Carlos J. Costa

DASHBOARDS AND DATA VISUALIZATION

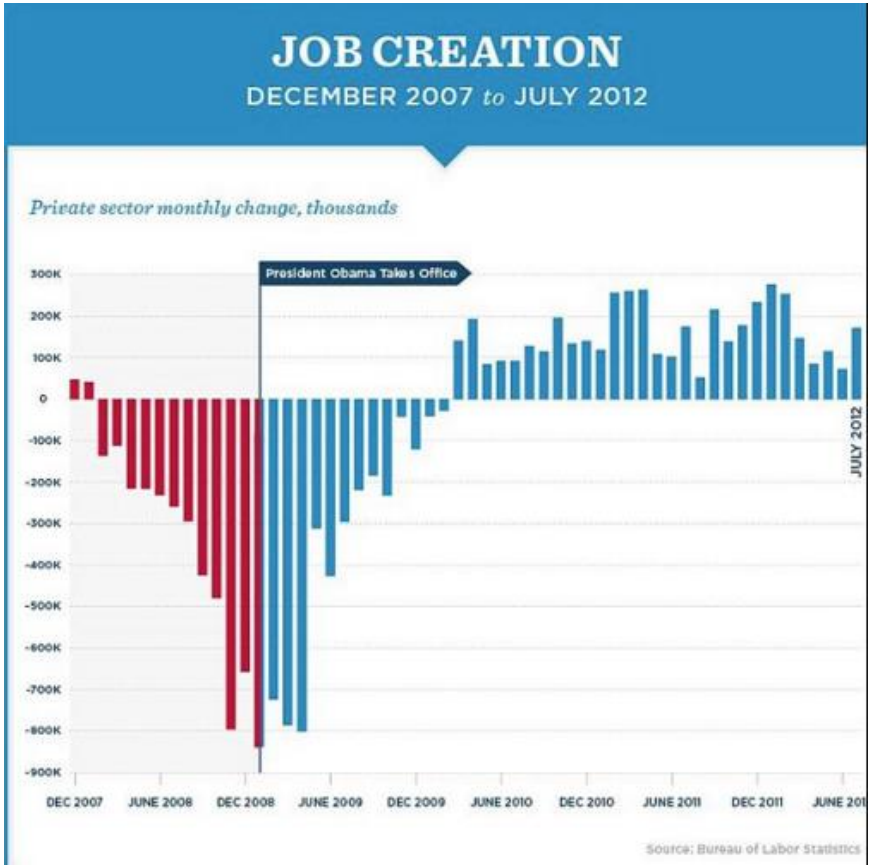
Telling a Story using data

- Some reports have problems

- Shadows and 3D sometimes are noise
- Colour schema
- Character fonts
- Not the more adequate graphs

What is telling a story with data?

- For a visual to work, they need to tell the story the author intended.



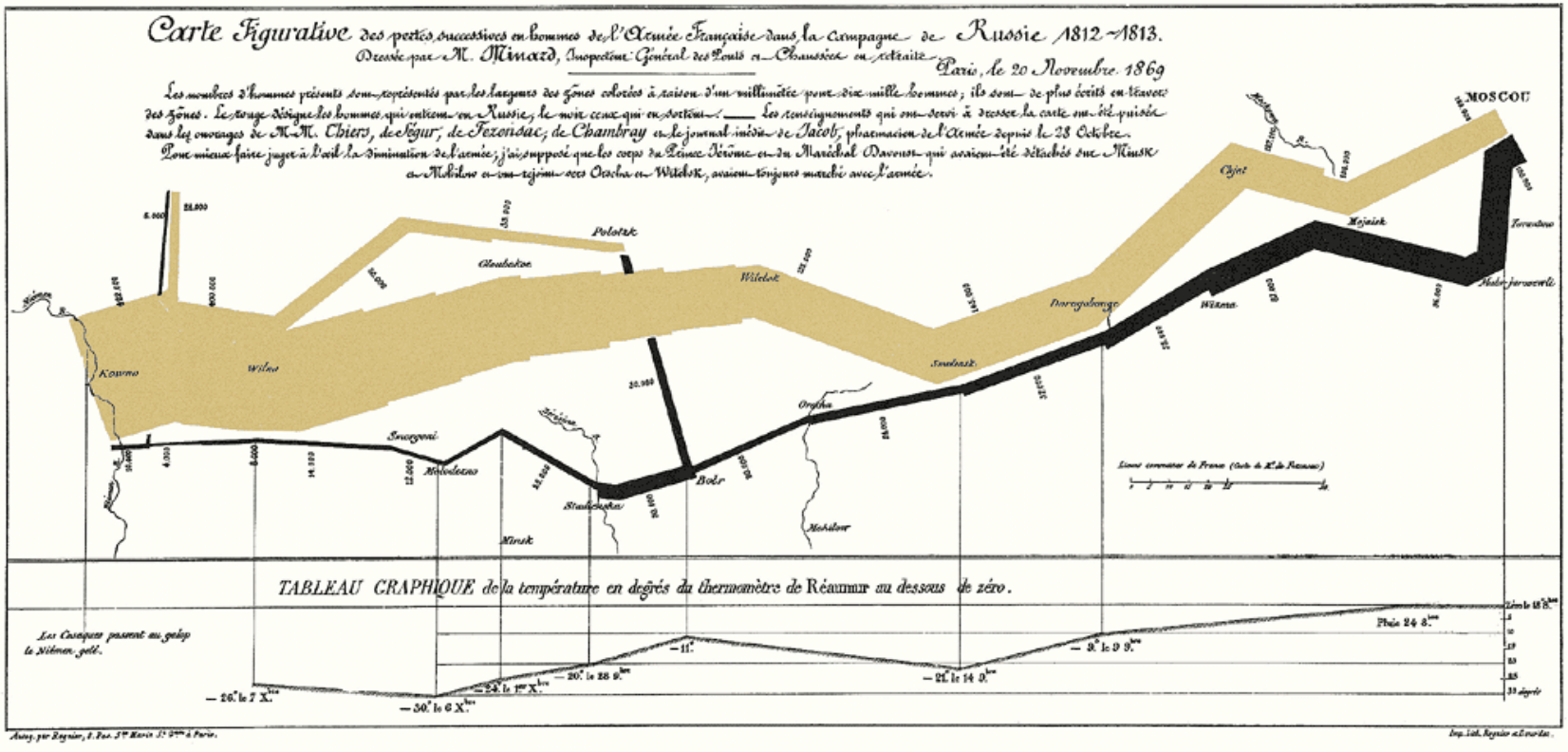
Source: Bureau of Labor Statistics | Nathan Yau

What is telling a story with data?

- Are there other ways to tell a great story through data?

Source: The Gap minder foundation, BBC, Youtube.com
Image Source: http://img.youtube.com/vi/jbkSRLYSojo/0.jpg

What is telling a story with data?



What is telling a story with data?

