Storytelling with InfoVis

CS 7450 - Information Visualization
October 12, 2016
John Stasko

Learning Objectives

- Define narrative visualization (vis for storytelling) and explain how it differs from analytic/exploratory visualization
- Name and describe different genres and approaches to narrative visualization
- Explain the style, content, and significance of Rosling's GapMinder video
- View and learn from designs of examples
  - Mariano Rivera, What's Warming World?, Home and Away, Bubble Bust to Recovery, Fallen of WWII, …

Review

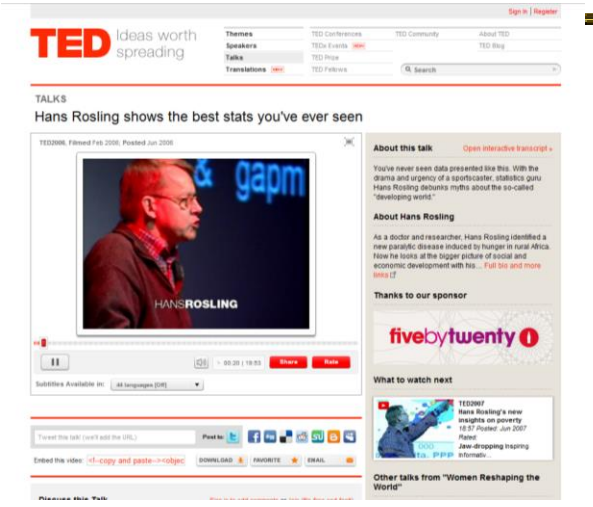
Purpose

- Two main uses of infovis
  - Analysis – Understand your data better and act upon that understanding
  - Presentation – Communicate and inform others more effectively
- Today we look at that second one more

Telling Stories

- Data visualization can help to communicate ideas, summarize, influence, unite, explain, persuade
- Visuals can serve as evidence or support

A Famous Example



Hans Rosling
Gapminder

2006

http://www.ted.com/index.php/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html

They Had Him Back

2007

http://www.ted.com/index.php/talks/hans_rosling_reveals_new_insights_on_poverty.html

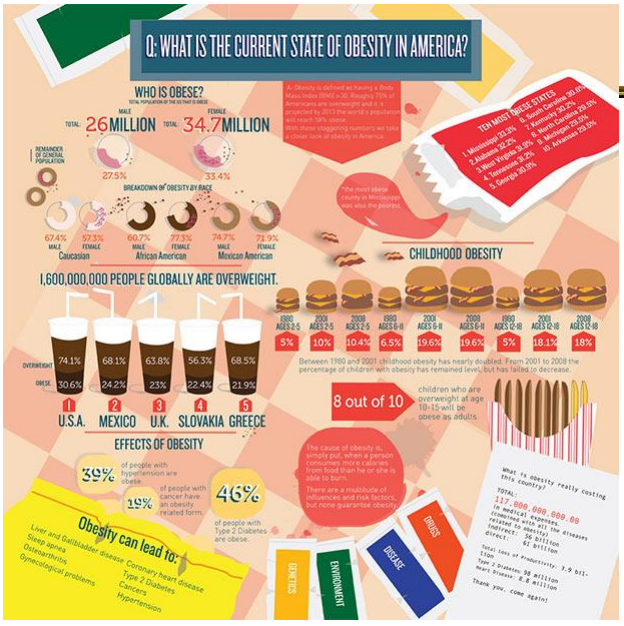
Discuss

- Why has this had such a big impact?

InfoGraphics

- See them everywhere today
- Perhaps a good example of infovis for presentation purposes
  - Typically not interactive though

http://thedinfographics.com/2011/11/16/obesity-in-america-facts-statistics-and-lies/



