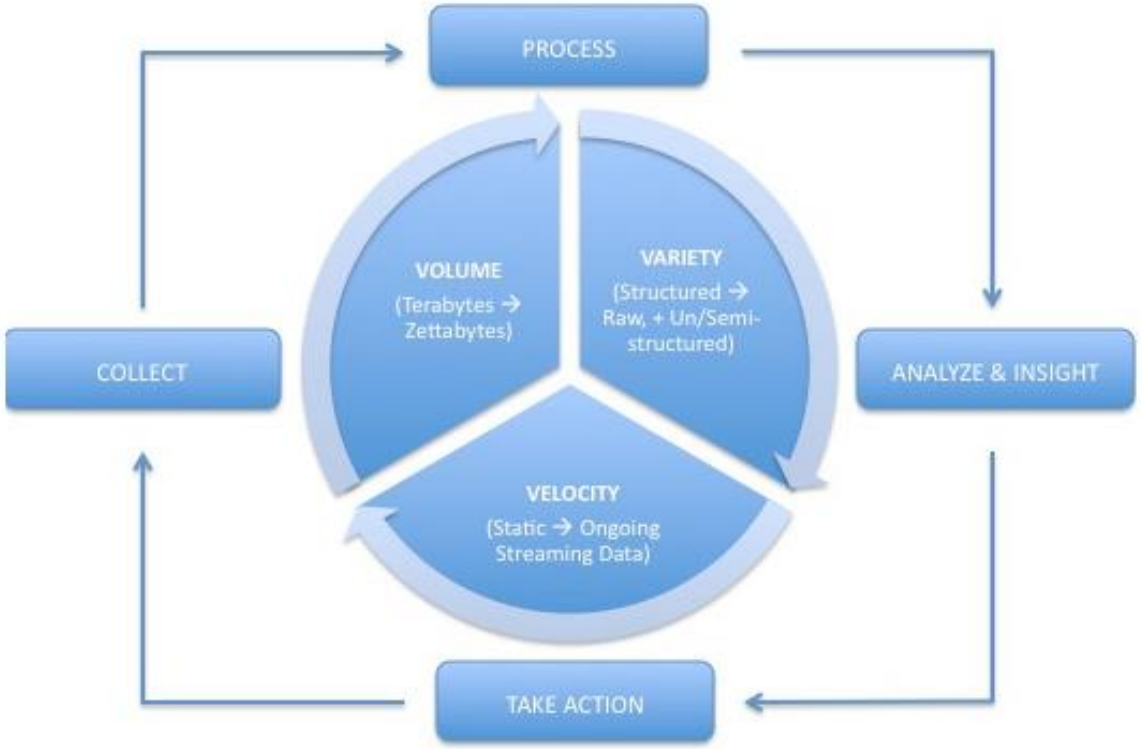
  - Rise of big data



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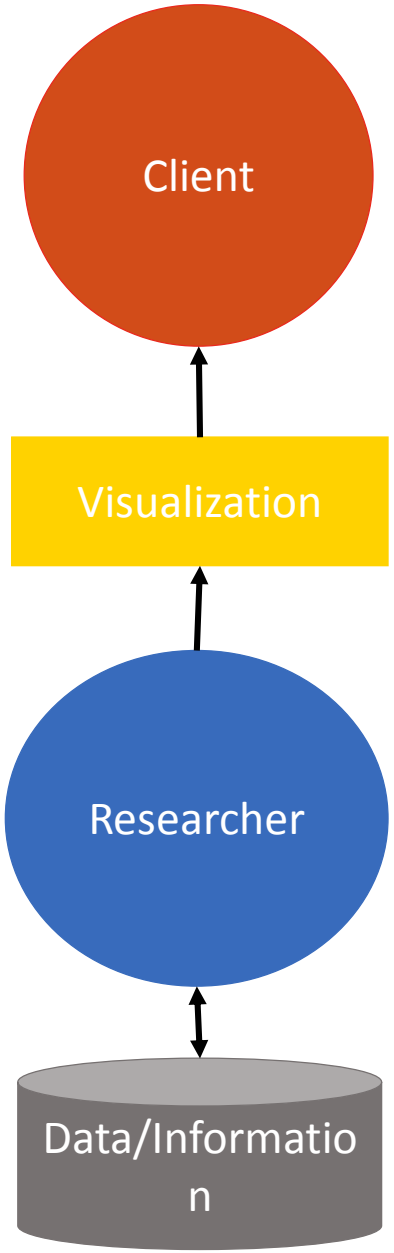
About Visualizations

Visualization Defined **Elements**

- **Data/Information**
  - Foundation of Visualization
  - Researcher interacts w/ data/information
- **Researcher (Designer)**
  - Must make design decisions based on the Client and the Data/Information



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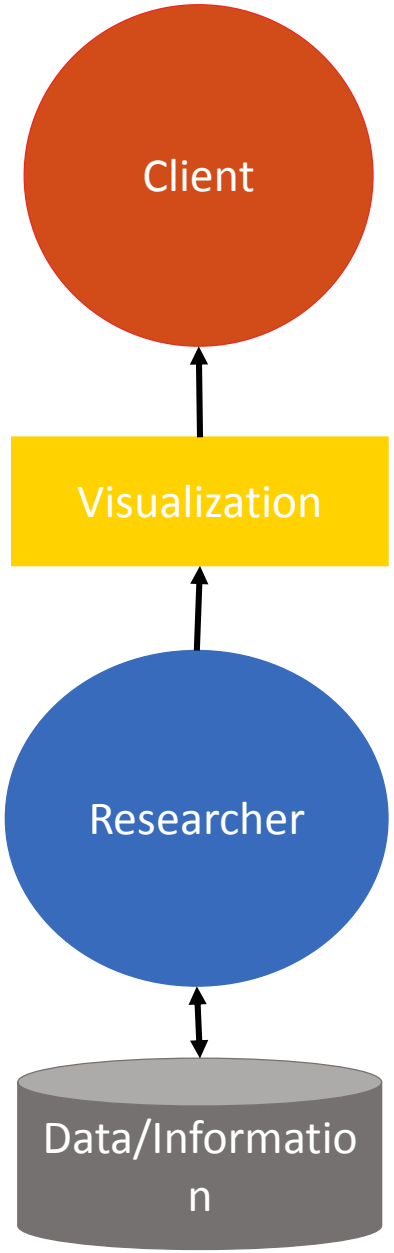
About Visualizations

Visualization Defined **Elements**

- **Visualization**
  - Communication tool between Researcher and Client
- **Client**
  - Researcher's success is measured based on the Client's success



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About Visualizations

Visualization Defined

Main Types

Infographics	Data Visualization
◆ Manually drawn • Custom treatment of information ◆ Specific to one dataset • Difficult to change or update ◆ Non-Quantifiable Data • Less uniform data	◆ Algorithmically drawn • Largely rendered with the help of computerized methods ◆ Easy to regenerate with different datasets ◆ Quantifiable Data • i.e. Numbers!

About Visualizations

Visualization Defined

Main Types

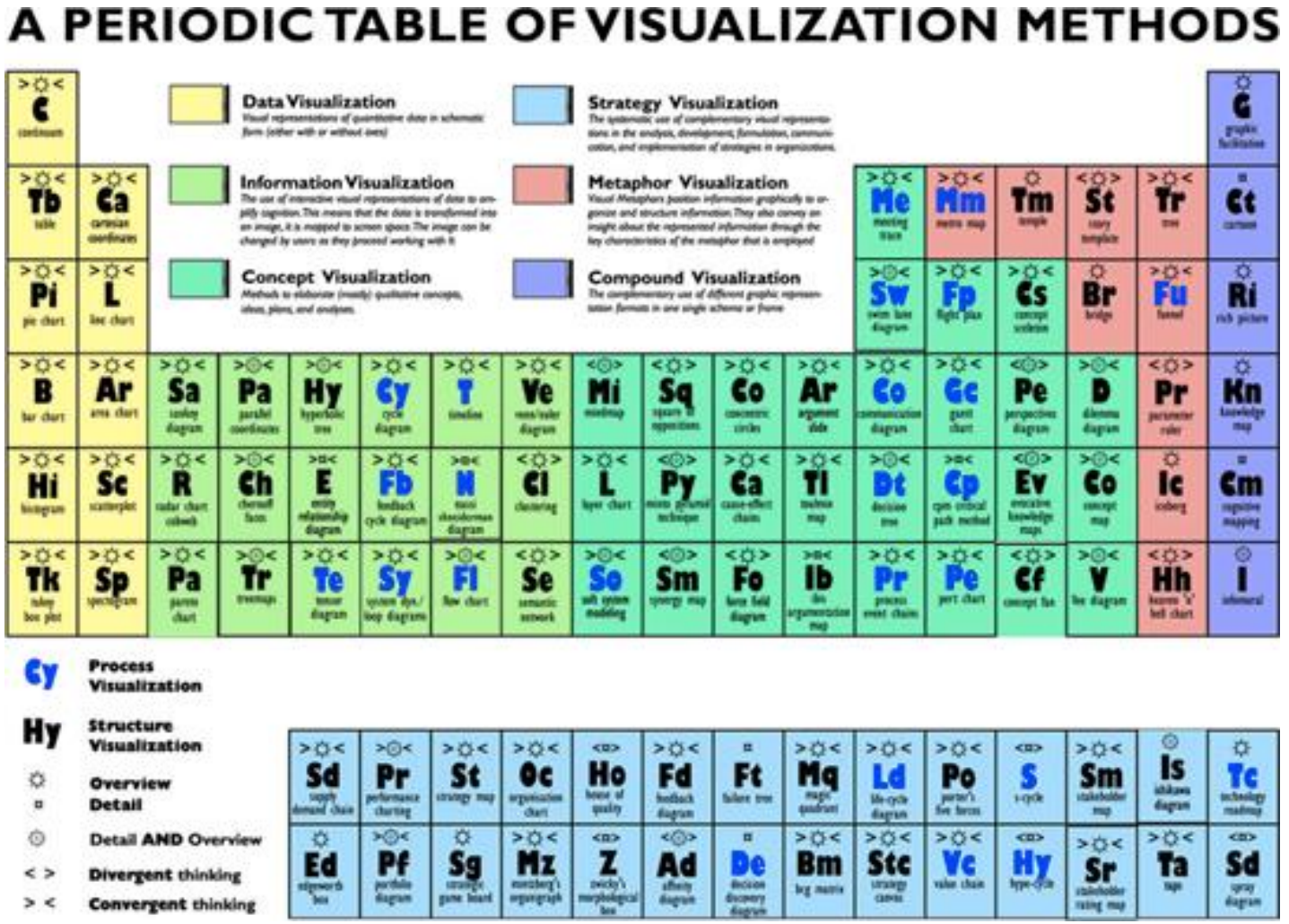
Infographics	Data Visualization
◆ Aesthetically rich • Strong visual content meant to draw the eye and hold interest ◆ Relatively data poor • Each information dimension needs to be manually added	◆ Often aesthetically barren • Style takes a backseat to data ◆ Relatively data rich • More data dimensions

About Visualizations

Visualization Defined

Example
Infographic

www.visual-literacy.org/periodic_table/periodic_table.html



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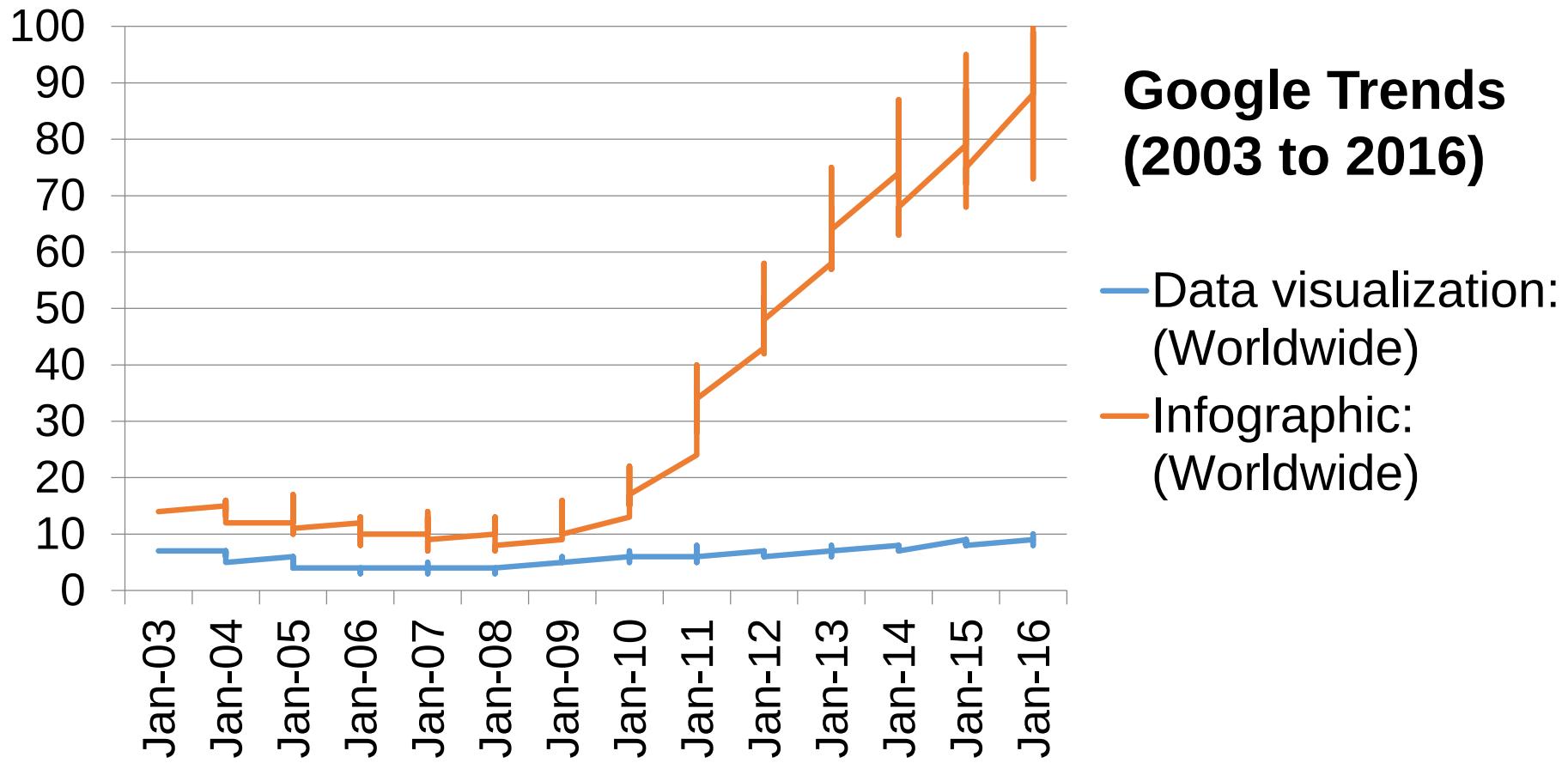
About Visualizations

Visualization Defined

Example
Data Visualization



Google Trends (2003 to 2016)

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About Visualizations

Why Visualization?

Benefits

- **Capitalize on the strengths of the human visual processing system**
  - A large proportion of the human cortex is dedicated to processing visual signals
  - Visual signals are integrated with language centres in the cortex
  - Visual processing is linked to information retention

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About Visualizations

Why Visualization?

Example

Benefits

Capitalize on the strengths of the human visual processing system

Textual Corporate Information

Sam Jacobson directly owns two companies, Great Energy Inc. and SamJac Holdings Company (his personal holding company). Through SamJac, Sam additionally retains partial ownership of 4 companies: ABC Renewable Energy, Star Capital, Western Utilities Limited, and ABC Energy Inc. ABC Energy Inc. is the parent company to five wholly-owned subsidiary companies: Jacobson Resources Inc.. Jacobson Minerals Inc., 12345 Ontario Inc., Jacboc Inc. and Wood Creek Inc.