- Tufte (2001) classifies Napoleon's March to Moscow, a drawing made by Charles Joseph Minard in 1869, as one of the most effective graphic illustrations ever created.
- "Minard's presentation tells a rich, flowing story" Tufte, 2001.
- The chart, which depicts the losses of Napoleon's army during its 1812 invasion of Russia, begins on the left-hand side with 442,000 men *en route* to Moscow.
- The black line, which moves in the reverse direction, signifies its retreat and the horrific losses.

Effective graphical display

Excellence in statistical graphics consists of complex ideas communicated with clarity, precision and efficiency. Graphical displays should:

- show the data
- induce 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 has to say
- present many numbers in a small space
- make large data sets coherent
- encourage the eye to compare different pieces of data
- reveal the data at several levels of detail, from a broad overview to 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.

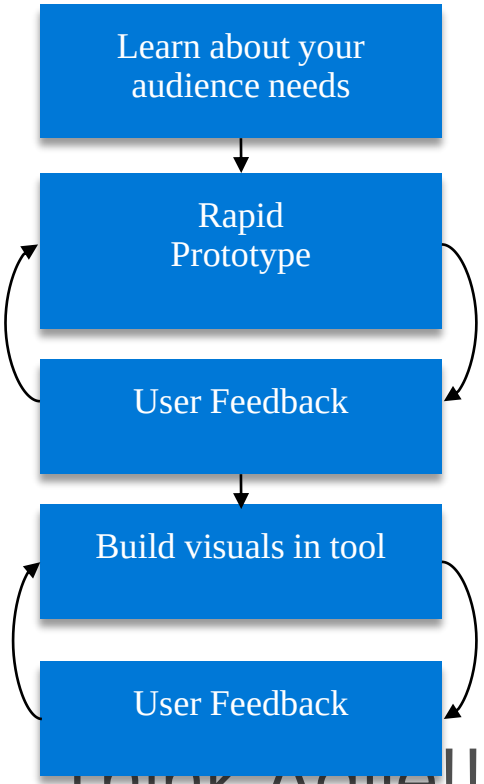
Tufte (2001)

What is behind Data visualization?

Top 5 Questions

Use Whiteboard to plan POC

Start Visuals with Sample Data

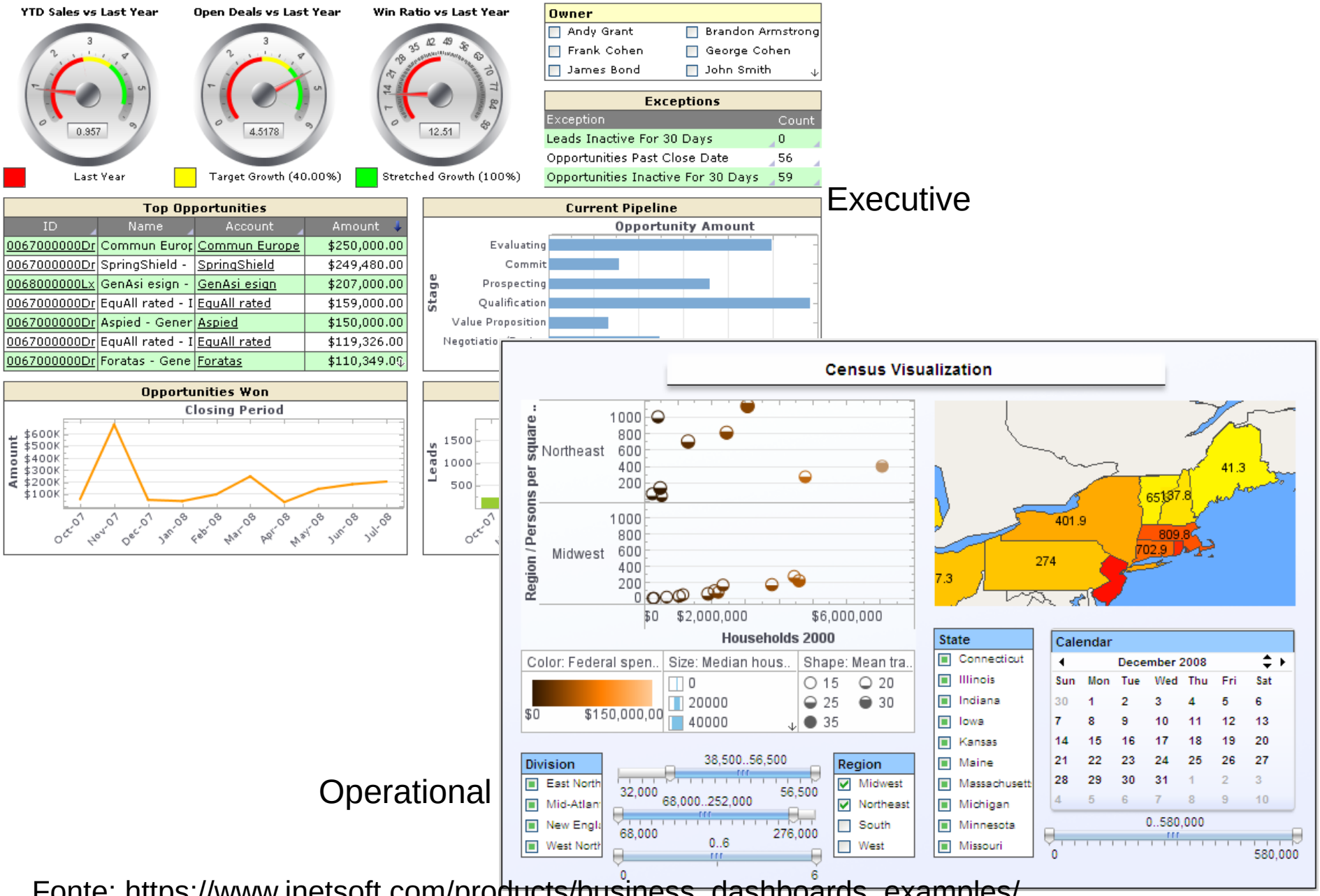


What is a Dashboard?

What is a Dashboard?

