Guidelines to Insightful Data Visualization
Christopher Childs, University of Central Florida
Data Visualization

A single representation of multiple sets of refined information (Datawatch, 2015)
Dashboard

A group of resources combined into one unified visual display (Keihani, 2015)
Why Talk Data Visualization

IR Professionals are charged with creating visualizations from institutional information.

Since the creation of visualization tools like Tableau, SAS Visual Analytics, and Power BI it has made data visualization very popular.
YOU GET A DASHBOARD, AND YOU GET A DASHBOARD

EVERYONE GETS A DASHBOARD!!
Why Talk Data Visualization

Everyone wants some type interactive visualization!

Anyone can create them

Not enough professionals think about the implications visualization will have on their business processes

- Why do we need this visualization?
- What message are we trying to convey with this dashboard?
- What visualization can tell this story best?
Why Talk Data Visualization

In order to create insightful data visualizations, IR professionals need to;

1. Understand what is important to the stakeholder

2. Employ design principles to help provide clarity to visualizations

3. Tell a consistent story with visualizations
What are we going to talk about today?

1. How to view data visualization

2. Starting the data visualization process
   - Know your audience
   - Asking the right questions

3. Design Principles for data visualization

4. Sketching out a story

5. Continuing the data visualization process
How to view data visualization
Great Resource for Data Visualization

Alberto Cairo

- Author of *The Truthful Art: Data, Charts, and Maps for Communication*
- Worked as a data-journalist and information designer at *El Mundo* (Cairo, 2013)
The world is full of stuff
Stuff is shapeless and useless
The world is filled with raw materials, like Marble
A Human brain envisions a shape that marble can adopt, and a human hand models it.
But the shape the brain envisions is not any shape. It depends on a purpose (function).

Michelangelo

“Moses”
(1513-1515)

In this case the purpose was to inspire awe, convey a sense of power, and of majesty
Today, the world is full of **even more stuff**
Our world is about complexity
Our goal is to **model that raw data** and make sense of it

“This is actually a traditional journalistic endeavor; to tame the world’s complexity, and then to summarize it, organize it, and present it” (Cairo, 2013)
A data visualization is a tool. It extends our skills and capacities, it lets us see beyond what we would normally see.
Starting the Data Visualization Process
Data Visualization and Dashboard Creation is a Process

- To ensure data visualizations are insightful, there needs to be a process of creating them. This will...
  - Foster organization when creating visualizations
  - Help maintain consistency between other dashboards
  - Help identify what the stakeholder want to see
Dashboard Development Process

**Planning**
- Intake meeting with stakeholders

**Mockup**
- Draft first visualizations

**Initial Review**
- Critique mockup

**Viz Development**
- Create visualizations or dashboard

**Viz Initial Review**
- Critique visualizations

**Publish to Web**
- Report final version of visualization

**Data Preparation**
- Create query to pull data
Planning – the first questions to ask when visualizing data

Before you even switch on a computer, ask yourself what are the questions that your stakeholders want answered

What tasks does your visualization need to accomplish (Cairo, 2013)
Interview Question Template
(Stakeholder Interview Questions, 2018)
1. What is the motivation for wanting this dashboard?

2. What is the business value and outcomes you want to see from this effort?

3. What are your current challenges in relation to reporting?

4. Has anything prevented this project from happening in the past?

5. What metrics do you currently look at?

6. What metrics would you like to see?

7. What are the top questions you want answered from the data?
Know your Audience

• What type of people will be interesting in the visualization?

• Is this open to the public or internal staff?

• How can we make a useful visualization of this metric?
FTIC Feeder School Dashboard: Audience

Who would want to see where UCF students come from?

• University Staff (Admissions, Enrollment Management, etc.)

• High School Guidance Counselors

• Parents

• Media
FTIC Feeder School Dashboard: Metrics

What information/metrics would this audience like to see

• How many people apply here and from what schools and counties?
  • Count of applications by high school, city, and county, Application Rate

• Of the students who apply, who are accepted and eventually enroll?
  • Count of enrollment at UCF

• Consider using a data glossary for a place for definitions and footnotes about metrics
  • Data Cookbook Specification for FTIC Feeder Schools
Mockup – Visualization Rough Draft

• Create a “rough draft” of visualizations
  • doesn’t involve preparing data

• Can help facilitate feedback from stakeholder

• Helps prepare for data preparation
  • Think of what variables will be needed to create visualizations
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Data Preparation