About Visualizations

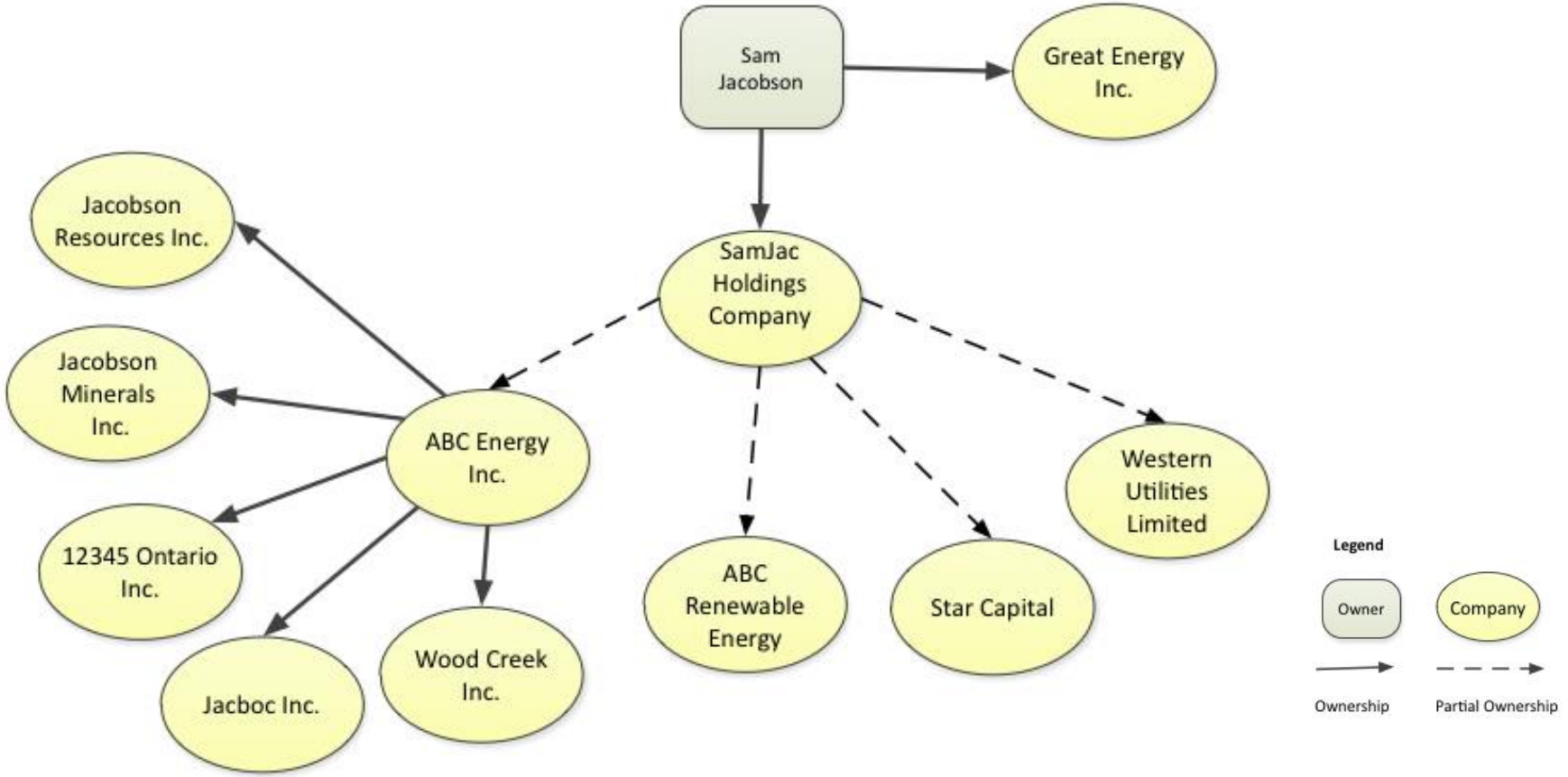
Why Visualization?

Example

Benefits

Capitalize on the strengths of the human visual processing system

Visual Corporate Information



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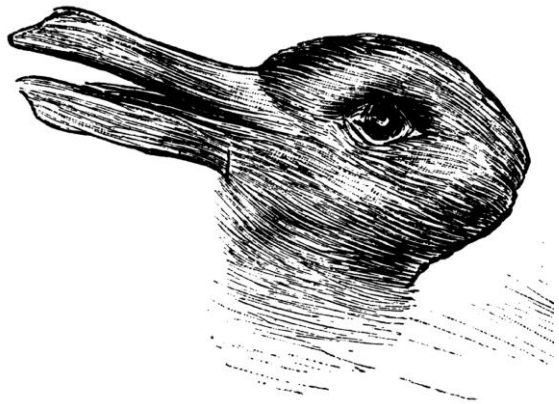
Why Visualization?

Benefits



- **Exploit the brain's natural ability to detect patterns**
  - Hardwired to detect patterns
  - Superior pattern processing is one of the human brain's unique features
  - Duck or Rabbit?

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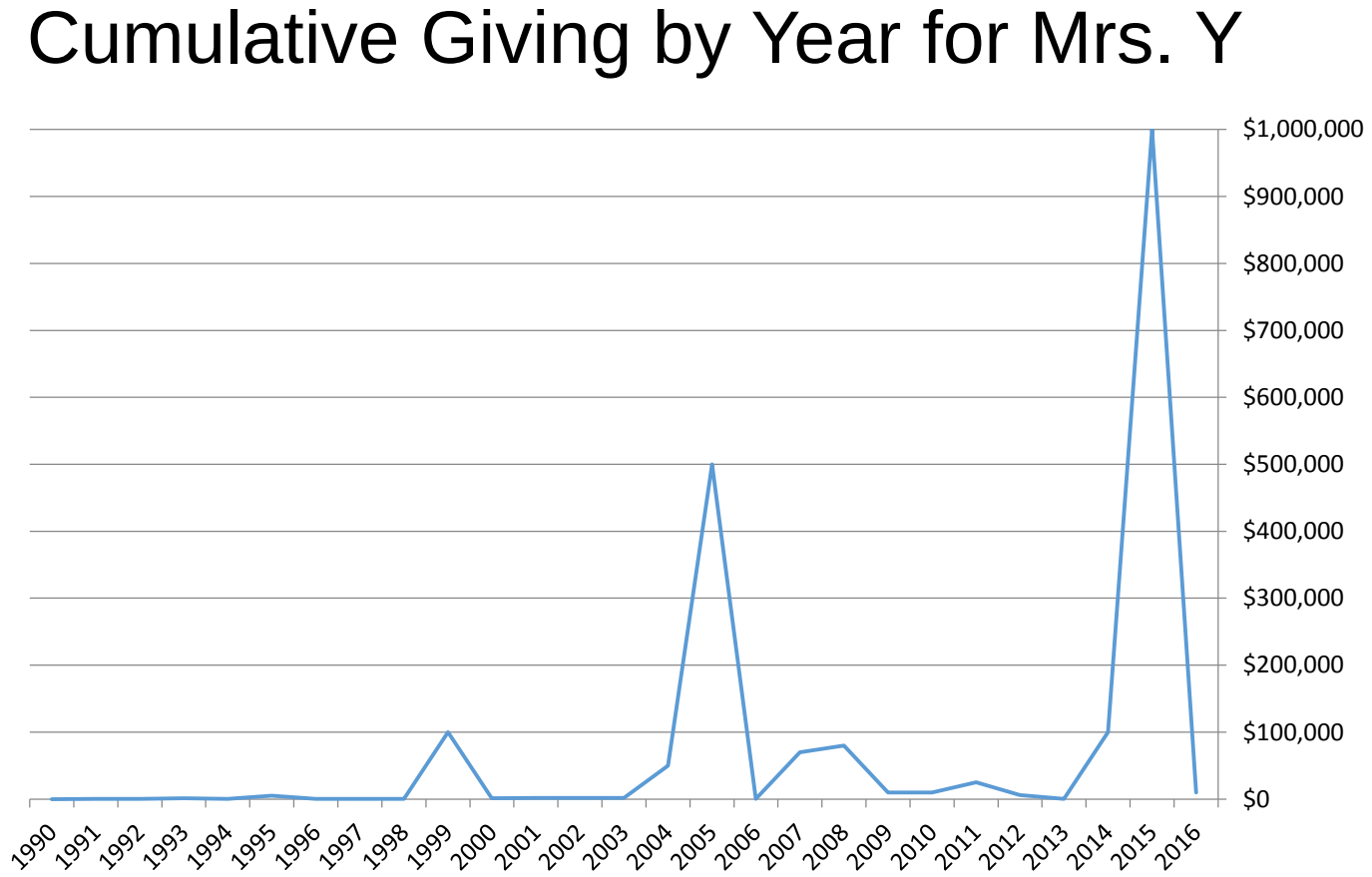
Why Visualization?

Example
Benefits

Exploit the brain's natural ability to detect patterns



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Why Visualization?

Example

Benefits

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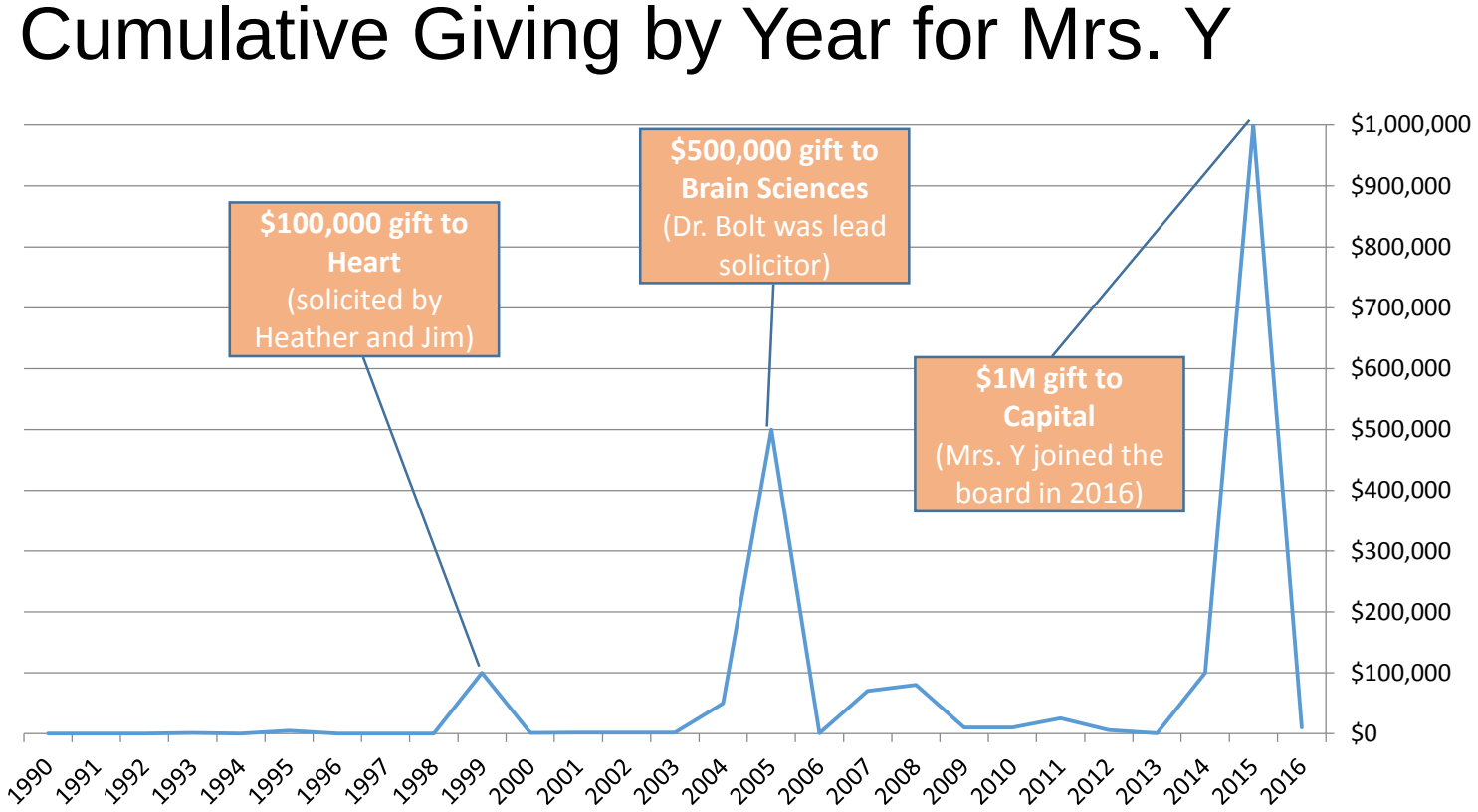

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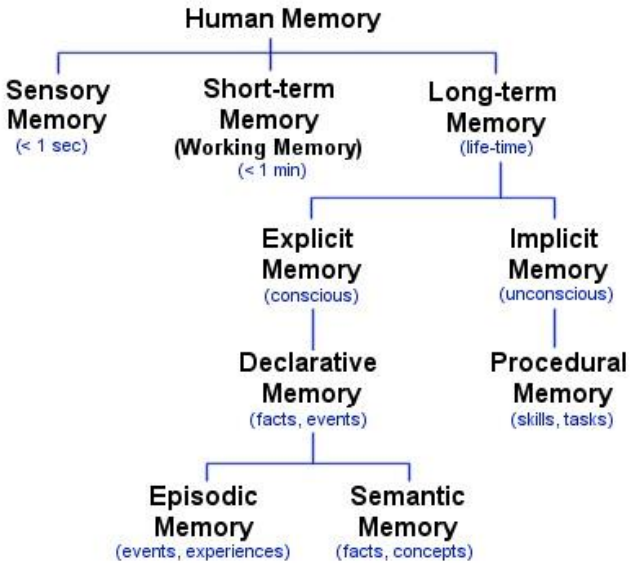
Why Visualization?

Benefits



- **Exploit the brain's natural ability to remember**
  - Since memories are based on reconstruction, visualizations are easier to recall
  - Visualizations are also more unique than textual description and therefore can be easier to remember
  - Visualization strengthens information retention over time

Chart from www.lukemastin.com/humanmemory/types.html

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About Visualizations

Why Visualization?

Example
Benefits

Exploit the brain's natural ability to remember

Event Research

Sid Dougal is CEO of BagPak Inc., a packaging company. He has an interest in Heart.

Anne Johnson is a doctor. Anne has been a board member since 2012. She has an interest in Heart.



Tony Small is CFO at Bank of CanSave. He has been a board member since 2015. He is a MG donor with an interest in Rehab.

TABLE 1



Chuck Jones is President of CJ Holdings, his own private equity company. Chuck is a MG donor with an interest in Mental Health.

Bill Lewis is founder of Buzz Mining. **Sandy Lewis** is President of the Lewis Family Foundation. They have an interest in Brain Sciences.

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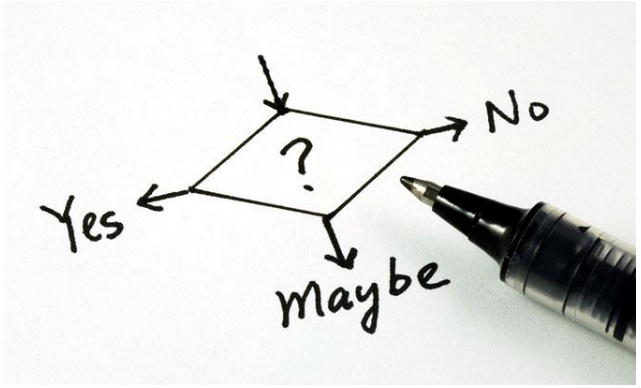
Why Visualization?