- Visual representation of the most relevant information needed to achieve one or more business objectives;
- Information presented in a consolidated and organized form on a single screen in order to be more easily monitored

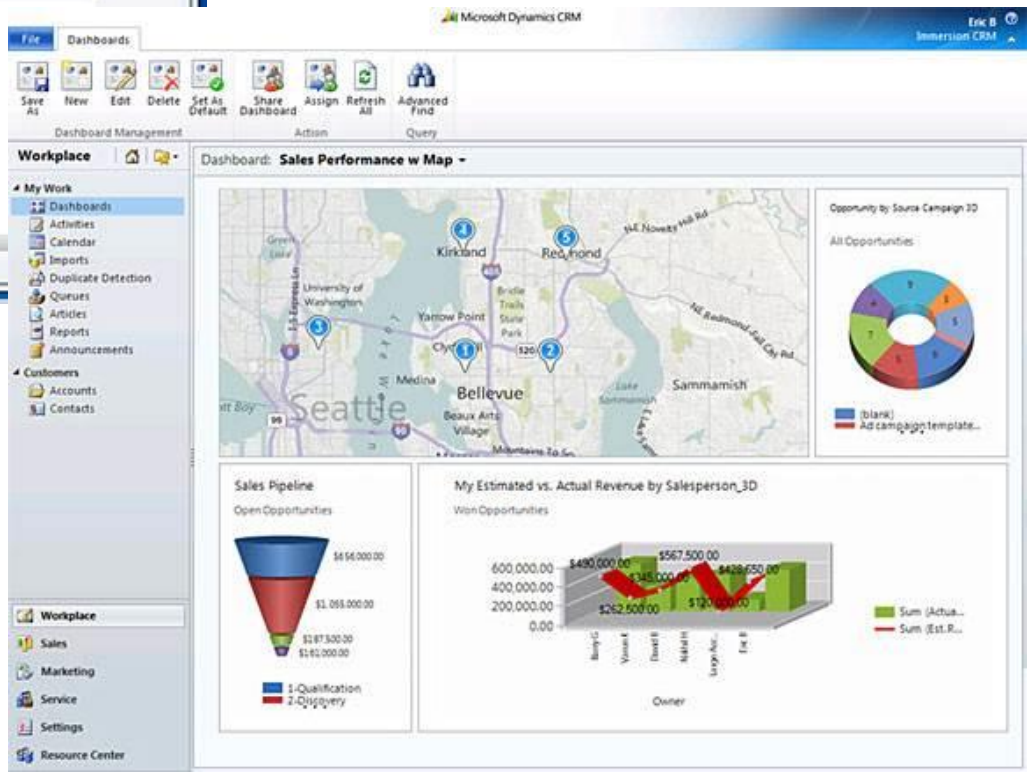
Few, 2006



Operational

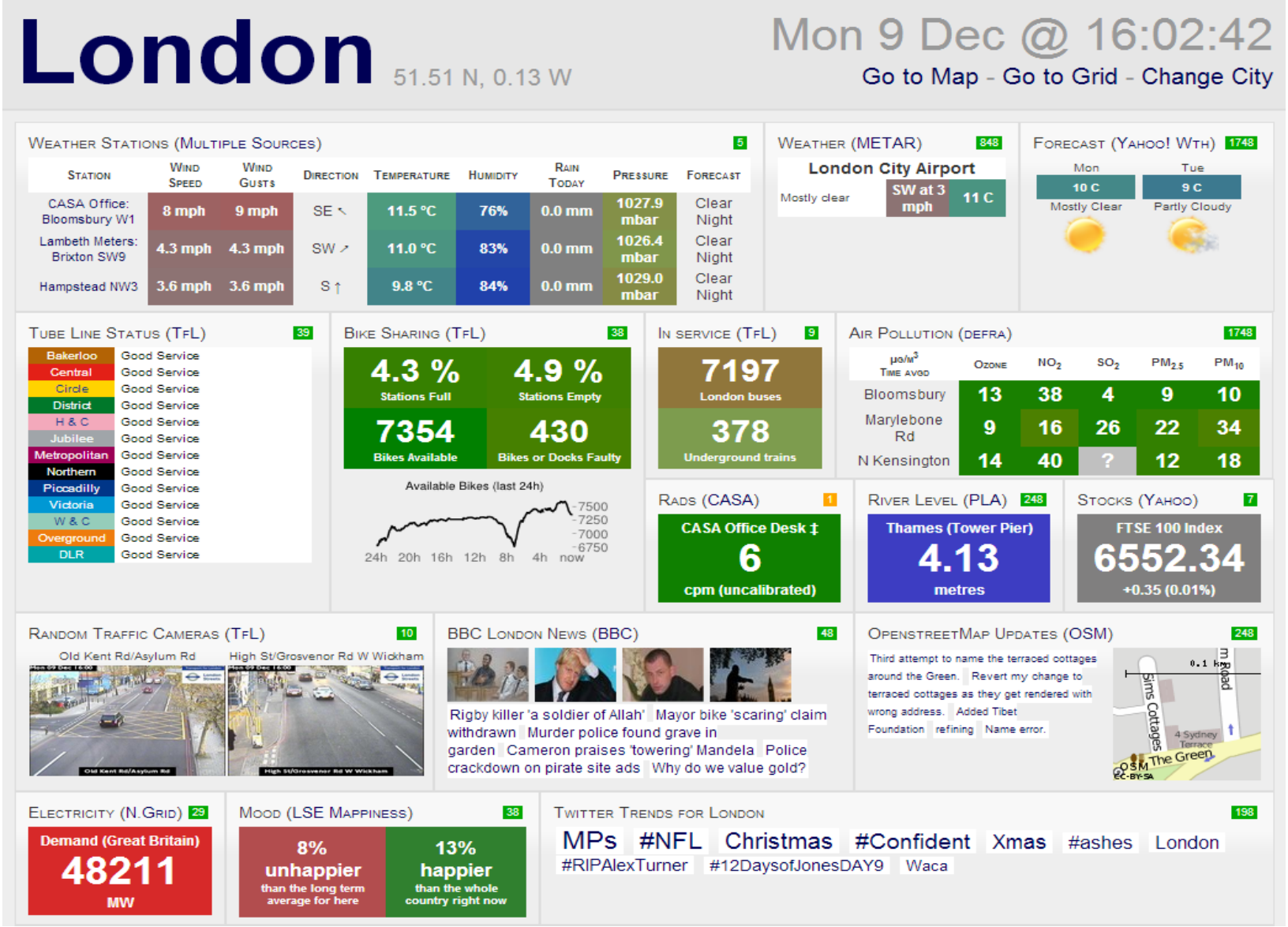
Fonte: https://www.inetsoft.com/products/business_dashboards_examples/