Where will the information come from?
• Where does the data we need live?
• Good to look at past queries made for a similar static reports

When will the visualizations be updated?
• This may depend on your stakeholder or audience
• Are there important times of the year where stakeholders need this information
Visualization Development: Design Guidelines and Concepts
# Know Your Visualization Tools

<table>
<thead>
<tr>
<th></th>
<th>Power BI</th>
<th>Qlik Sense</th>
<th>Tableau</th>
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<tbody>
<tr>
<td><strong>Visualization Capabilities</strong></td>
<td>Easy-to-use Platform</td>
<td>Self-service Analytics Tool</td>
<td>Perfect Graphics and Visualization Capabilities</td>
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<tr>
<td><strong>Advances Analytics Capabilities</strong></td>
<td>Supports R Language-Based Visualizations</td>
<td>Does not support R or Python-based objects.</td>
<td>Provides fully integrated support for R and Python</td>
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<tr>
<td><strong>Cloud Capability</strong></td>
<td>Compatible with Microsoft Azure</td>
<td>Offers a SaaS cloud product</td>
<td>Compatible with robust cloud platforms like, Azure, AWS etc</td>
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<tr>
<td><strong>Big Data Integration</strong></td>
<td>Places the solution above Tableau and Qlik</td>
<td>Lets you access and manage all your data, big and small, within a single environment</td>
<td>Connect to nearly any data repository, ranging from MS Excel to Hadoop clusters</td>
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<tr>
<td><strong>Storage Limits</strong></td>
<td>10GB cloud storage</td>
<td>500GB of cloud storage</td>
<td>100GB data storage</td>
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</table>
Position Visualizations

- Show important metrics on top of the page

- Direct eyes of the user by the position of visuals
**Color Scheme**

- Use a color scheme
  - Using cold colors can help for aesthetic purposes

- Use grey colors to draw the users eye to other variables in the visualization

- Create a “style guide” to maintain color consistency of visualizations and dashboards
UCF Style Guide

3.1.1 Main Color 1: Blue

- Blue 1
  - RGB: 165,199,233
  - HEX: A5C7E9

- Blue 2
  - RGB: 68,119,170
  - HEX: 4477AA

- Blue 3
  - RGB: 17,68,119
  - HEX: 114477

- Blue 4
  - RGB: 14,36,58
  - HEX: 0E243A

3.1.2 Main Color 2: Green

- Green 1
- Green 2
- Green 3
- Green 4
Coblis – Color Blindness Simulator

https://www.color-blindness.com/coblis-color-blindness-simulator/

Drag and drop or paste your file in the area below or:

Choose File  No file chosen

Trichromatic view:  Anomalous Trichromacy:
- Normal
- Red-Weak/Proxanomaly
- Green-Weak/Deuteranomaly
- Blue-Weak/Tritanomaly

Dichromatic view:
- Red-Blind/Protanopia
- Green-Blind/Deuteranopia
- Blue-Blind/Tritanopia

Monochromatic view:
- Monochromacy/Achromatopsia
- Blue Cone Monochromacy

Use lens to compare with normal view:
- No Lens
- Normal Lens
- Inverse Lens

Reset View
Font Size

• **BIGGER THE FONT SIZE** the more it draws readers’ eyes

• **BOLDING** will make words stand out in visualizations

• Using black lettering with a simple font style is best
Sketch out the Story:
Organize your ideas for visuals into a story. Or group visuals that relate to each other to create a theme.
Enrollment Dashboard Stories

Created 4 pages all about UCF Enrollment
  -First page: summary page, high-level look of the theme of the dashboard

  -Other pages: subject-specific data, can relate to demographic information

Enrollment Dashboard Interactive Facts Webpage

<table>
<thead>
<tr>
<th>UCF Student Enrollment</th>
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<td>Headcounts</td>
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<td>Student Classification</td>
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<tr>
<td>College/Major Enrollment</td>
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</table>
Data Visualization Process is Not Complete

Internal Reviews with staff

Follow-up meetings with stakeholders

Keep the lines of communication open with stakeholders
  • Continue to request feedback on visualizations
Great Data Viz Resources
More Great Resources

Cole Nussbaumer Knaflic

*storytelling with data*

a data visualization guide for business professionals

WILEY


The Dos & Don’ts of Presenting Data, Facts, and Figures

Dona M. Wong

“INVALUABLE.” — How Design
References