Benefits



- **Quickly bring a client to conclusion**
  - Assists with fast decision making
  - Interactive visualizations allow the Client to quickly explore data in a meaningful, curated manner

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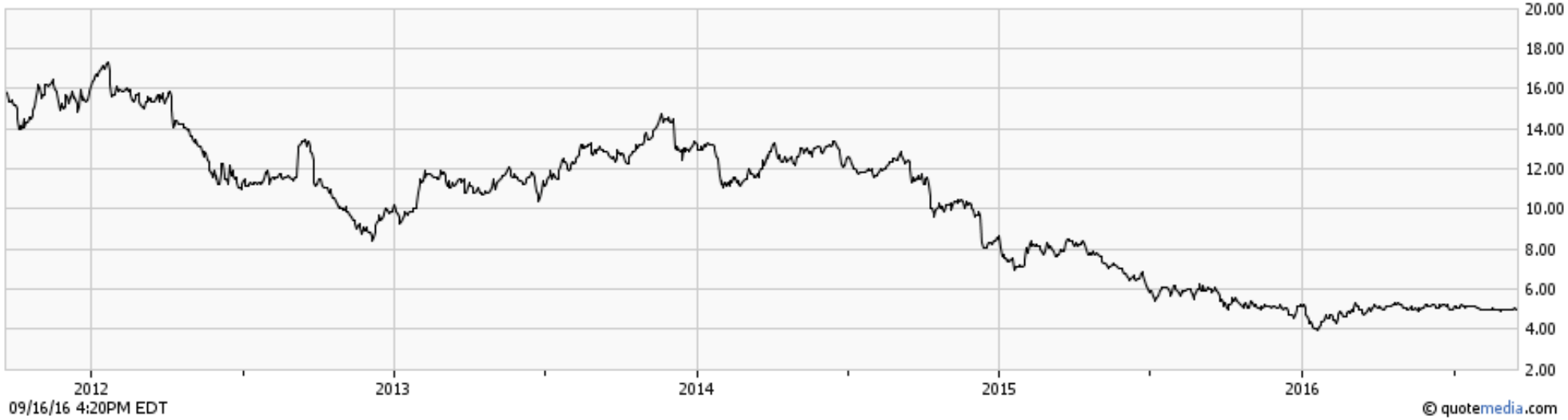
About Visualizations

Why Visualization? **Benefits**

Is it a good time to ask Mr. Smith for a gift?

- Example **Quickly bring a client to conclusion**
  - Five-Year Stock Price Trend
  - Tells a clear and accurate story fast!



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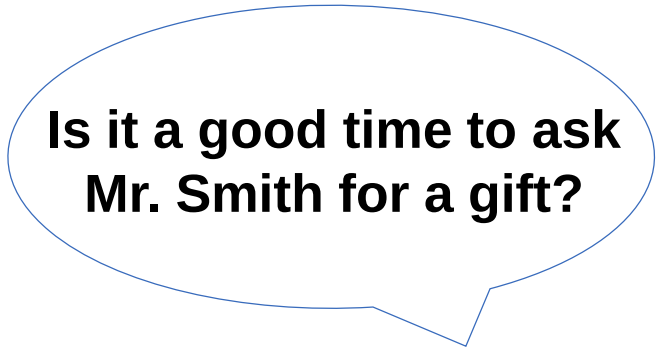
About Visualizations

Why Visualization? **Benefits**



- Example **Quickly bring a client to conclusion**
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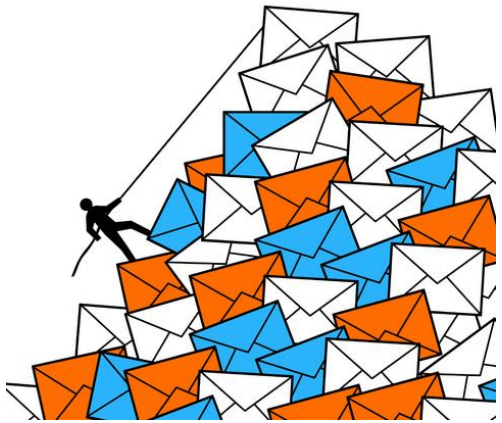
Why Visualization?

Benefits



- **Refine the narrative, tackle information overload**
  - Big data is too large to comprehend and absorb in its raw form
  - A picture can paint a thousand words
  - Provides context and enables categorization

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About Visualizations

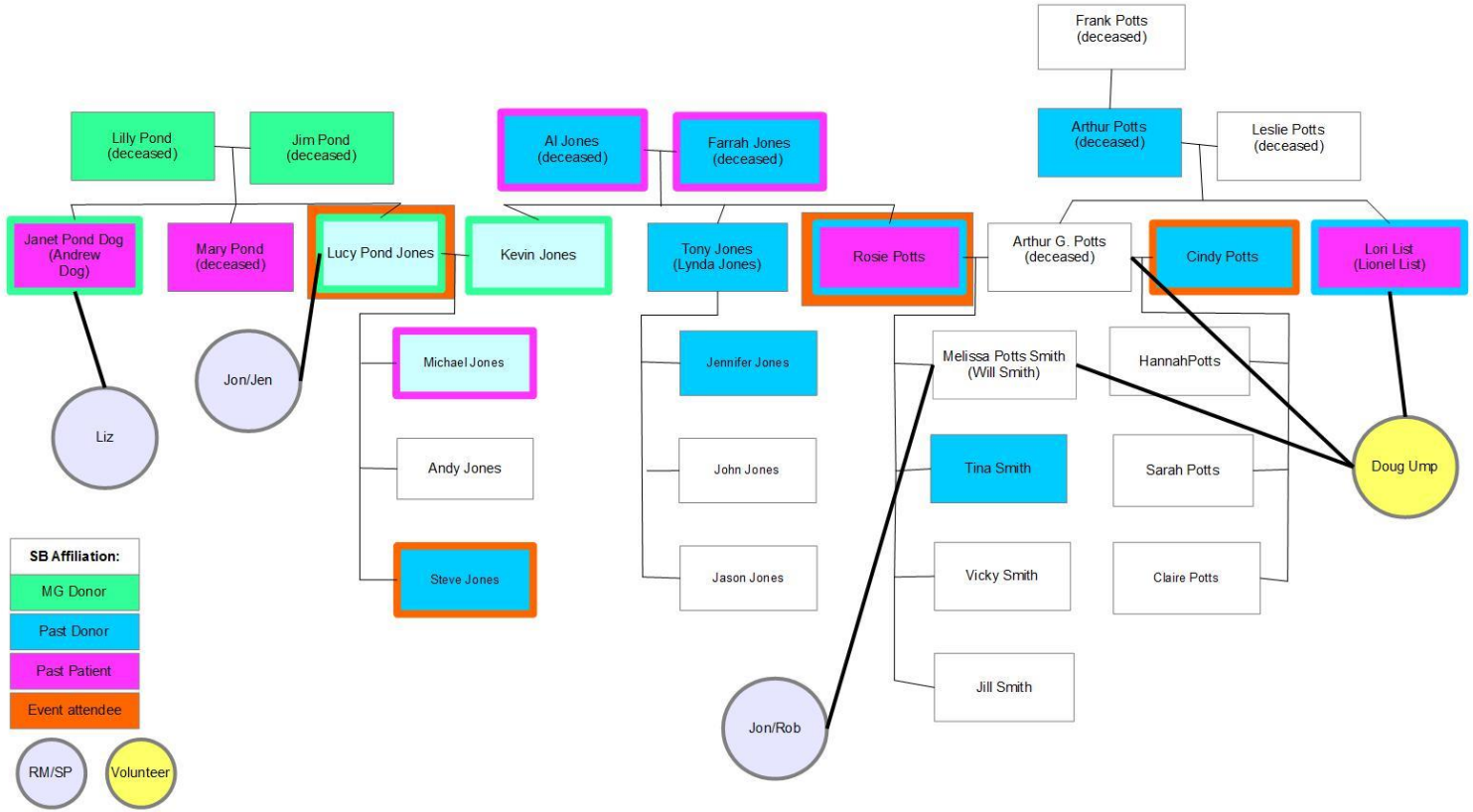
Why Visualization?

Example

Benefits

Refine the narrative, tackle information overload

Annotated Family Tree with Affinity/Connections



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About Visualizations

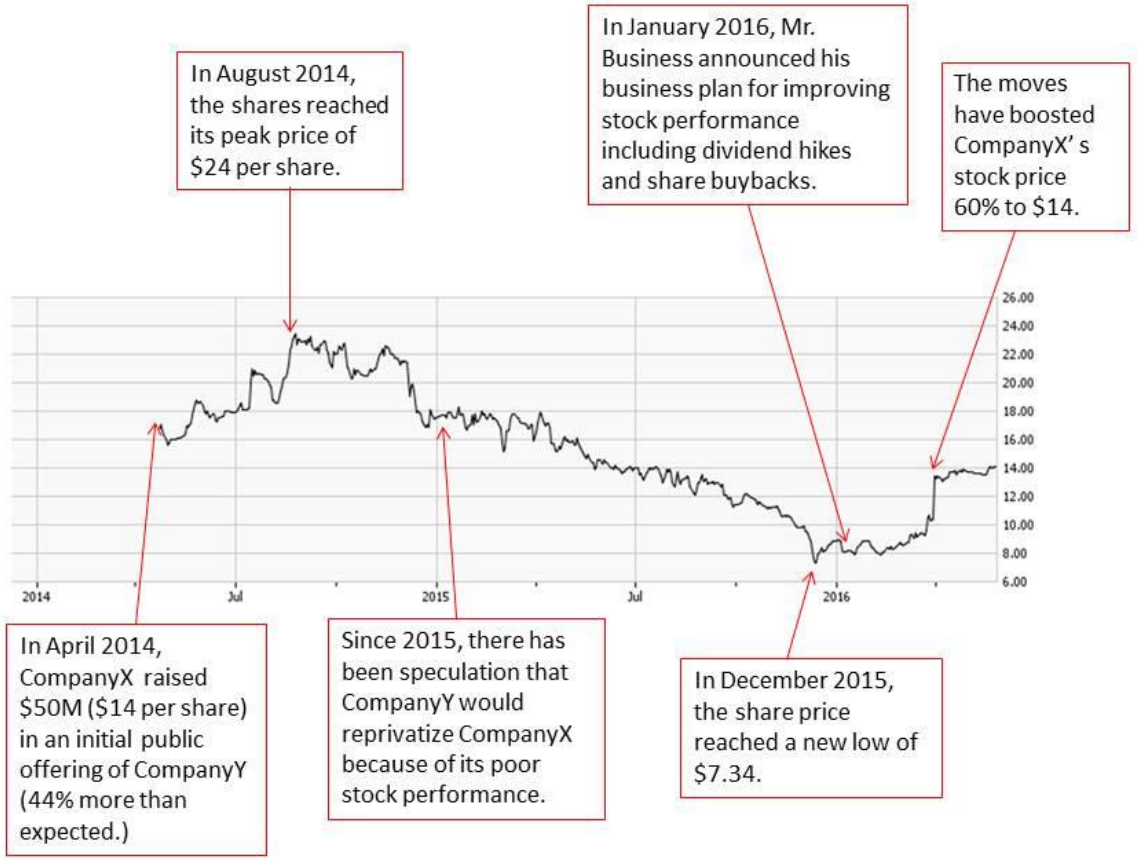
Why Visualization?

Example

Benefits

Refine the narrative, tackle information overload

Annotated Stock Chart with Notable Company News



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About Visualizations

Why Visualization?

Benefits

- **Uncover trends and new areas to explore**
  - Data is easier to manipulate and view from multiple angles, facilitating new approaches
  - Determine correlations and identify gaps
  - Encourages hypothesis and testing to inform new strategies
  - Focus attention in key areas

About Visualizations

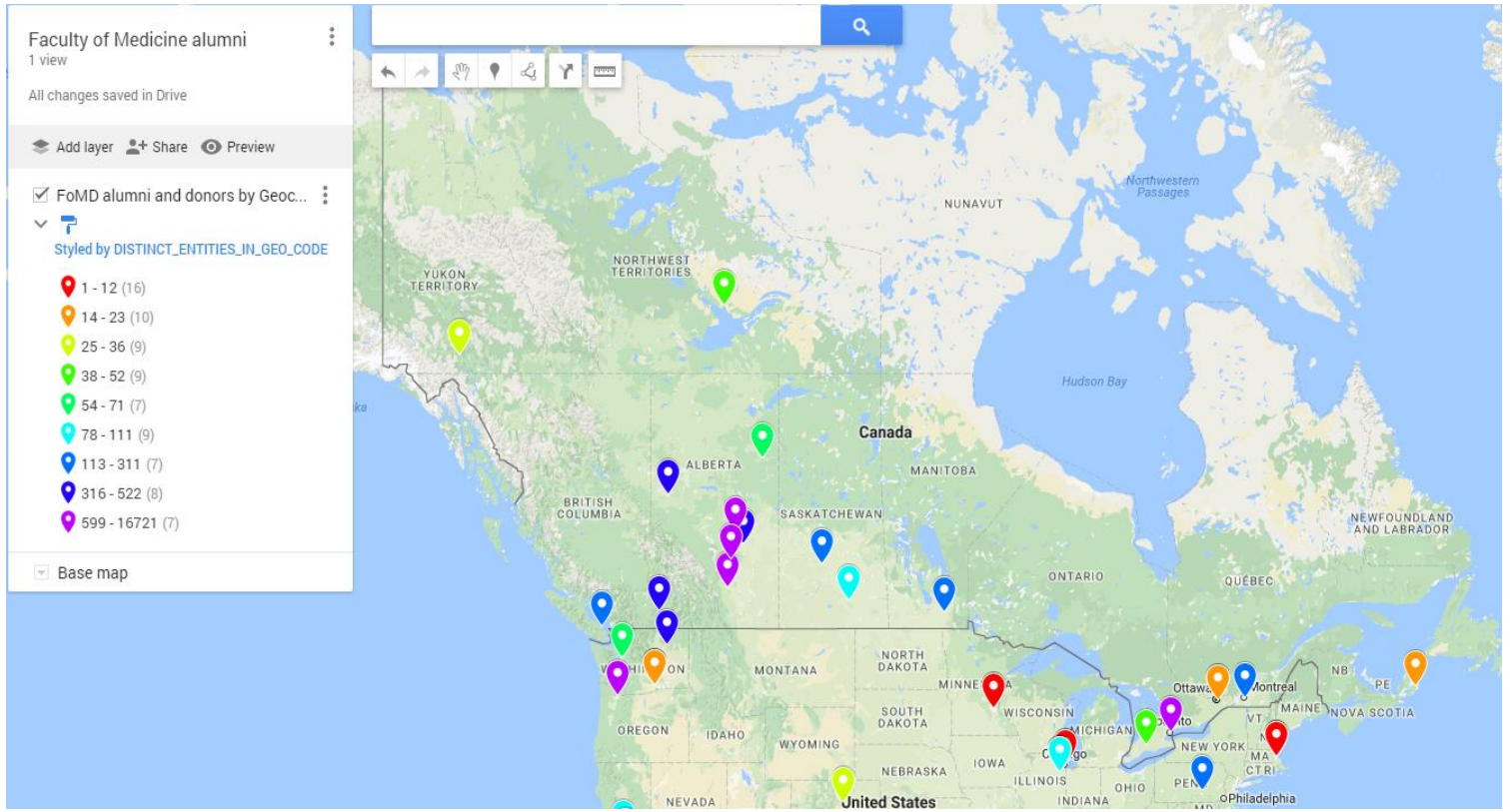
Why Visualization?