Oracle sales pipeline

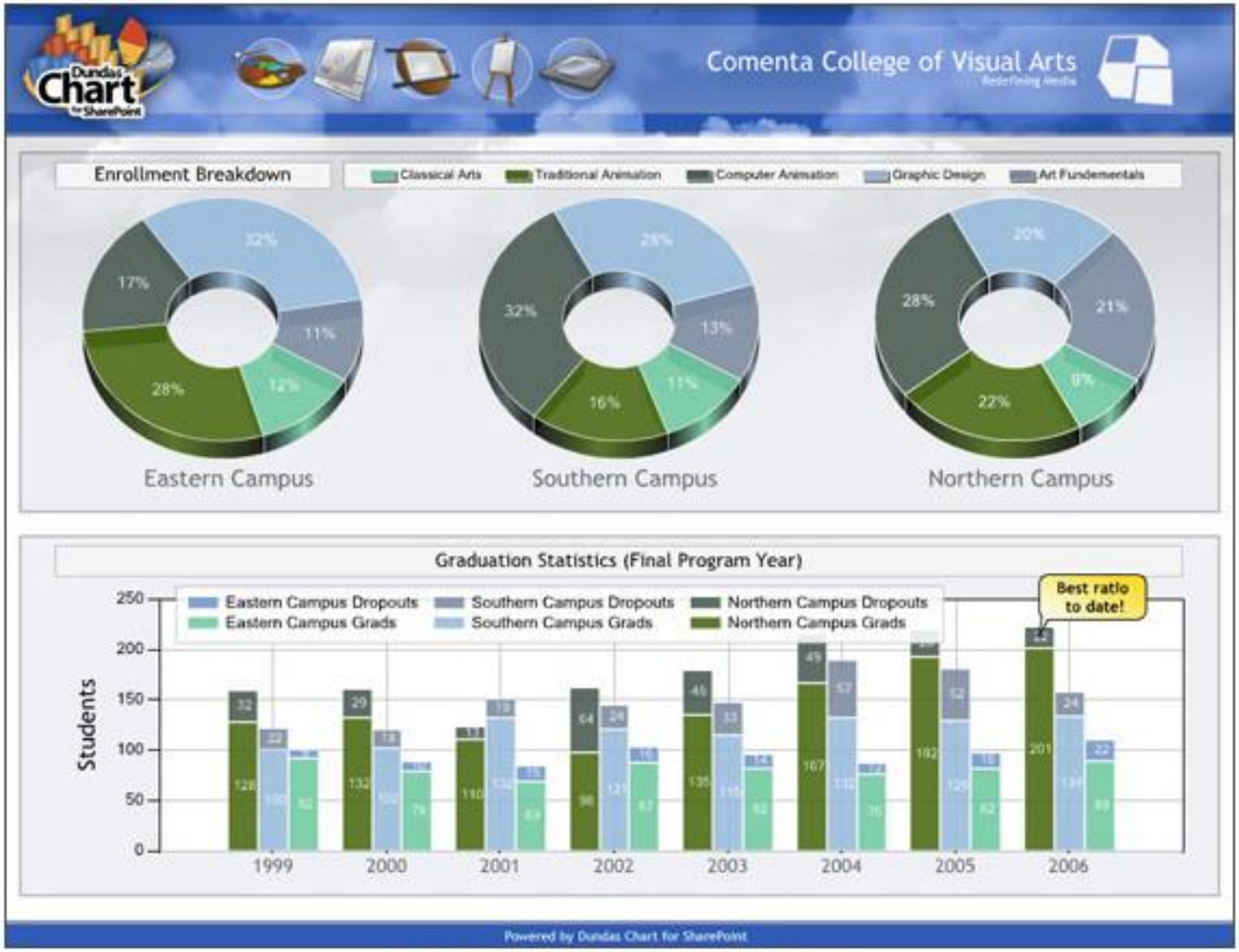


Microsoft Sales Pipeline

Fonte: http://searchcrm.techtarget.com/photostory/2240113011/CRM-user-interfaces-Sales-dashboard-examples/2/Microsofts-sales-dashboard

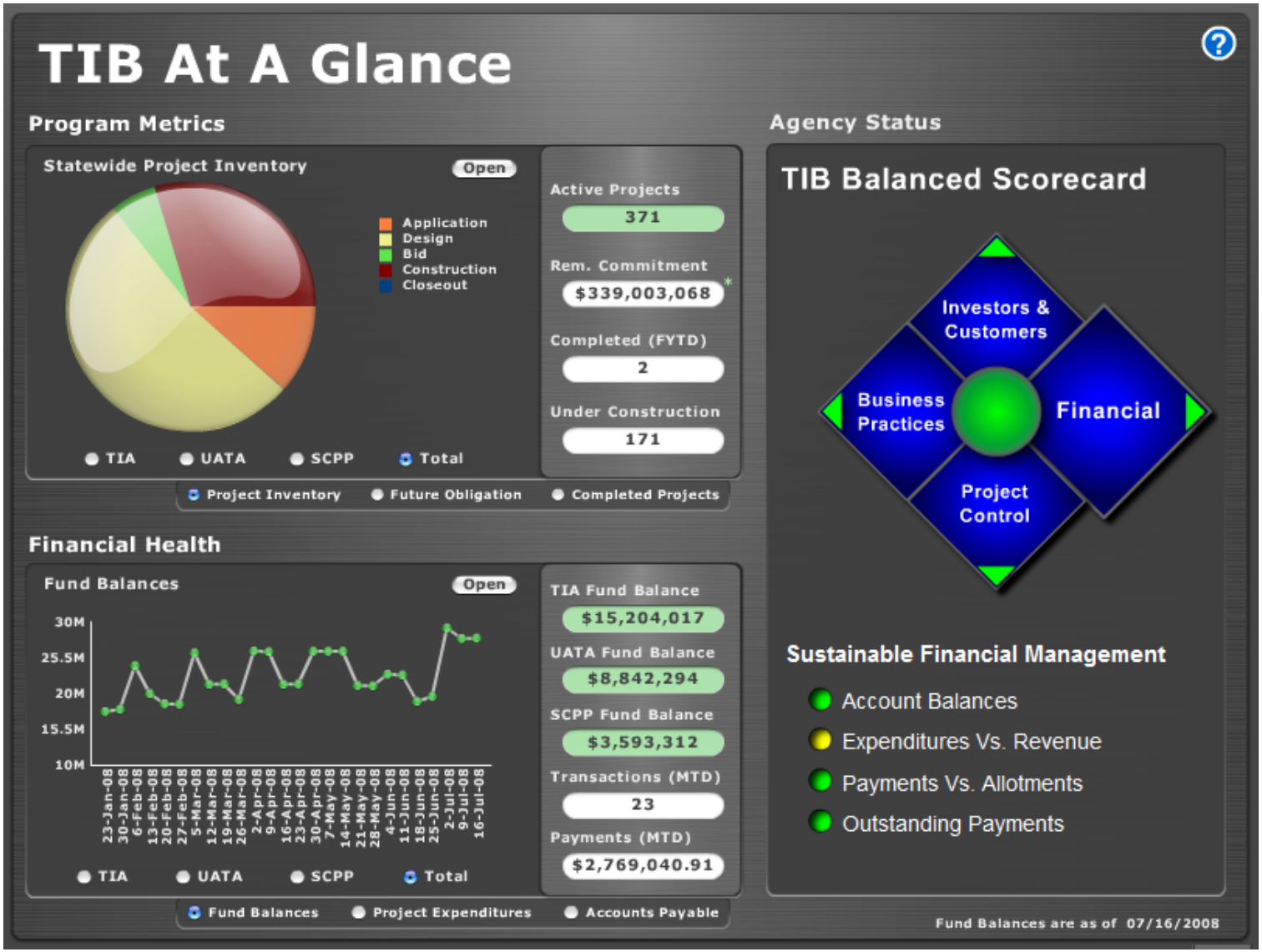


https://www.matillion.com/insights/dashboard-examples-the-good-the-bad-and-the-ugly/



Digital Dashboard, Education Metrics

https://www.matillion.com/insights/dashboard-examples-the-good-the-bad-and-the-ugly/



https://www.matillion.com/insights/dashboard-examples-the-good-the-bad-and-the-ugly/