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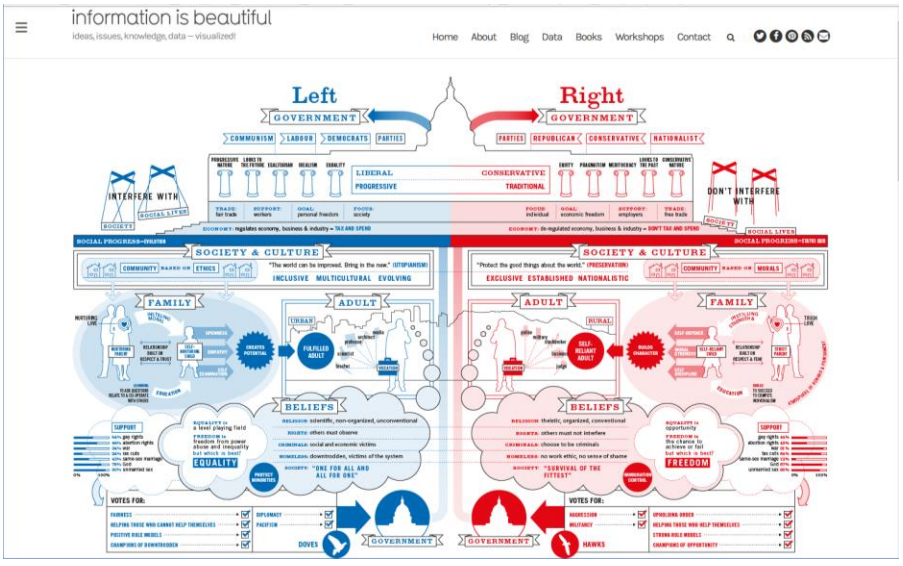
http://www.informationisbeautiful.net/visualizations/left-vs-right-us/



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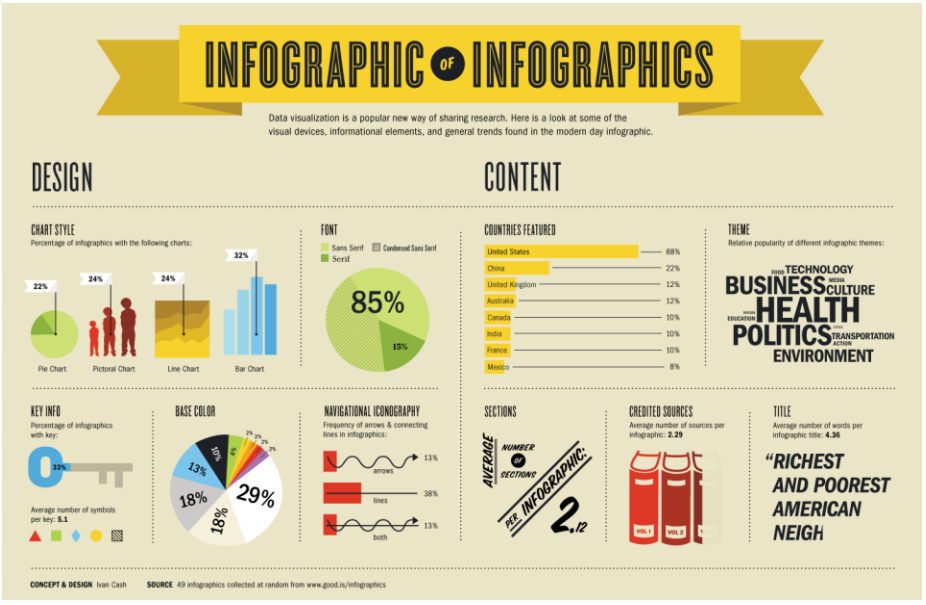
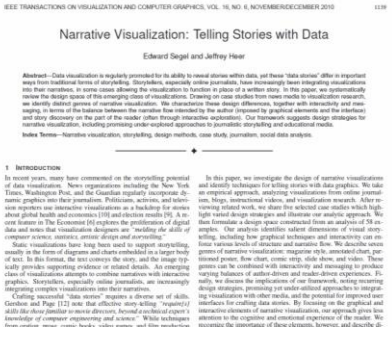
http://www.wired.com/2012/07/you-suck-at-infographics