Example

Benefits

Uncover trends and new areas to explore

Map of Faculty Alumni



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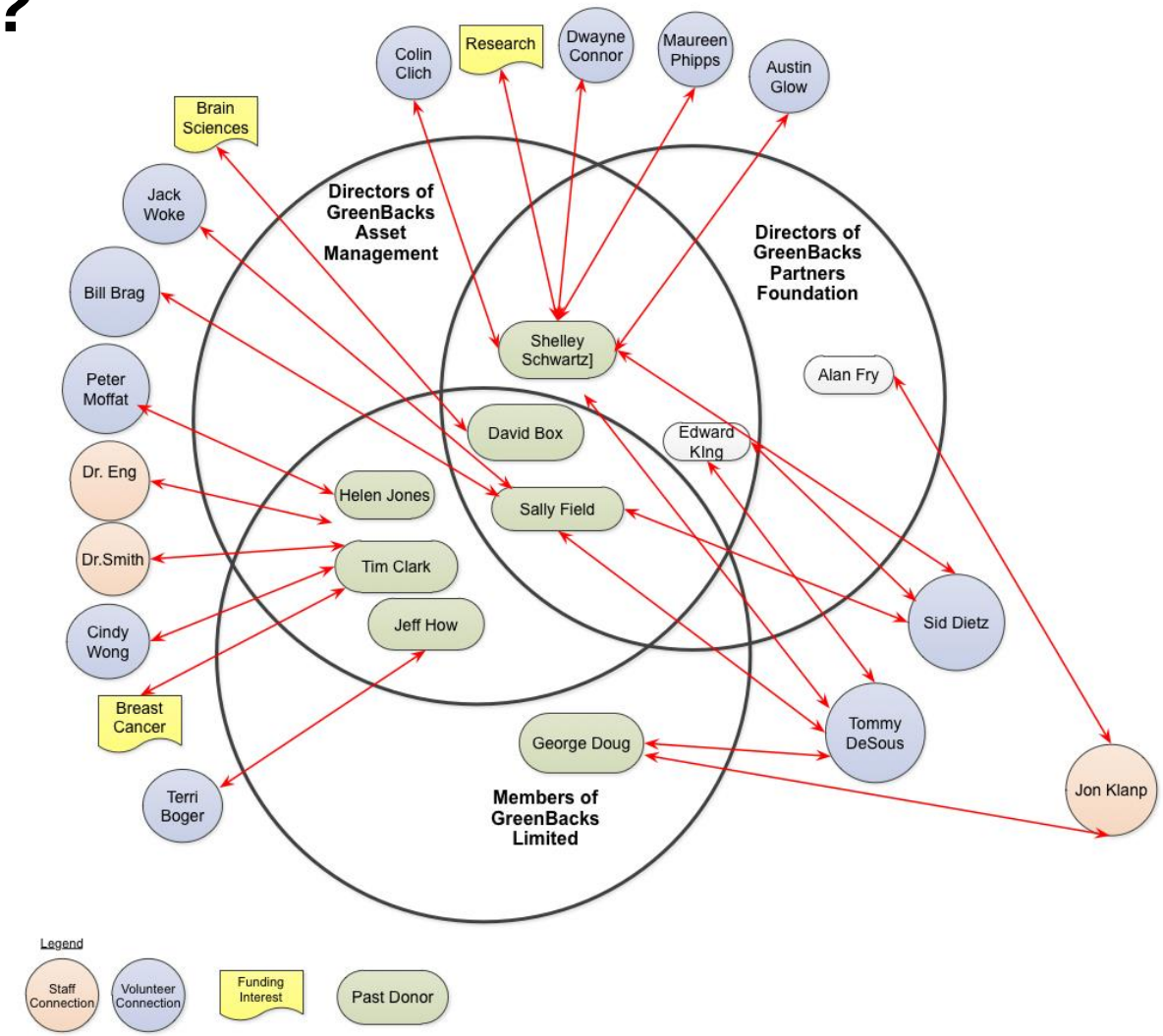
Why Visualization?

Example
Benefits

Uncover trends and new areas to explore



- Relationship Map Between a Corporate Foundation, Board of Directors, and Founding Members and the Hospital Foundation
- Help to develop strategy!

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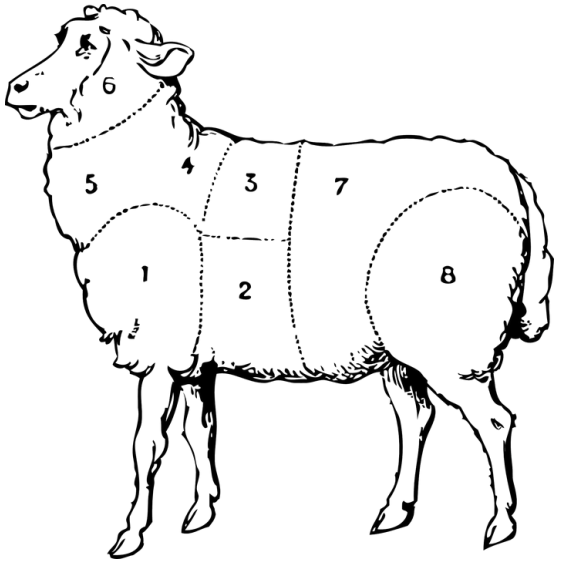
About Visualizations

Classification of Visualization

- Ways to categorize or describe visualizations
- Classification will impact design decisions
  - Important to define requirements before designing



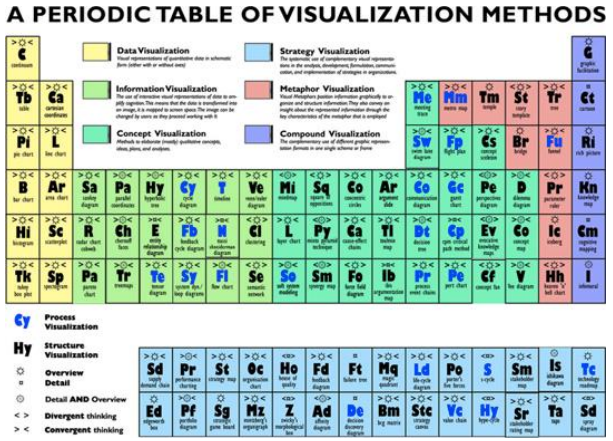
About Visualizations

Classification of Visualization

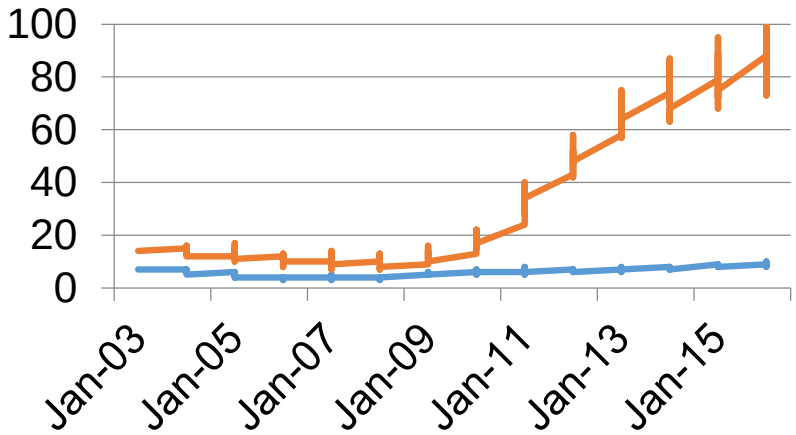
Infographic vs. Data Visualization

- Most important distinction to make
  - Refer to *Defining Visualizations - Main Types*

Infographic



Data Visualization



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About Visualizations

Classification of Visualization

Complexity

A price chart has 2 data dimensions - price and date

- The greater the number of data dimensions, the more complex the visualization
  - The more complex the harder to design well
- Rule of thumb: 3 to 4 data dimensions max per visualization

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About Visualizations

Classification of Visualization

Exploratory vs. Explanatory

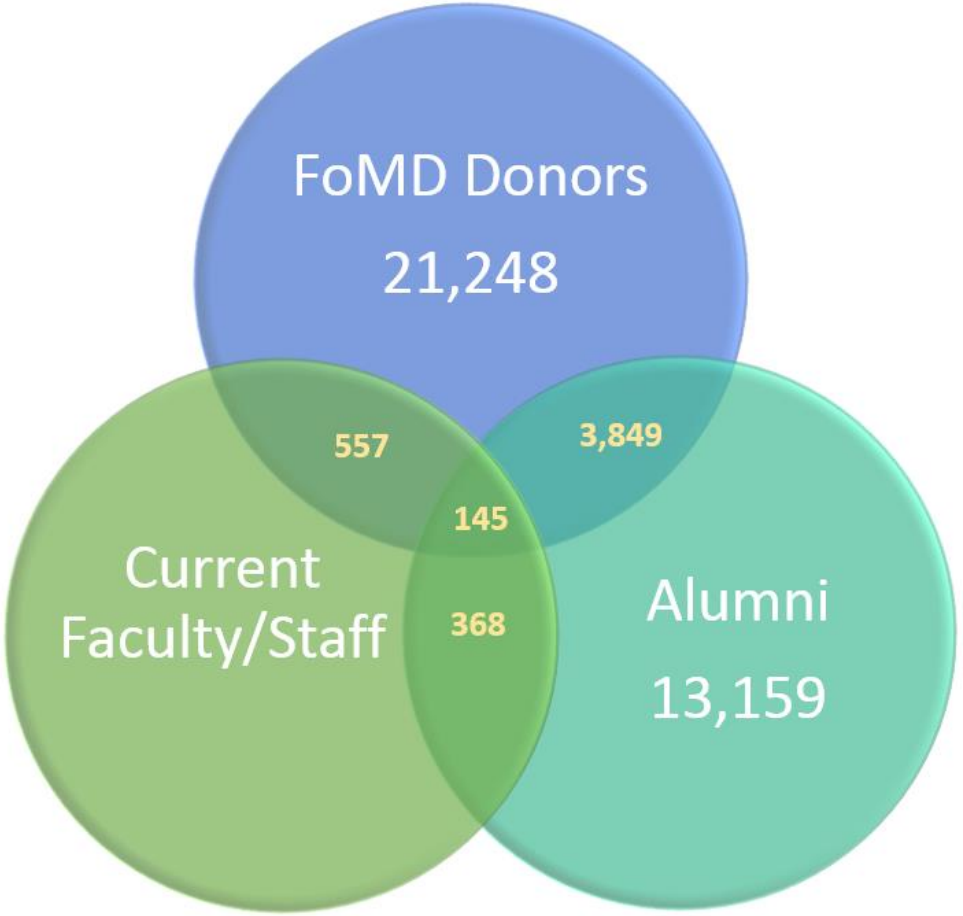
- **Exploratory:**
  - Researcher is usually the audience
  - Purpose: To explore a dataset by translating data into visual medium
  - Answer is the end product
- **Explanatory:**
  - Client is the audience
  - Purpose: communicating a story to a new audience
  - Answer is known from the start

About Visualizations

Classification of Visualization

Example
Exploratory

Overlap between Faculty of Medicine Donors, Alumni and Faculty



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About Visualizations

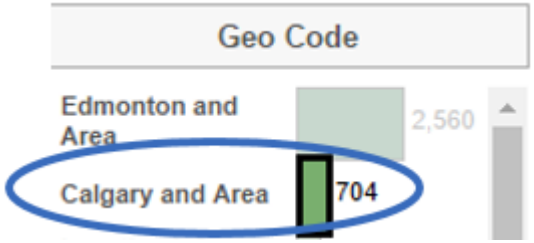
Classification of Visualization

Example
Exploratory

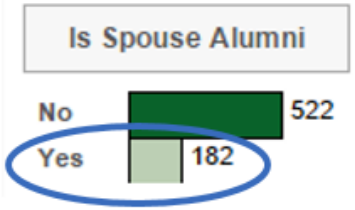
Unassigned
Faculty
Alumni

- There are 5,214 unassigned Faculty alumni in Canada, how many:

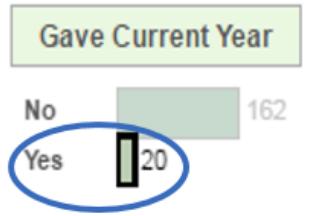
1. Live in Calgary?



2. Are married to an alum?



3. Gave this fiscal year?



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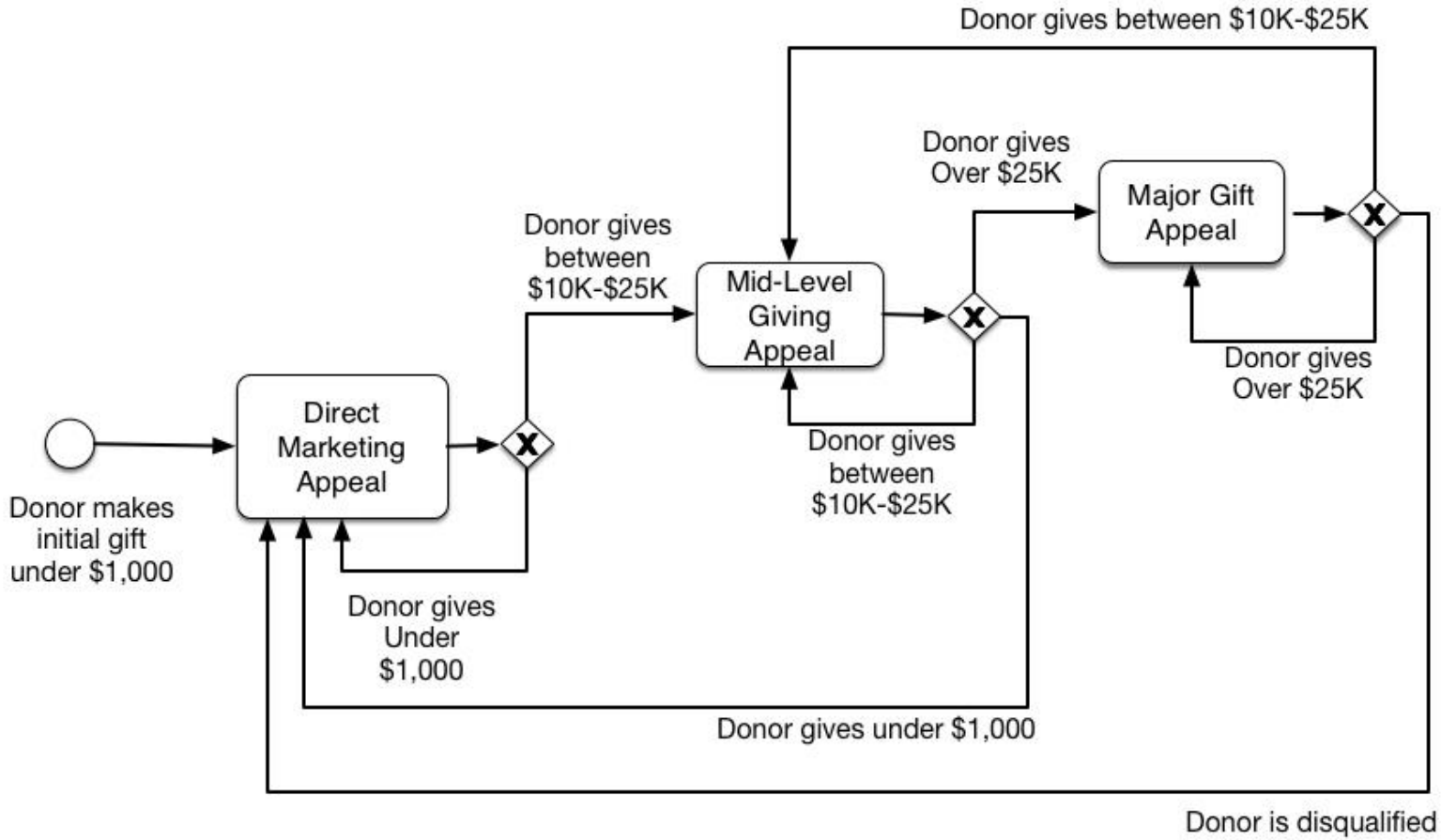
About Visualizations

Classification of Visualization

Example
Explanatory

Donor
Pipeline
Segmenting



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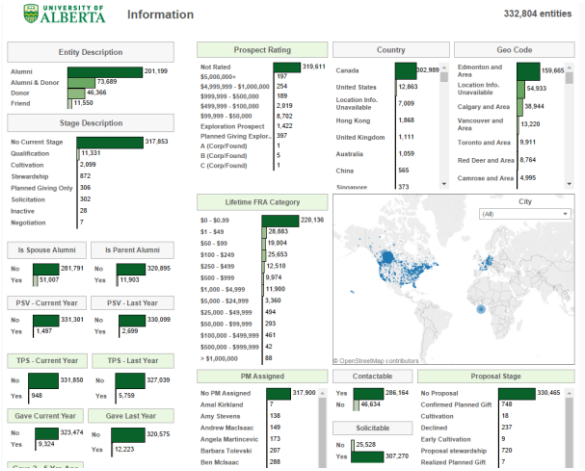
About Visualizations

Classification of Visualization

Hybrid



- Both Exploratory and Explanatory
  - Curated dataset
  - Presented with the intention of allowing exploration on a reader's part
  - Interactive in nature

About Visualizations

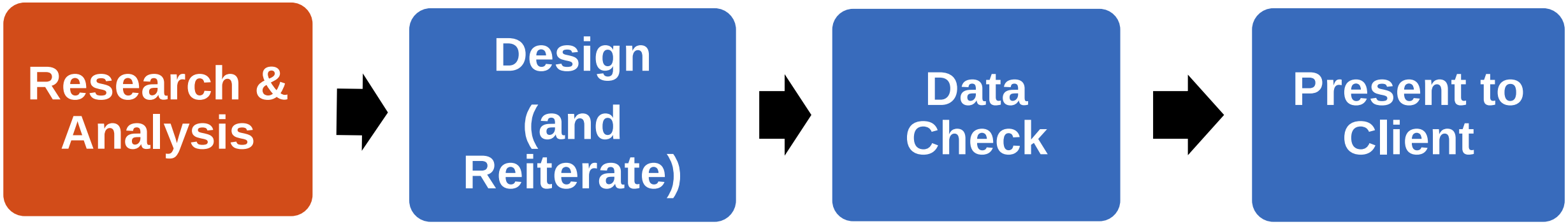
Classification of Visualization

Informative vs. Persuasive

- **Informative:**
  - Neutral presentation of facts
  - Purpose: To educate audience
  - Synthesis of broad datasets
- **Persuasive:**
  - Subjective presentation of facts
  - Purpose: To inform an intended audience of a specific view by presenting select information

Designing Visualizations

Process Overview



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Designing Visualizations

Research & Analysis

- Visualizations should **enhance** your prospect research
- Must assess return on investment
  - How will the visualization add value? (Refer to *Why Visualizations?*)
- Common “information suspects” for visualization:
  - Family relationships
  - Corporate/Industry information
  - Ownership structure
  - Prospect Lists
  - Financial Information

Designing Visualizations

Research & Analysis

Know your Data/Information

- Must understand data/information in order to treat it well
- Ensure you have the full picture
  - If you are uncertain, it could mean you need to do further research/analysis
- Easier and more efficient to do research prior to designing the visualization

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Designing Visualizations

Research & Analysis

Know your Data/Information

- Consider the characteristics, relationships and structure of your information:
  - Is it a time-series? A hierarchy?
  - How many data dimensions? What are the most important dimensions?
  - What sort of relationships do they have?
  - How variable are they? How can they be characterized?
  - Is there any data missing?