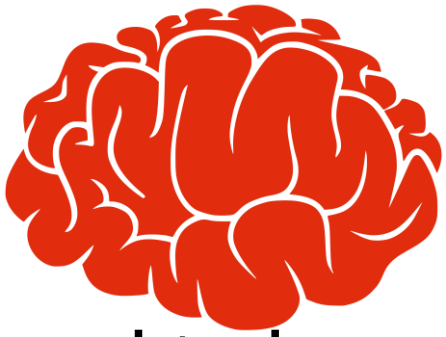
Common Pitfalls in Dashboard Design

- Pitfall #1: Exceeding the Boundaries of a Single Screen
- Pitfall #2: Supplying Inadequate Context for the Data
- Pitfall #3: Displaying Excessive Detail or Precision
- Pitfall #4: Expressing Measures Indirectly
- Pitfall #5: Choosing Inappropriate Media of Display
- 8Pitfall #6: Introducing Meaningless Variety
- Pitfall #7: Using Poorly Designed Display Media
- Pitfall #8: Encoding Quantitative Data Inaccurately
- Pitfall #9: Arranging the Data Poorly
- Pitfall #10: Ineffectively Highlighting What's Important
- Pitfall #11: Cluttering the Screen with Useless Decoration
- Pitfall #12: Misusing or Overusing Color
- Pitfall #13: Designing an Unappealing Visual Display

Few, 2006a

Science behind data Visualization

- Our Brains – that big red thing in the middle.



- We have learned to be very visual beings. We have three levels of memory to make things actual.

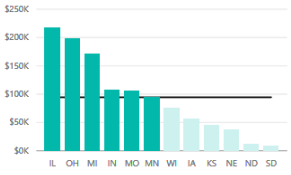
Iconic memory

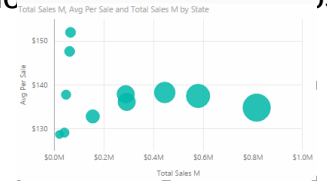
Short Term memory

Long Term memory

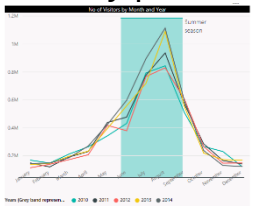
Science behind data Visualization

- Pre-cognitive attributes
  - Very precise quantitative perception: 2D length and positioning

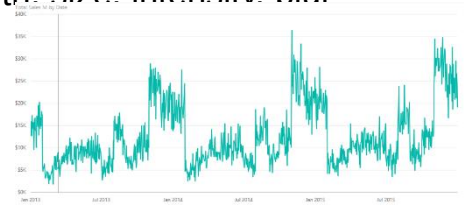




  - Not very precise quantitative perception: width, size, intensity, blur



Sales was up **20%** YoY



  - Non-Quantitative Perception = Orientation, Form, Enclosure, Added Brands

Region	Total Sales M	Sales YoY
South	$1,566,447	10.66%
MidWest	$992,456	5.42%
NorthEast	$931,919	11.98%
Pacific	$758,435	13.94%
Mountain	$283,976	27.43%
	$133	▼ -85.34%

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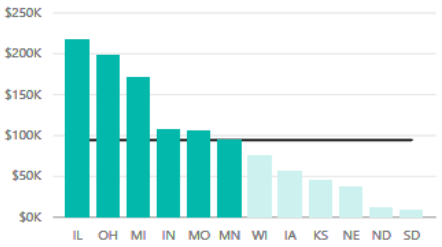
Based upon Few, 2006b

Gestalt Principles

Proximity, Similarity



Continuity

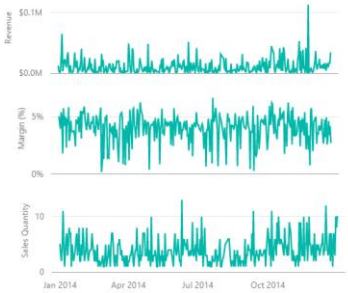
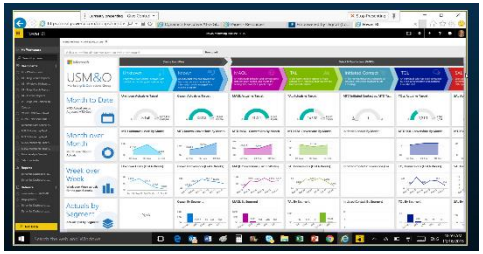


Figure and Ground

Enclosure, Symmetry

Continuity and Symmetry



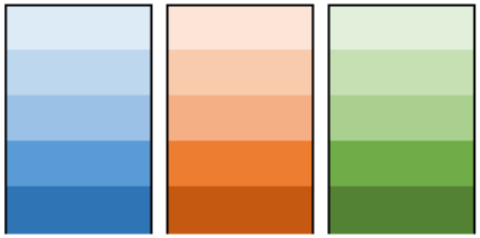
Visual Perception

- Organization of Visual perception
  - Colour
  - Shape
  - Spatial positioning
  - Movement

Few, 2006b

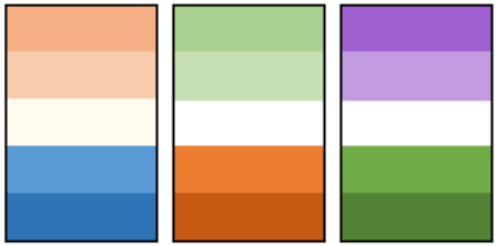
Art behind data visualization

- Types of Colours



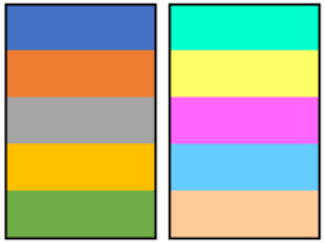
Sequential

There is a scale



Divergent

There are two divergente spaces



Qualitative

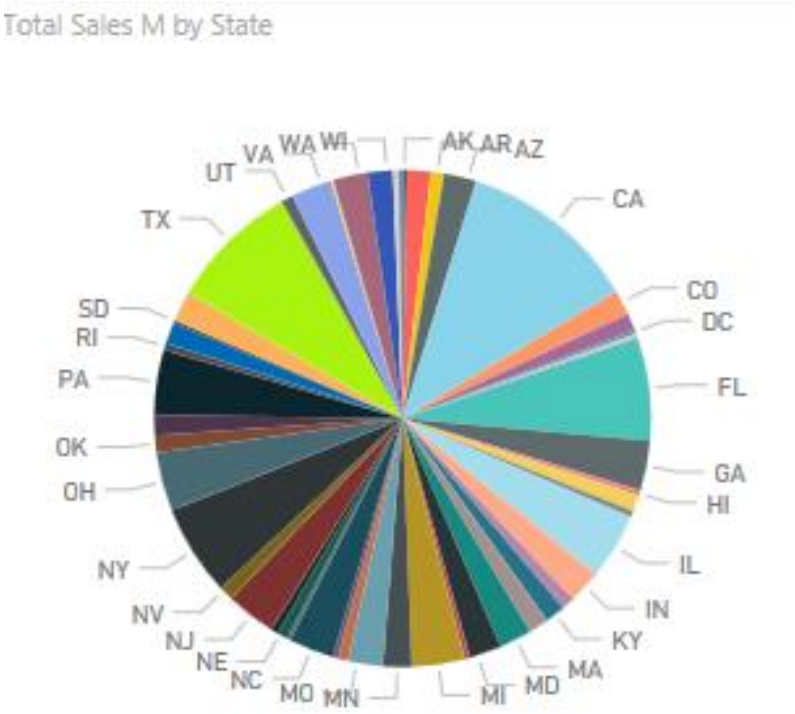
There is no longitudinal organization/ order

Art behind data visualization

- **Important:**
  - Do not have more than 3-5 colours in a single look (think short term memory)
  - The eye can not differentiate more than 5 colours from the same hue
  - Try to have a semantic meaning for the colours used (Red = Bad, Green = Good)

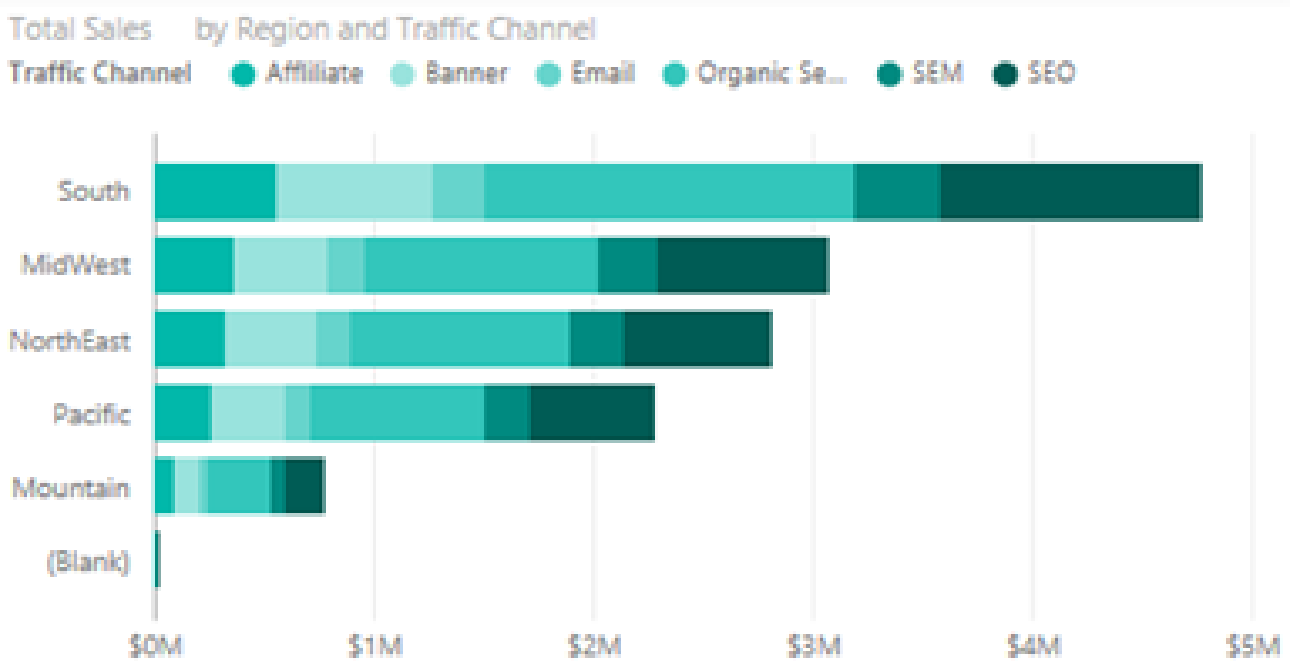
Art behind data visualization

- Avoid:

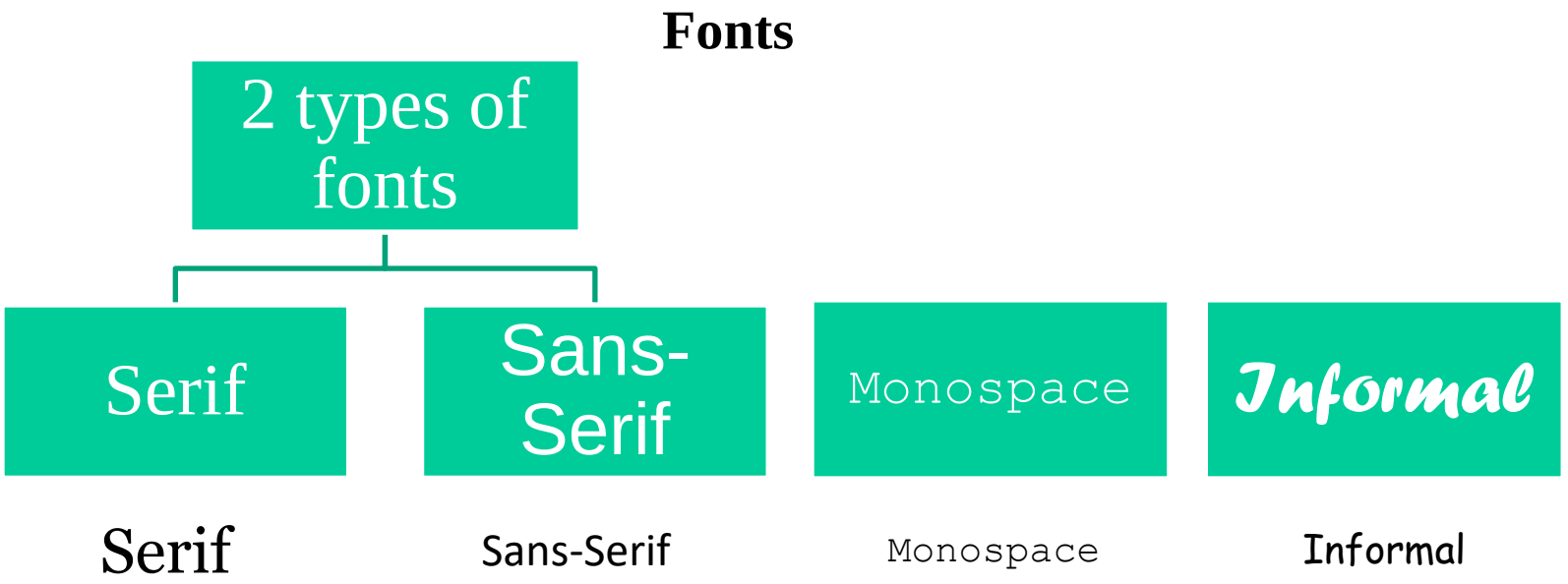


Art behind data visualization

- Avoid:



Art behind data visualization



- Sans-Serif better for Digital Media in professional context
- Ex. Segoe, Calibri, Trebuchet