Designing Visualizations

Research & Analysis

Know your Data/Information

- Example of data set

Organizations donating to the Faculty of Medicine

Funding Interest	ID	Prospect Group	Total Giving	Last Gift Date	Geo Code	Last Contact	Last Contact Type
Cancer	255098	Medicine & Dentistry	$1,195,844.35	12/07/2016	Montreal and Area	20/05/2014	Correspondence
Emergency Medicine	390785		$15,500.00	04/07/2016	Ottawa and Area		
Gastroenterology	398530		$149,786.72	30/06/2016	New York and Area		
Multiple Sclerosis	254451	Medicine & Dentistry	$2,352,503.82	30/06/2016	Toronto and Area		
Emergency Medicine	403746		$5,000.00	28/06/2016	Edmonton and Area		
Diabetes	361050	Medicine & Dentistry	$1,875,922.00	24/06/2016	Toronto and Area	24/04/2014	Correspondence
Fetal Acohol Syndrome	386205		$185,000.00	23/06/2016	Vancouver and Area		
Various	386188		$6,172,425.77	21/06/2016	Ottawa and Area		
Liver	328232	Medicine & Dentistry	$914,000.00	13/06/2016	Toronto and Area	23/03/2016	Correspondence
Cancer	247038	Faculty Development	$32,731,231.88	10/06/2016	Edmonton and Area	01/04/2016	Personal Scheduled Visit
Various	254278	Medicine & Dentistry	$70,560.00	10/06/2016	Edmonton and Area	19/12/2008	Correspondence
Brain	403298		$5,173,045.00	10/06/2016	Montreal and Area		
Vision	360951	Corporate & Foundation Relations	$144,671.00	07/06/2016	Toronto and Area	22/01/2016	Correspondence
Vision	391473		$54,296.00	07/06/2016	Toronto and Area		
Pediatrics	398722		$22,507.00	31/05/2016	Ottawa and Area		
Pediatrics	365271	Corporate & Foundation Relations	$1,605,083.09	31/05/2016	New York and Area		
Research	400209		$81,244.80	31/05/2016			

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Designing Visualizations

Research & Analysis

Know your Data/Information

- Example of data set

Sam Jacobson directly owns two companies, Great Energy Inc. and SamJac Holdings Company (his personal holding company). Through SamJac, Sam additionally retains partial ownership of 4 companies: ABC Renewable Energy, Star Capital, Western Utilities Limited, and ABC Energy Inc. ABC Energy Inc. is the parent company to five wholly-owned subsidiary companies: Jacobson Resources Inc.. Jacobson Minerals Inc., 12345 Ontario Inc., Jacboc Inc. and Wood Creek Inc.

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Designing Visualizations

Research & Analysis

Know your Client

- Know your client and his/her needs:
  - How will they be using the information? For what action?
  - How much detail do they need?
  - How long do they have to review the information?
  - What is their learning style?
  - Are they familiar with the subject?
  - What jargon do they know?

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Designing Visualizations

Research & Analysis

Know your Narrative

- What is the specific story that you are telling?
- What is your scope?
- What do you want to achieve?
- Avoid TMI – keep it simple (as possible)
  - Extra information will obscure the message and complicate the extraction of knowledge

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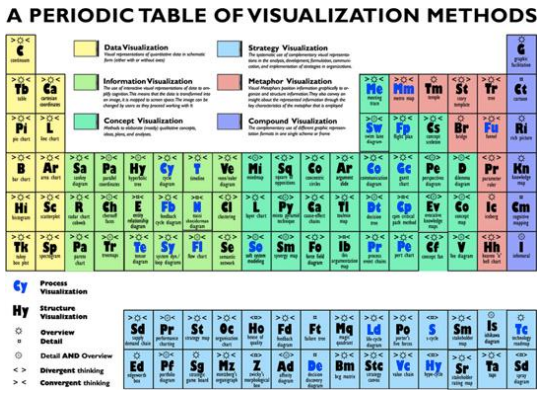
About Visualizations

Research & Analysis

Know your Visualization



- Infographic or Data Visualization?
- How many data dimensions?
- Exploratory or Explanatory?
- Informative or Persuasive?
- Hybrid?

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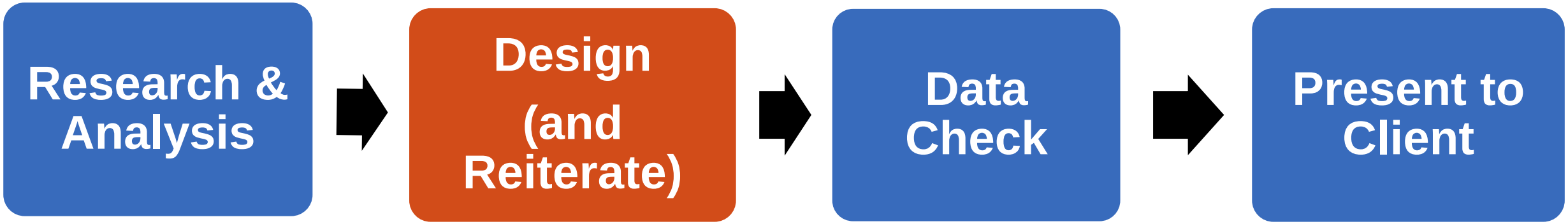
Designing Visualizations

Process Overview



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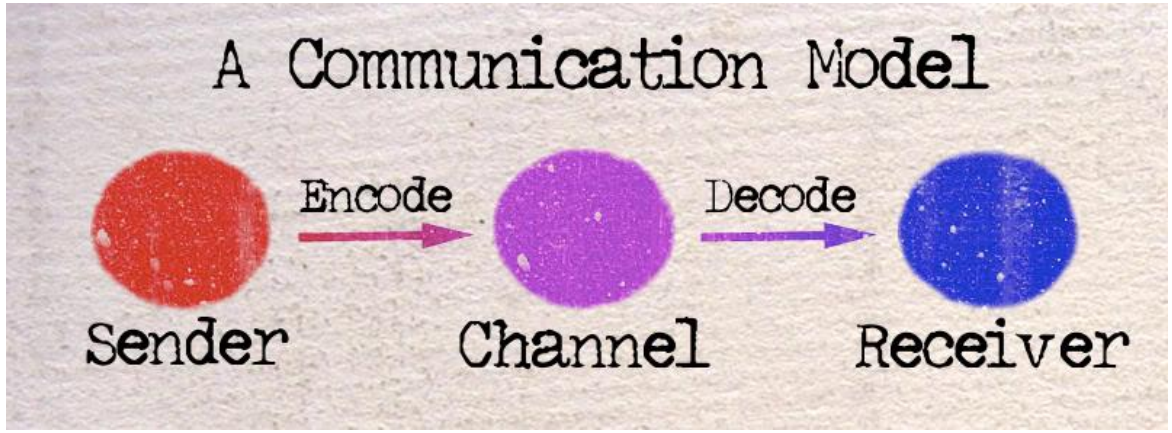
Designing Visualizations

Design & Reiterate

Encode Your Data

- Choose appropriate visual encodings to represent your data dimensions
- Trial and Error process
- Practice makes perfect (reuse coding schemas)

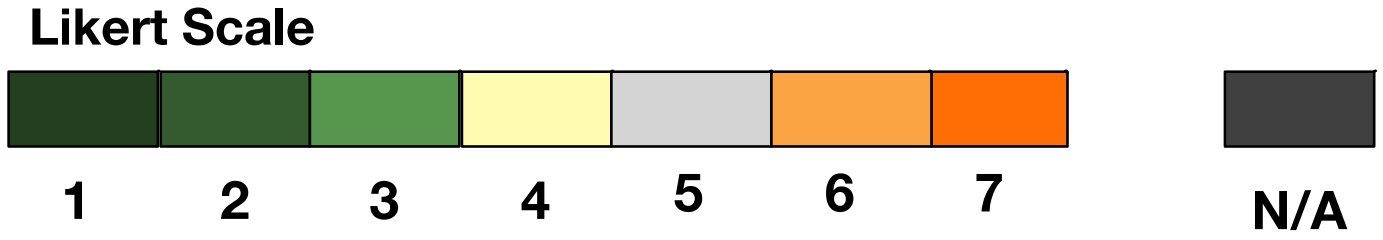


Designing Visualizations

Design & Reiterate

Encode Your Data

- **Encode by colour**
  - Use a colour schema to distinguish between data dimensions
  - Be sure to use distinctive colours
  - Too many colours can make the visualization harder to interpret

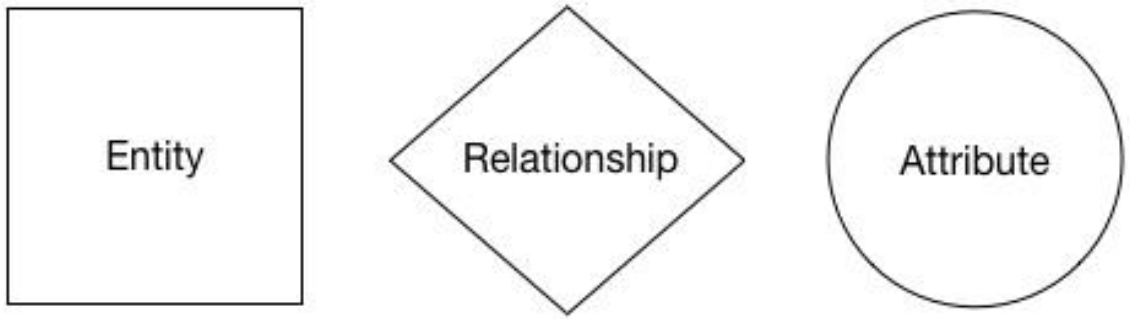


Designing Visualizations

Design & Reiterate

Encode Your Data

- **Encode by shape**
  - Use distinct shapes to represent data dimensions
  - Always include legend



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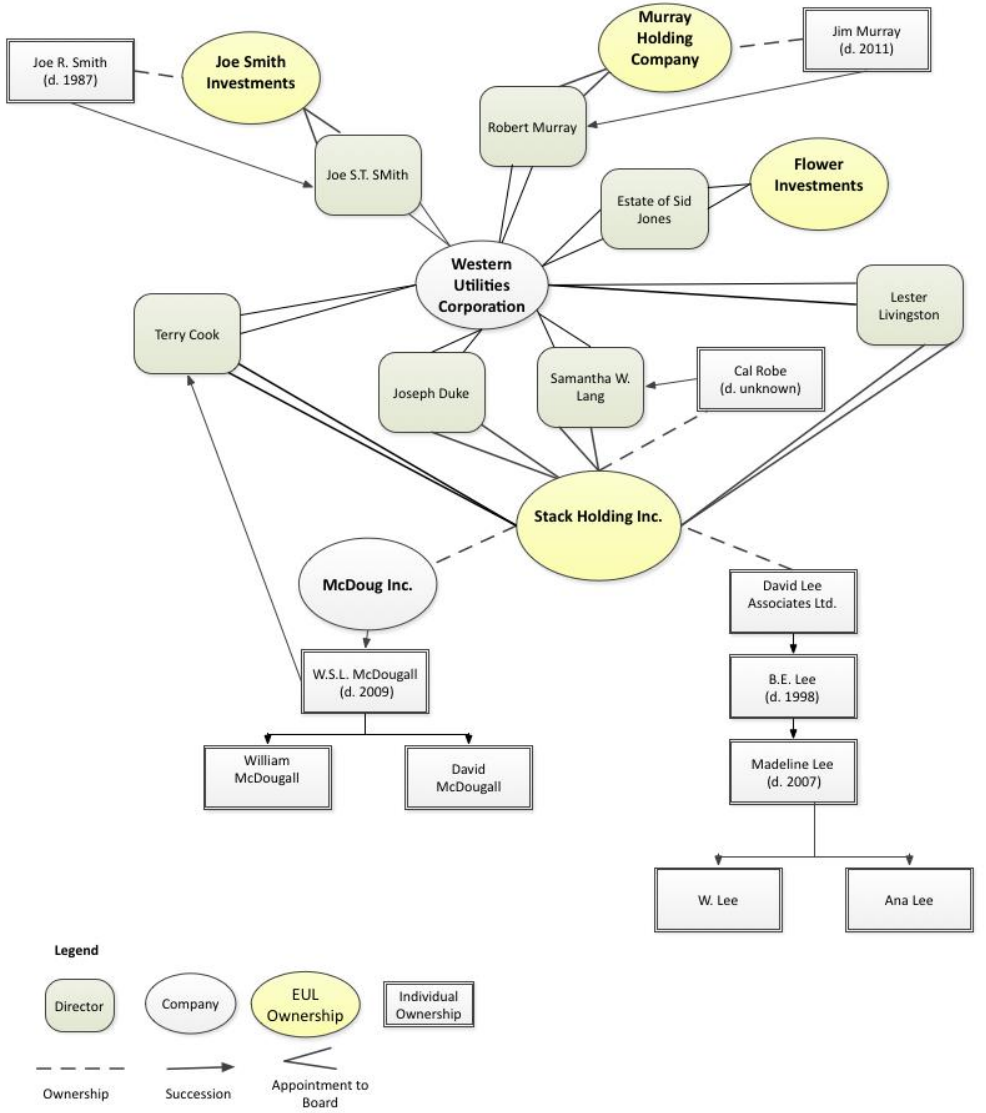
Designing Visualizations