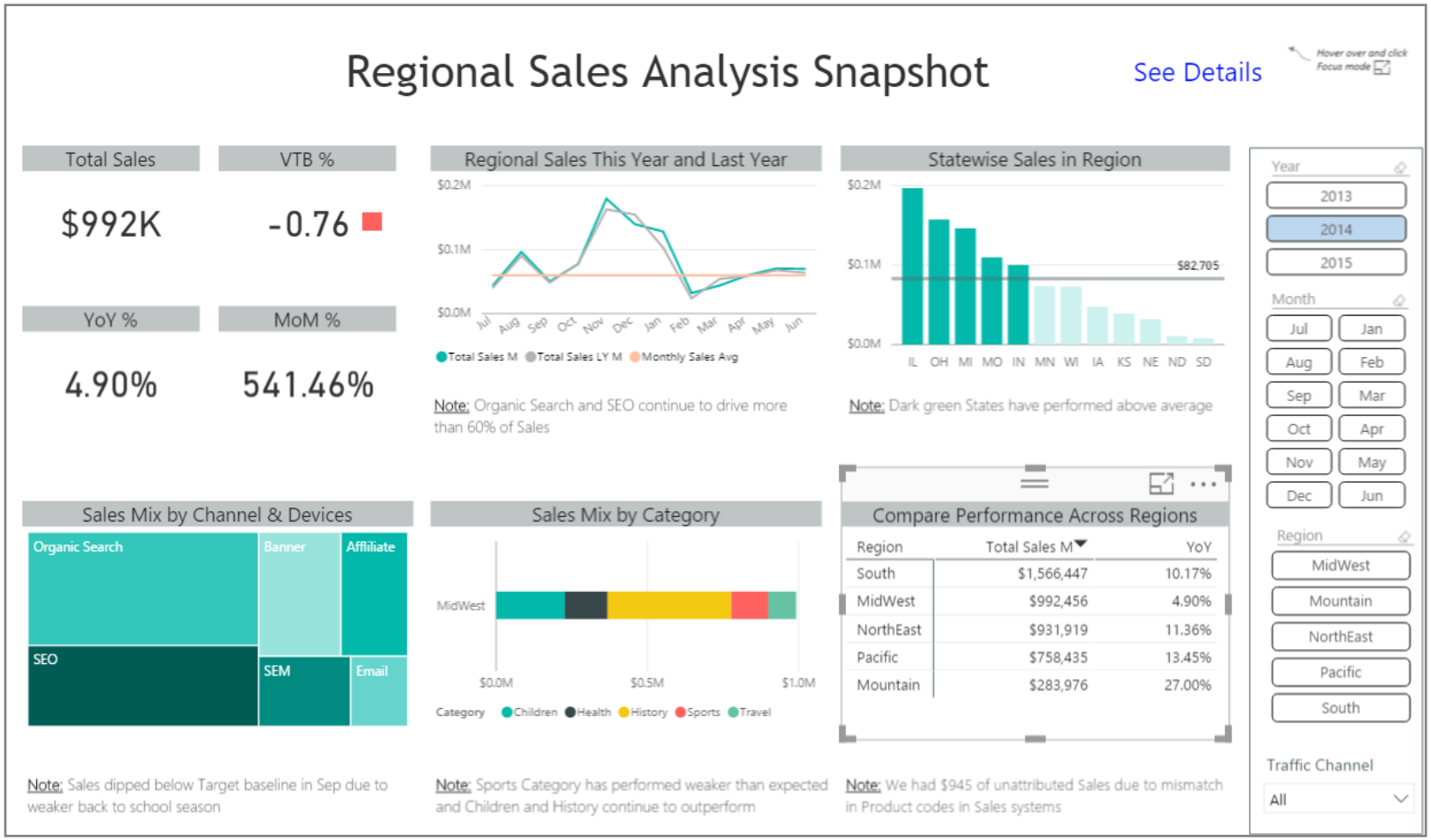
Art behind data visualization

- You can change the font weight using three techniques
  - Change the size:
    - Hi Power BI - Segoe UI Light 28
    - Hi Power BI - Segoe UI Light 24
  - Choice of different fonts with greater weight of the same family
    - Hi Power BI - Segoe UI (Body) 24
    - Hi Power BI - Segoe UI Light 24
  - Use bold
    - **Hi Power BI** - **Segoe UI Light 24 (Bolded)**
    - Hi Power BI - Segoe UI Light 24 (Non-Bolded)

Art behind data visualization

- Recommendations regarding the use of fonts:
  - Choose at most 2-3 font types / sizes on a report page / control panel
  - Choose a lighter weight font Ex. "Segoe UI Light" for
    - Axis
    - Important Data Tags
    - Text box
    - Non-titles
  - Use a larger weight font from the same family for titles instead of (bold) Ex. Segoe UI Bold

Characters and fonts



Main Challenges

- Main challenges:
  - Placing a large volume of useful and often unrelated information in a limited space
  - Be clear
  - Choosing the right information

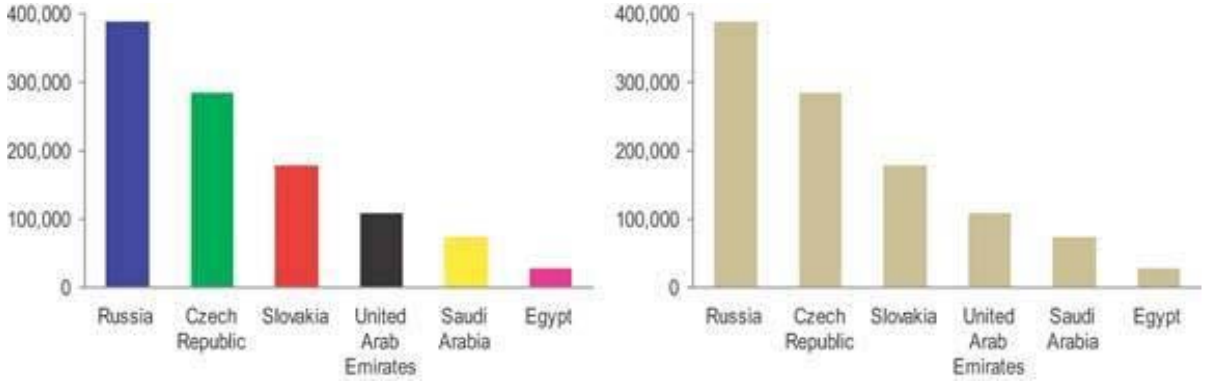
Few, 2006b

Main Challenges

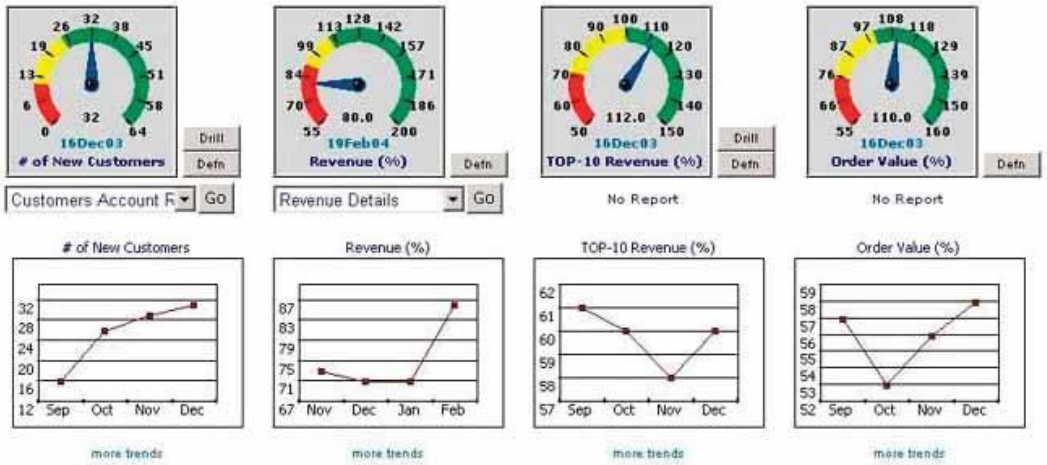
- Well-designed dashboards deliver information that:
  - It is exceptionally well organized
  - It is condensed, mainly in summaries and exceptions
  - It is specific and customized to audience needs and goals
  - Presented through concise means that communicate data and message clearly and directly

Few, 2006b

Example of non-data pixels to be eliminated

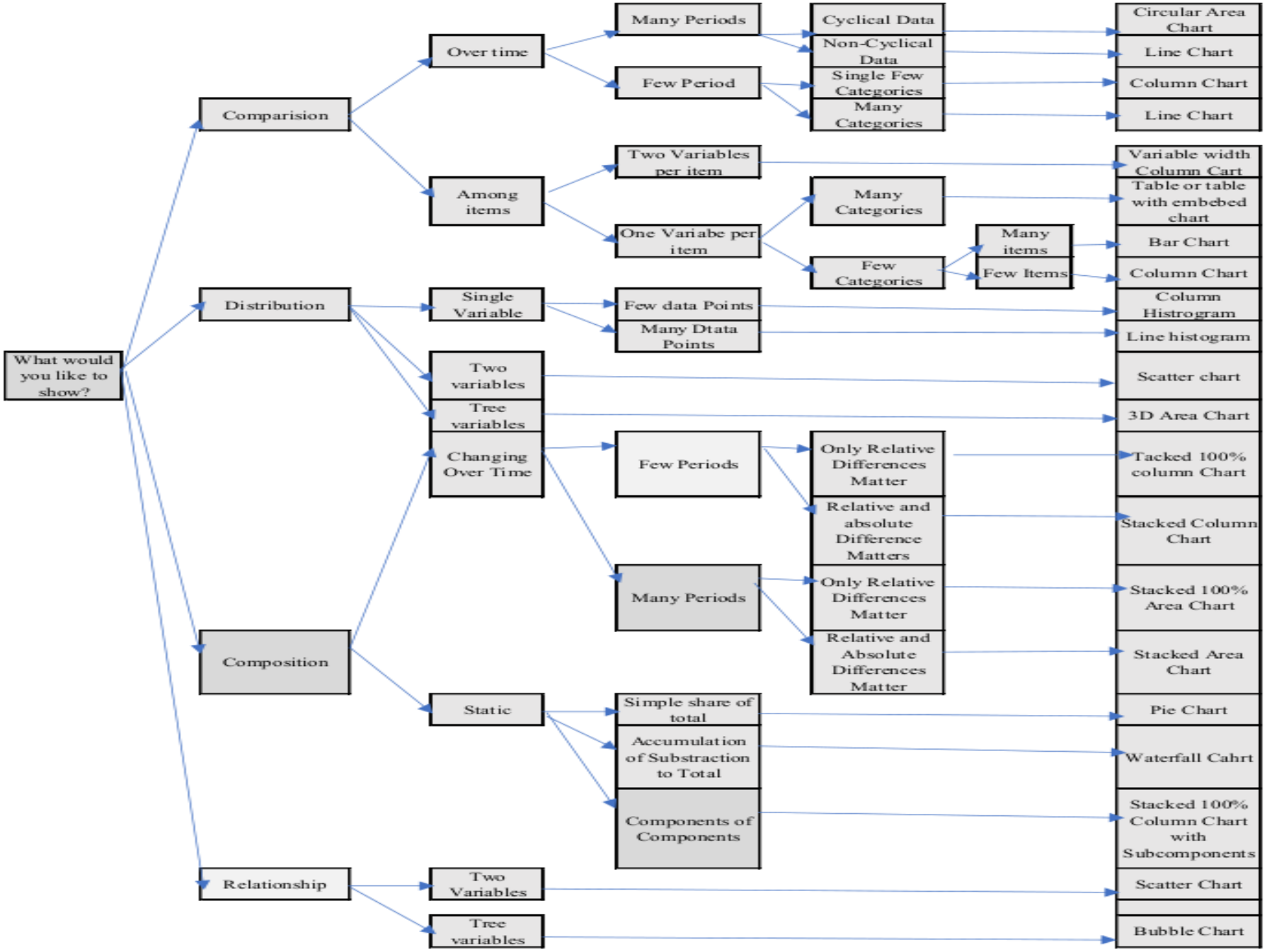


Colours have no meaning.



Borders are useless

Choosing the better graphics


What would you like to show?
Comparision
Over time
Many Periods
Few Period
Cyclical Data
Non-Cyclical Data
Single Few Categories
Many Categories
Circular Area Chart
Line Chart
Column Chart
Line Chart
Among items
Two Variables per item
One Variabe per item
Many Categories
Few Categories
Many items
Few Items
Variable width Column Cart
Table or table with embebed chart
Bar Chart
Column Chart
Distribution
Single Variable
Few data Points
Many Dtata Points
Column Histrogram
Line histogram
Two variables
Tree variables
Changing Over Time
Scatter chart
3D Area Chart
Few Periods
Many Periods
Only Relative Differences Matter
Relative and absolute Difference Matters
Only Relative Differences Matter
Relative and Absolute Differences Matter
Tacked 100% column Chart
Stacked Column Chart
Stacked 100% Area Chart
Stacked Area Chart
Composition
Static
Simple share of total
Accumulation of Substraction to Total
Components of Components
Pie Chart
Waterfall Cahrt
Stacked 100% Column Chart with Subcomponents
Relationship
Two Variables
Tree variables
Scatter Chart
Bubble Chart

Business Questions

1. What are my total sales for a selected year and region?
2. What are my total sales per year?
3. What is the gross profit per city of my country?
4. How are my sales by Channel, Device, Category for the selected Year?
5. How do my total sales and annual growth for the region compare to other regions?
6. What are my total sales for the selected year, month by categories?
7. How is my trend of 1 month per average sale for my categories? What is the minimum and maximum average per sale?

References

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