Design & Reiterate

Encode Your Data

By shape

Company
Ownership History
for Estate File



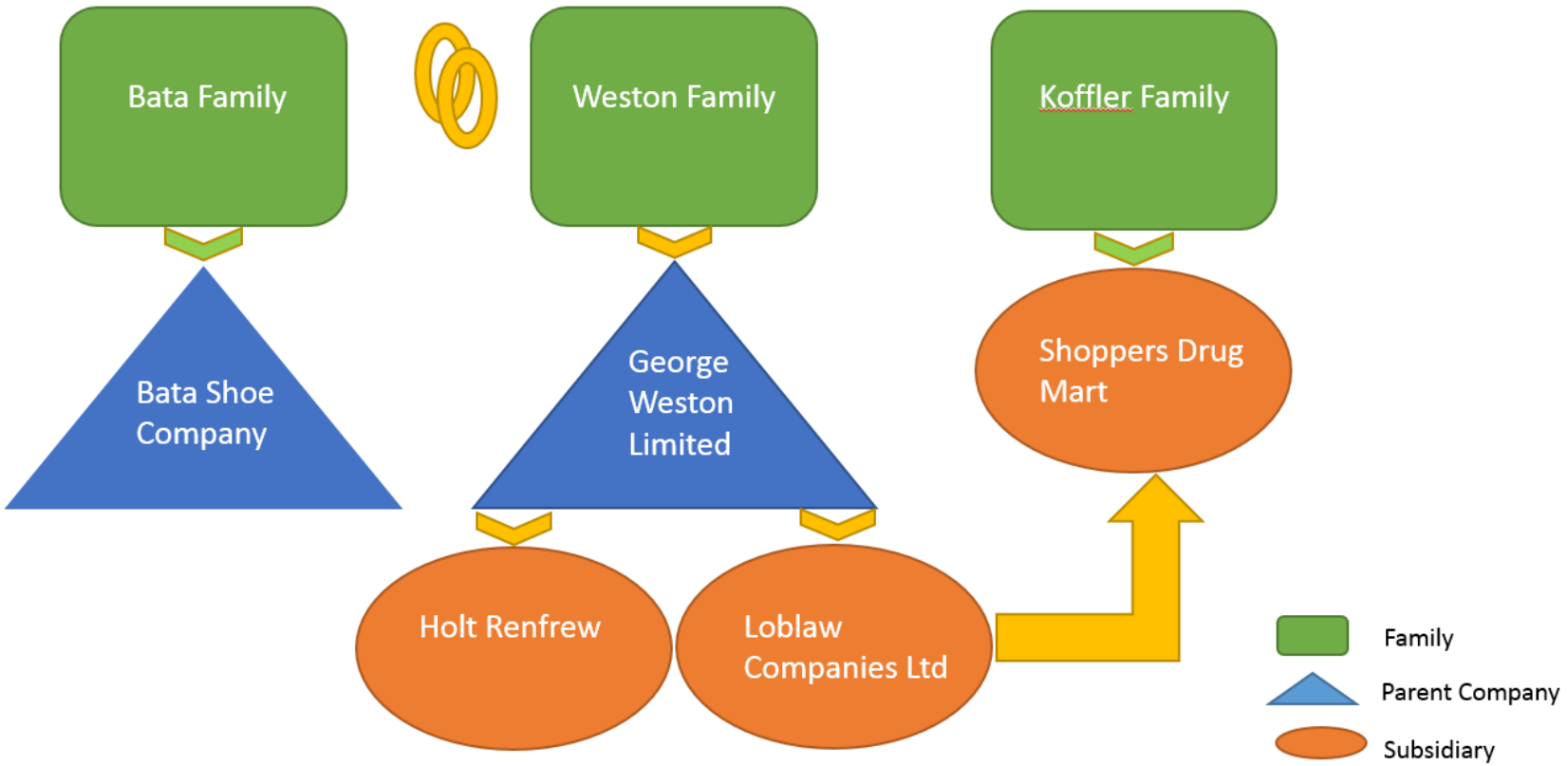
Designing Visualizations

Design & Reiterate

Encode Your Data

By shape

Family/Business Connections



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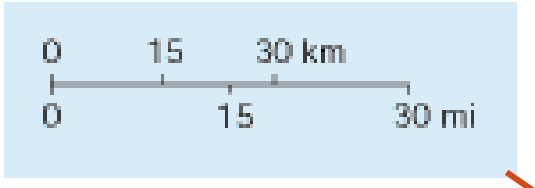
Designing Visualizations

Design & Reiterate

Encode Your Data



- **Encode by size**
  - Assign meaning by using size to represent data
  - Should be proportionally accurate (use % sizing to adjust shapes)

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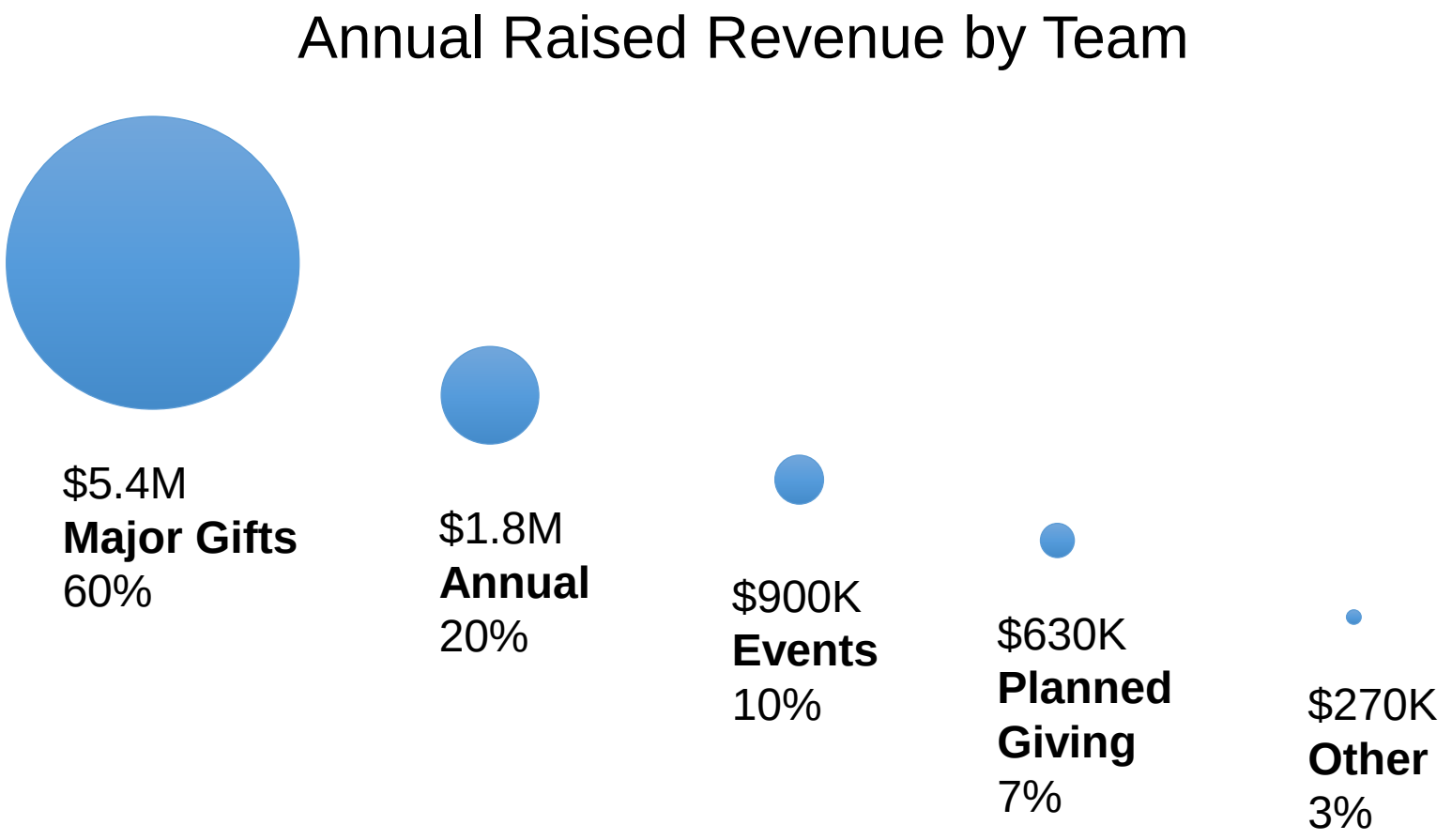
Designing Visualizations

Design & Reiterate

Encode Your Data

By size



Designing Visualizations

Design & Reiterate

Encode Your Data

- Choose appropriate visual encoding
  - **Encode by placement/proximity**
    - Good mapping leverages visual similarity - a powerful cognitive tool

Upstairs apartment doorbell

Downstairs apartment doorbell

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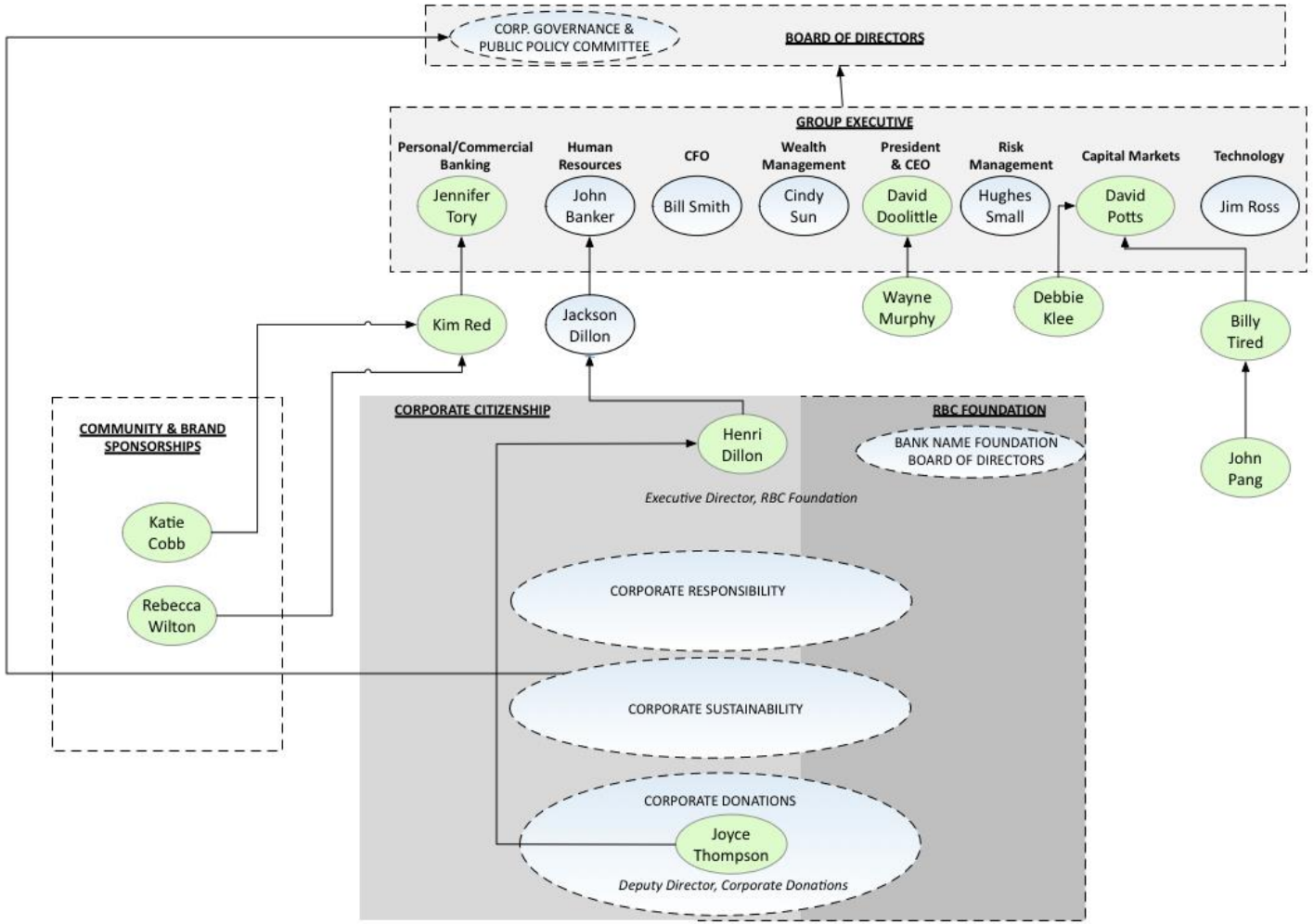
Designing Visualizations

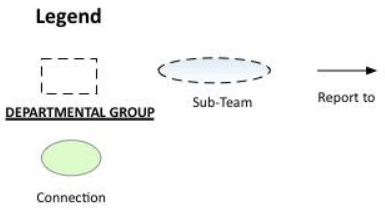
Design & Reiterate

Encode Your Data

By Placement/ Proximity



Reporting Structure for Bank Contacts



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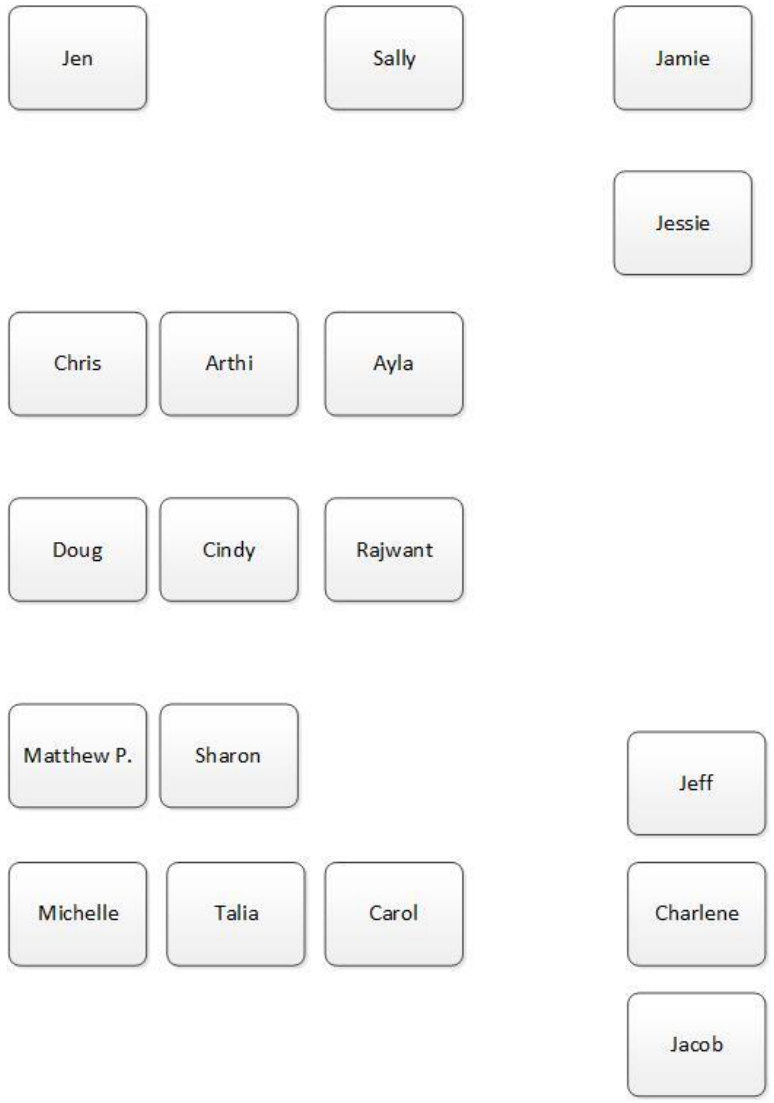
Designing Visualizations

Design & Reiterate

Encode Your Data

By Placement/ Proximity



- File Circulation Cover Sheet
- Hard copies can be be more efficiently shared

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Designing Visualizations

Design & Reiterate

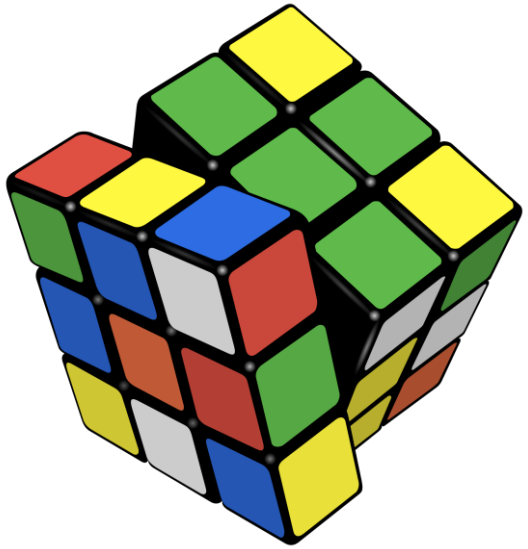
- Be deliberate - less is often more

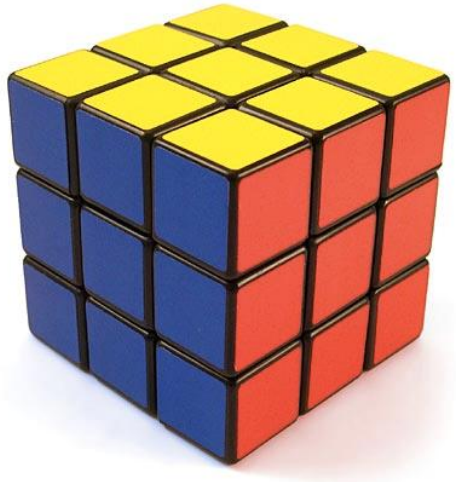
Designing Visualizations

Design & Reiterate

Reiterate

- Takes time to find the optimal configuration
- The more complex the model, the more challenging it is to encode data dimensions in a clear and understandable way

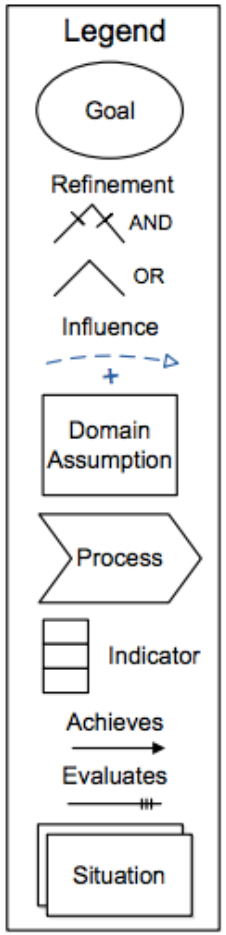




Designing Visualizations

Design & Reiterate

Add a Legend and Sources



- Legend will help the Client to understand visualization
  - Leave zero ambiguity
- Show your sources
  - Add validity to visualization
  - Reduce questions

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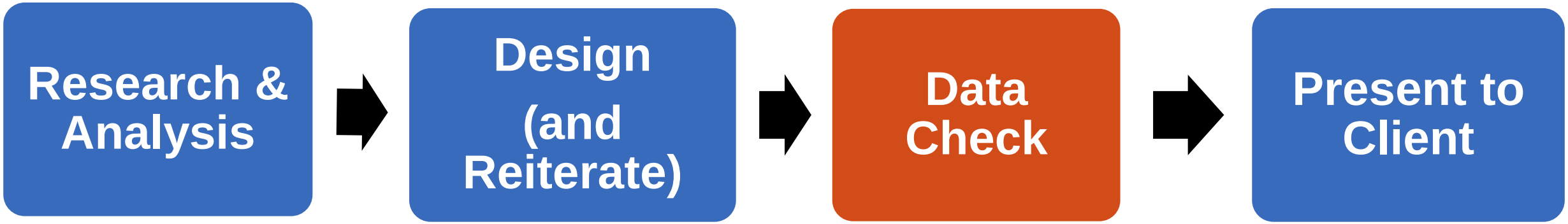
Designing Visualizations

Process Overview



Designing Visualizations

Data Check

- **Validate your visualization**
  - Accuracy is key
  - Ensure the integrity of your visualization
  - For larger visualizations, do random data checks to ensure data is accurate

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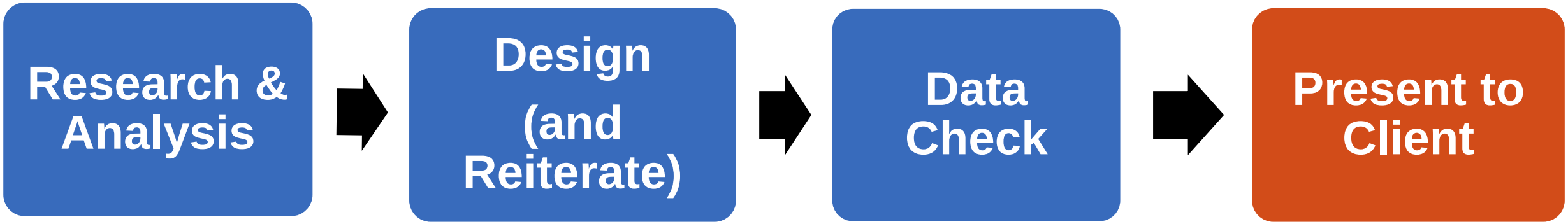
Designing Visualizations

Process Overview



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Designing Visualizations

Present to Client

- Not a “required” step
- Good way to get feedback (especially at the beginning)
- Help introduce new format to audience
- Help to better understand context

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Tips & Tools

Best Practices General Tips

- Be accurate!
- Use the “5 second rule”
  - Client should be able to understand (decode) within 5 seconds
- Minimize text
- Decide whether a legend is needed
- Be data transparent

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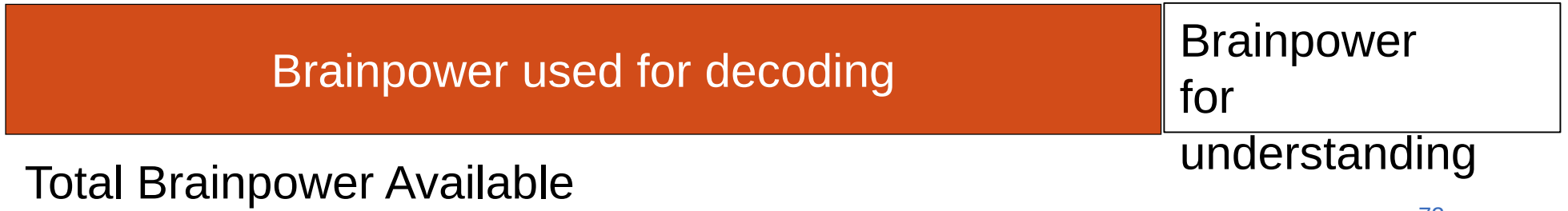
Tips & Tools

Best Practices

Avoid Cognitive Burden

- Cognitive burden is the **total sum** of **mental efforts** required to understand and assimilate information
  - Cognitive burden makes it more difficult and slower to learn
  - It interferes with thinking, reading, learning and decision making
  - Good design reduces cognitive burden

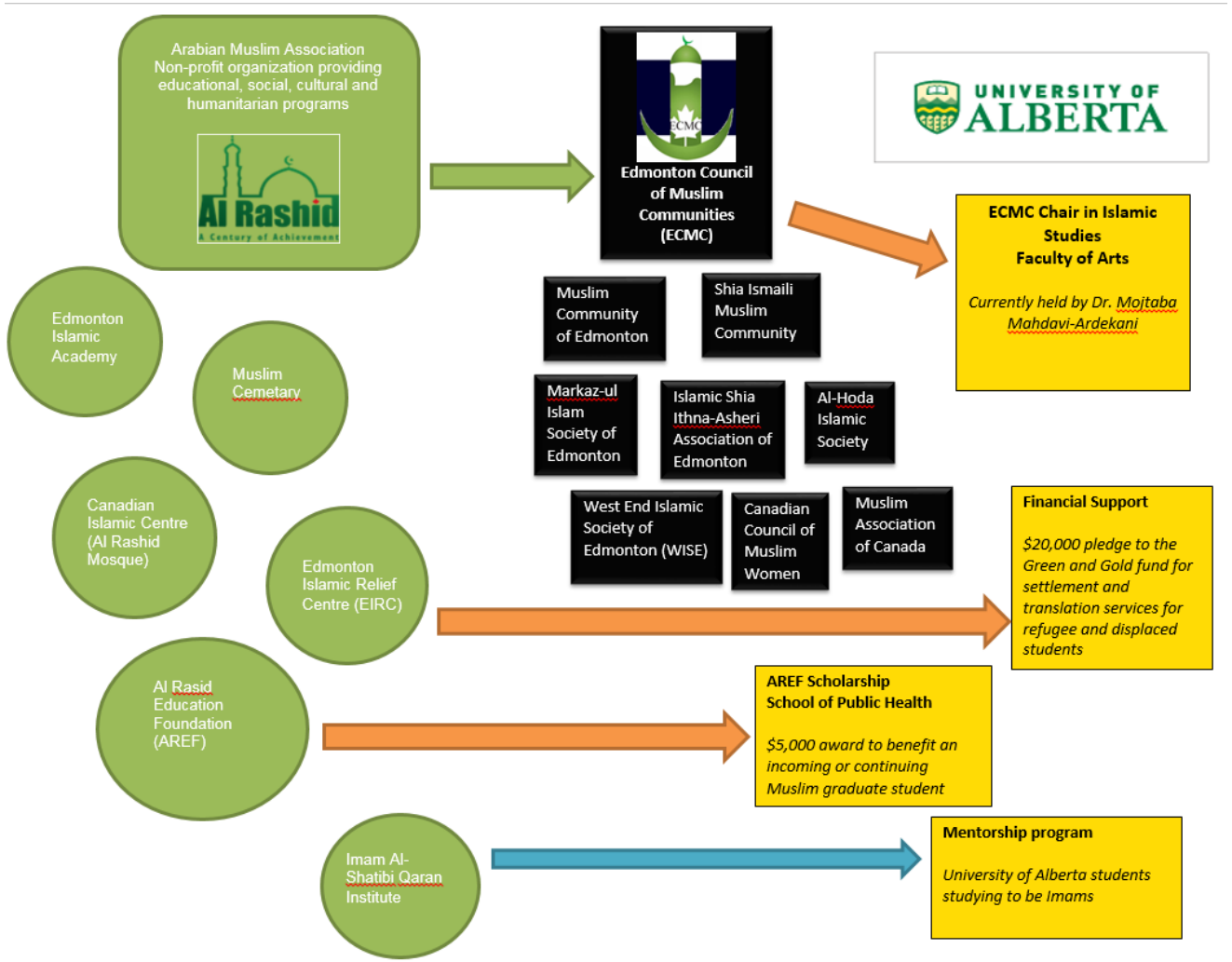


Tips & Tools

Best Practices

Avoid Cognitive Burden

High Cognitive Burden



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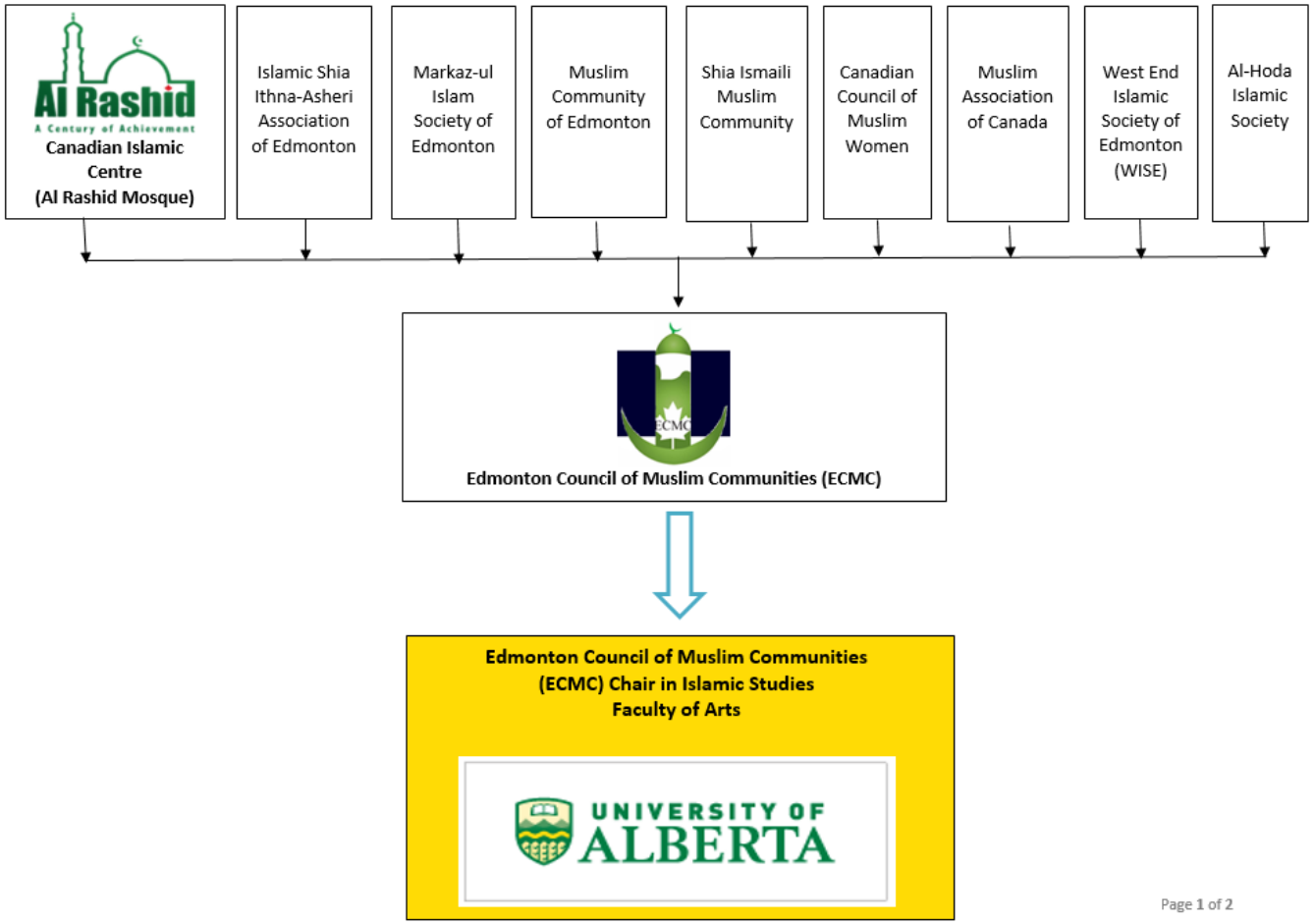
Tips & Tools

Best Practices

Avoid Cognitive Burden

Low Cognitive Burden



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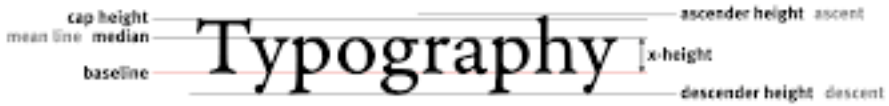
Tips & Tools

Best Practices

Typography

- Words in ALL CAPS are hard to read
- Sans-serif is easier to read than serif (especially on screens)
- Avoid extreme font sizes (not too big or too small)



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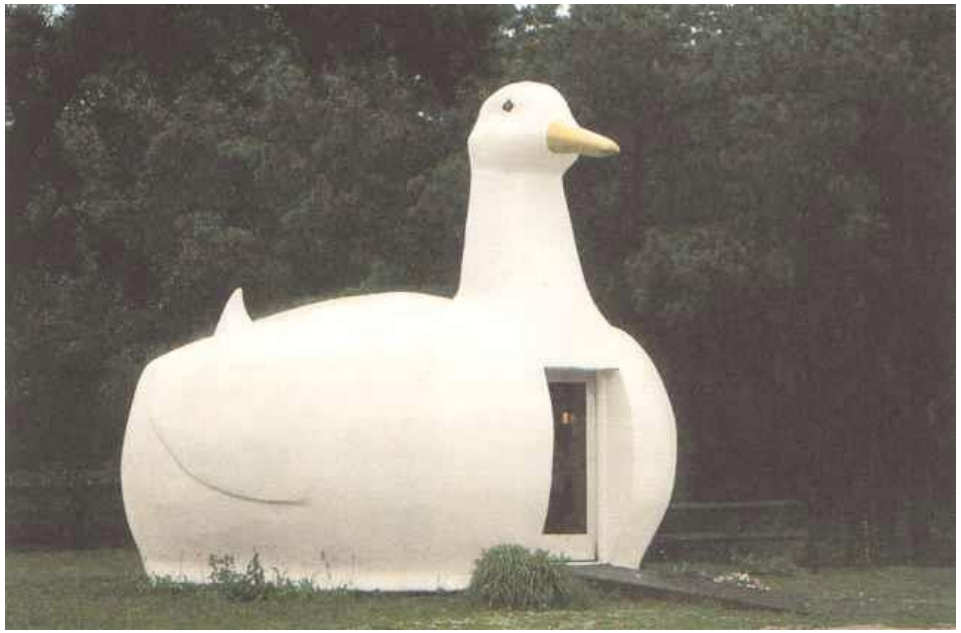
Tips & Tools

Best Practices

Avoid
“Chart Junk*”

**Edward Tufte*
(Yale University)

- “The Duck” - Excessive use of ridiculous decorative elements



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Tips & Tools

Best Practices

Avoid
“Chart Junk*”

**Edward Tufte*
(Yale University)

- “The Grid” – excessive use of gridlines that contributes to visual noise

3	4	5	6	7
01/23/1999	04/2/2003	07/3/1990	12/12/2005	01/4/2013
$65.00	$0.00	-$56.00	$35.00	$99.00

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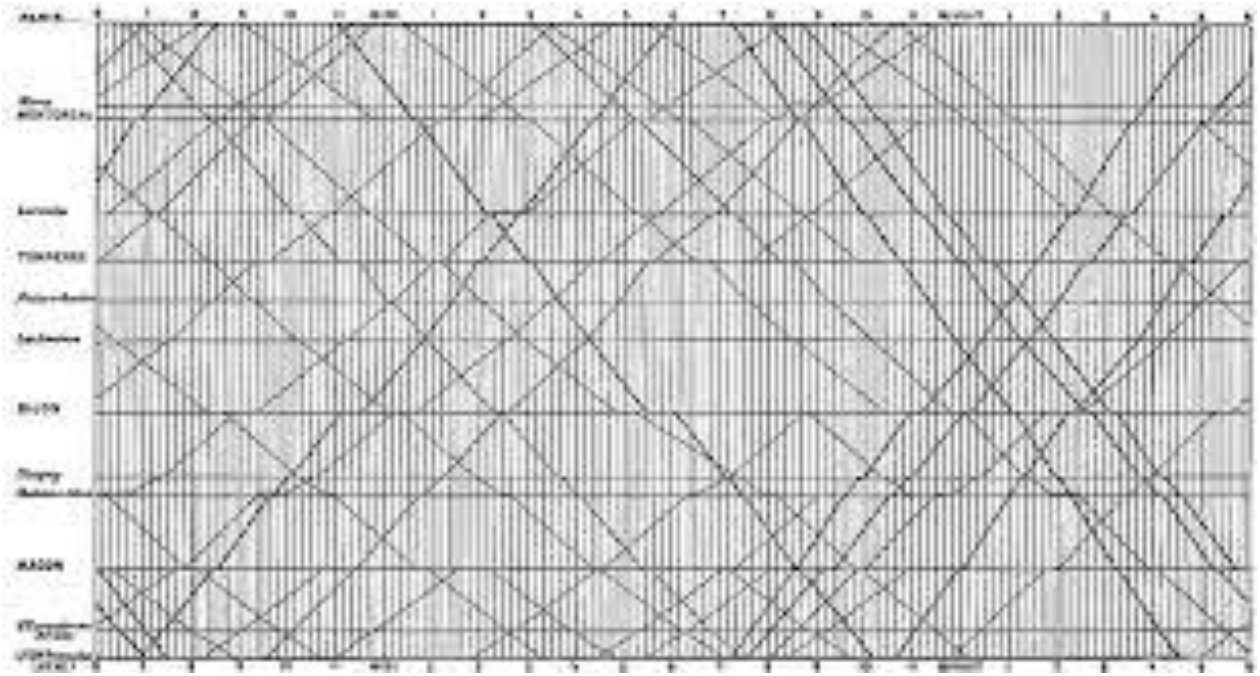
Tips & Tools

Best Practices

Avoid
“Chart Junk*”

**Edward Tufte*
(Yale University)

- “Vibration” – closely packed fine lines that almost seem to move



Tips & Tools

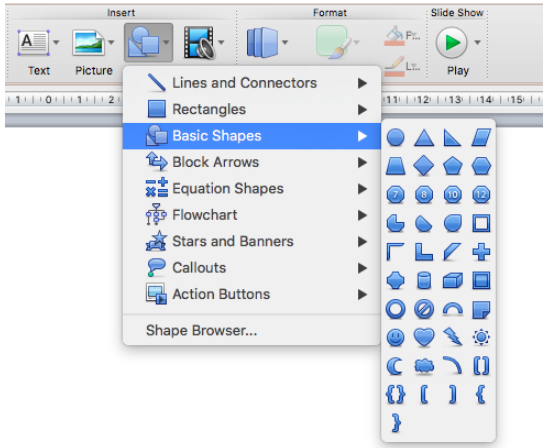
Software

- Wide variety of software available (free and paid)
- Designing visualizations is an inter-operable skill
  - Can apply knowledge of specific software widely (there are similar features between software)

Tips & Tools

Software

Microsoft PowerPoint



- Included with Microsoft Office
- Easy to learn and use
- Limited functionality (less control over nodes and connections)
- Templates for infographics available online
- Can easily annotate existing images in PowerPoint (Call Outs)

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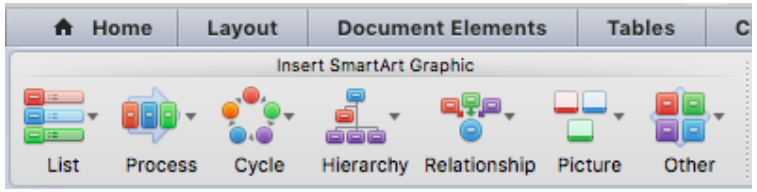
Tips & Tools

Software

Microsoft Word



- Included with Microsoft Office
  - Similar functionality to PowerPoint
- Easily added to Research Profiles
- Multiple visualization tools available
  - Easy to try different formats with same data set
  - Preview style and design options
- Limited functionality
- Templates are restrictive (challenging formatting)

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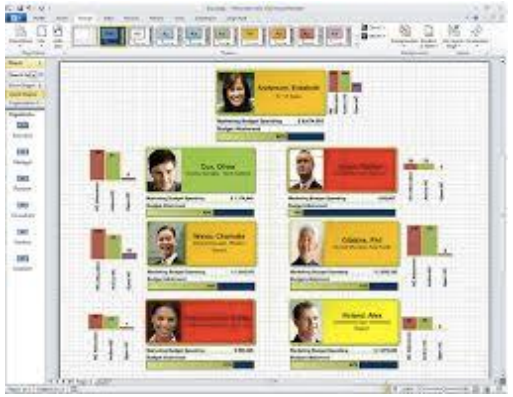
Tips & Tools

Software

Microsoft Visio



- Not included with Microsoft Office
- Slightly more involved learning process
- Excellent customization
  - Full control over nodes and connections
- Creates cleaner, more professional products
- More accurate modeling
- Templates and stencils widely available (free and paid)

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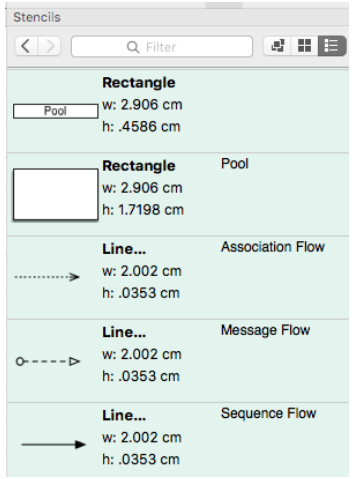
Tips & Tools

Software

Omnigraffle



- Mac version of Visio
- Slightly more involved learning process
- Excellent customization
  - Full control over nodes and connections
- Creates cleaner, more professional products
- More accurate modeling
- Templates and stencils widely available (free and paid)

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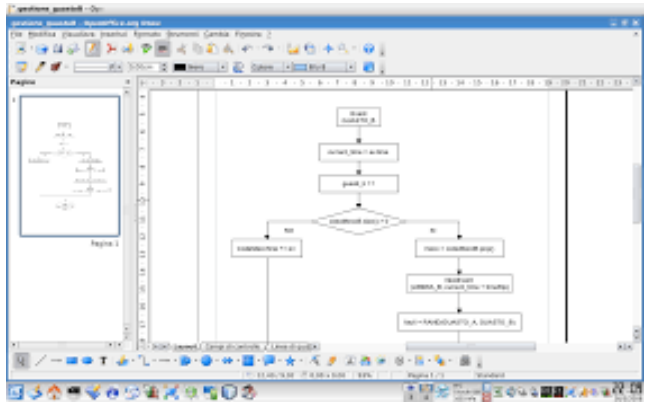
Tips & Tools

Software

OpenOffice Draw



- Free to download (good for beginners who want to try drawing software for free)
- Fairly straight forward interface
- More challenging to achieve clean look vs. paid version of drawing software
- Less control over customization (challenging formatting)

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Tips & Tools

Software

Web-based software

- Free web-based software, such as:
  - Google Draw
  - Lucidchart
  - Piktochart
- Easy to use, simple interfaces
- Export image files
- More challenging to achieve clean look vs. paid version of drawing software
- Less control over customization

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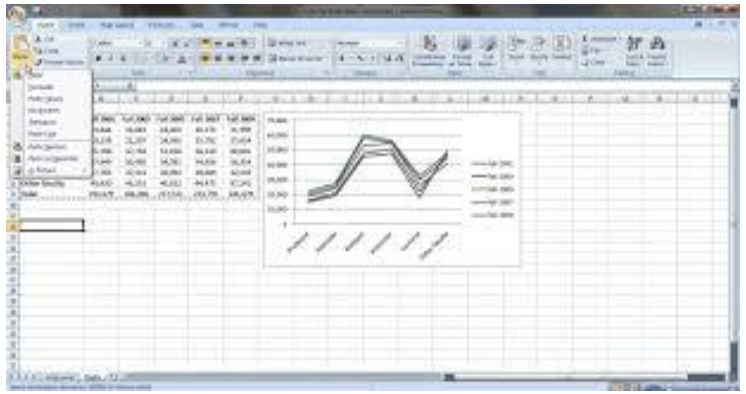
Tips & Tools

Software

Microsoft Excel



- Included with Microsoft Office
- Easy to pull data from database
- Formulas make it easy to clean and manipulate data
- Can interact with data (filters, pivot tables)
- Easy to make basic graphs
- Use to create dashboard reports
- Add-ins can increase functionality

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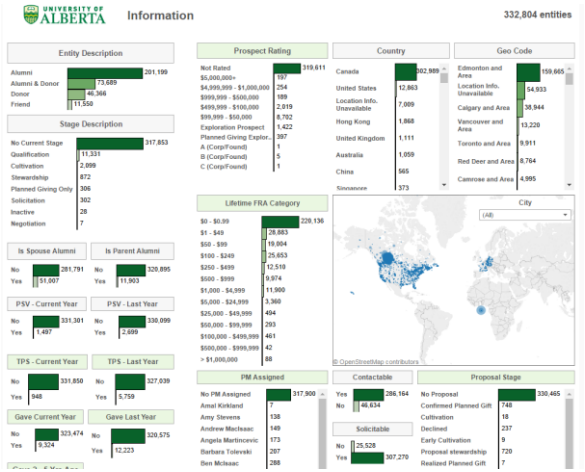
Tips & Tools

Software

Tableau



- Free and Paid versions
- Intuitive, drag and drop manner integrates with most data types
- Interactive:
  - User can highlight sections and drilldown into charts without extensive skills or assistance from IT once created
- Create and save views for data sets you utilize frequently
- Limited time spent formatting

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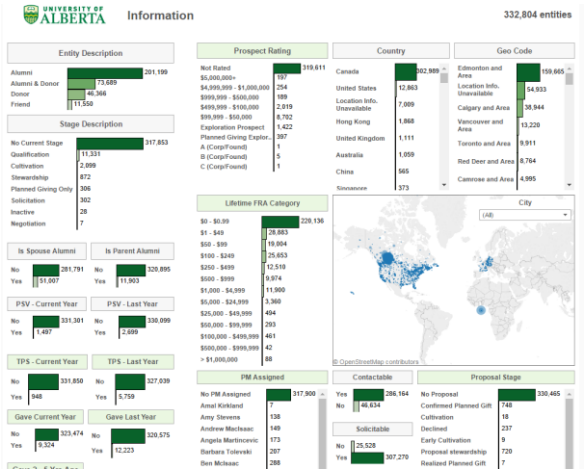
Tips & Tools

Software

Tableau



- Can subscribe to a specific dashboard
  - i.e. weekly giving, and receive email notification of new report
- Still need IT expertise if you're connecting to a database rather than simply uploading from an excel or CSV file
- If connected to database than it can refresh data daily, remaining current
- Free trial available

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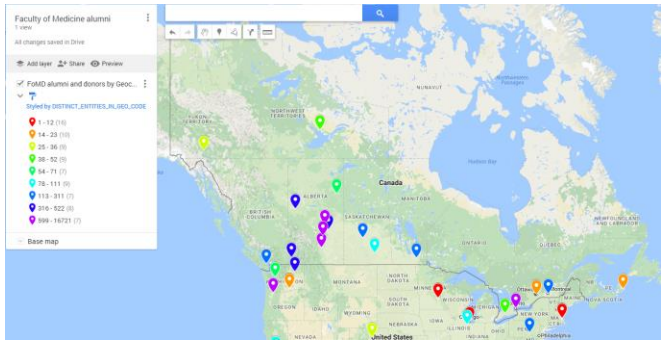
Tips & Tools

Software

Google Maps



- Free web-based tool
- Easy to use interface
- Fewer features for customization
- Import data sets from Google Sheets, Excel, CSV file types
- Different style options available
- Can manipulate data columns you want to use

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Tips & Tools

Software Tips

- Use screen grabs/print screen options to create image files
  - Copy & paste from Globe & Mail for stock charts
- Embed images into drawing software and annotate
- Learn shortcuts of software
- Reuse structure of existing infographics (such as family trees)
- Understand how to manipulate nodes and connections
  - Big part of creating infographics

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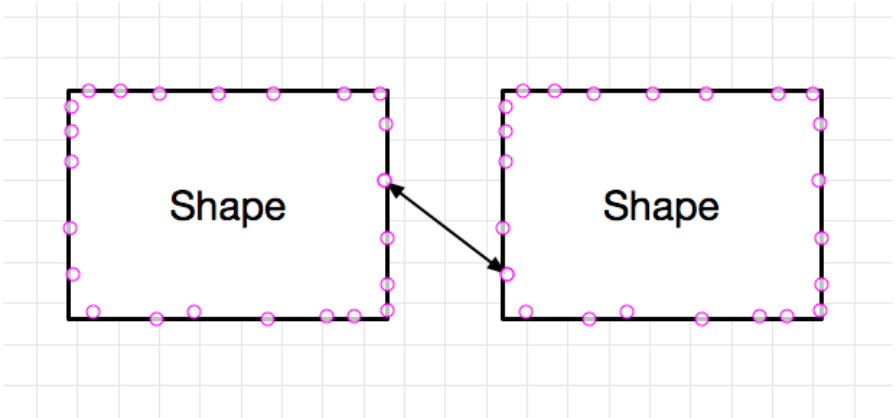

Wrap Up

Index of Visualizations

Title	Slide #	Created Using
Elements of Visualization	12, 13	PowerPoint
Visual Corporate Information	20	Visio
Cumulative Giving for Mrs. Y	22	Excel
Cumulative Giving for Mrs. Y	23	Excel + PowerPoint
Event Research	25	Omnigraffle + PowerPoint
Price Chart	27, 28	Screen Grab from TMX.com

Wrap Up

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Further Reading

- Cool Infographics Blog
- Cool Infographics, Randy Krum (2013)
- Data Visualization for Dummies, Mico Yuk and Stephanie Diamond (2014)
- Data points: visualization that means something, Nathan Yau (2013)
- Designing Data Visualizations, Noah Ilinsky and Julie Steele (2011)
- Designing Everyday Things, Don Norman (1988)
- The Visual Display of Quantitative Information, Edward Tufte (1983)

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Contact Us

Erin Moffatt

Prospect Research Analyst,
University of Alberta
eemoffat@ualberta.ca

Liz Murray

Manager, Knowledge & Systems,
Sunnybrook Foundation
Liz.Murray@sunnybrook.ca

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Questions?

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