A Lead Paper

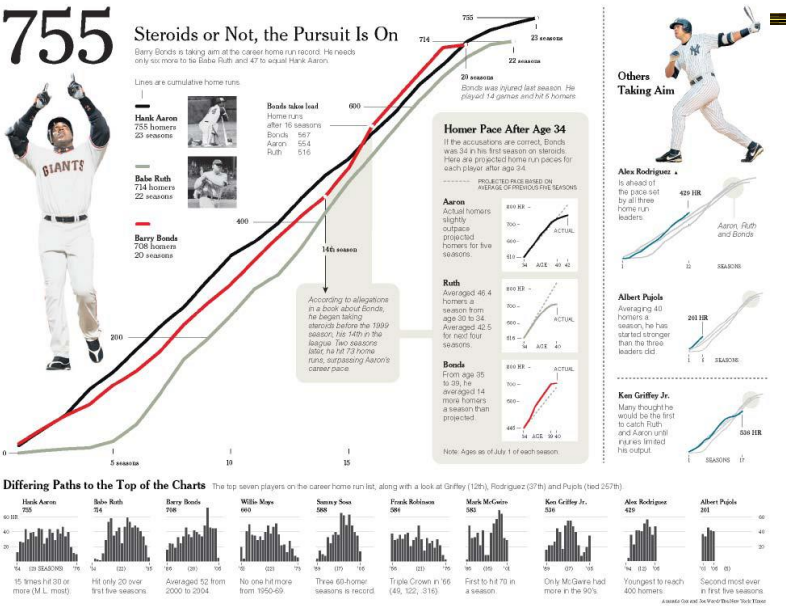
Segel & Heer
TVCG (InfoVis) '10

- Studied storytelling: Described topics as "Narrative Visualization"
  - How does this differ from traditional forms of storytelling
  - Reviews the design space
  - Characterizes genres
  - Describes a framework



Case Studies

NY Times 2006



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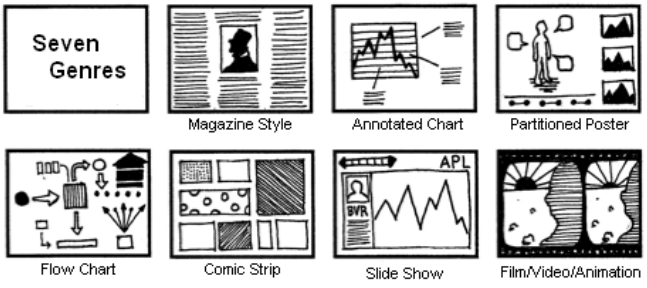
Design Space Dimensions

- Genre (next slide)
- Visual Narrative Tactics
  - Visual structuring
  - Highlighting
  - Transition Guidance
- Narrative Structure (non-visual mechanisms to assist narrative)
  - Ordering
  - Interactivity
  - Messaging

Genres

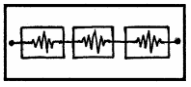


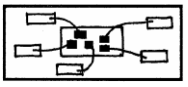
Observations

- Clusters of different ordering structures
- Consistency of interaction design
- Under-utilization of narrative messaging

Approach

- Author-driven vs. reader-driven
- Common patterns
  - Martini glass
  - Interactive slideshow
  - Drill-down story



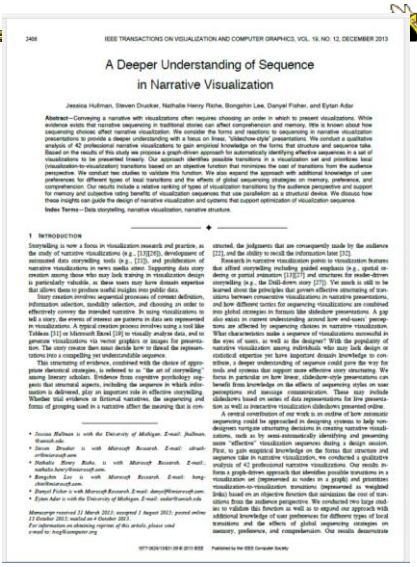


Follow-on work

IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 17, NO. 12, DECEMBER 2011

Visualization Rhetoric: Framing Effects in Narrative Visualization

Jessica Hullman, *Student Member, IEEE*, and Nicholas Diakopoulos, *Member, IEEE*



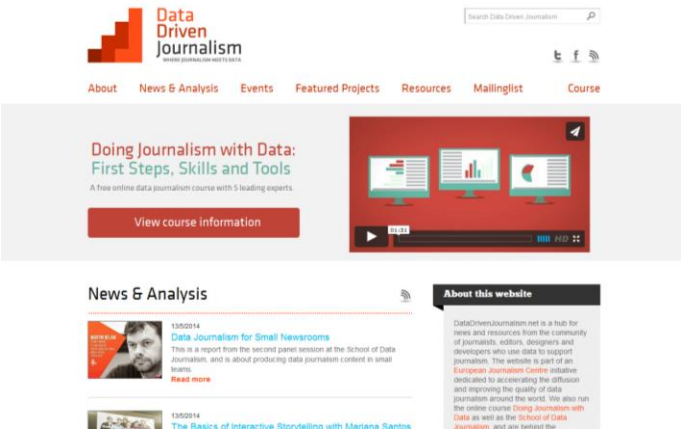
IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 19, NO. 12, DECEMBER 2013

A Deeper Understanding of Sequence in Narrative Visualization

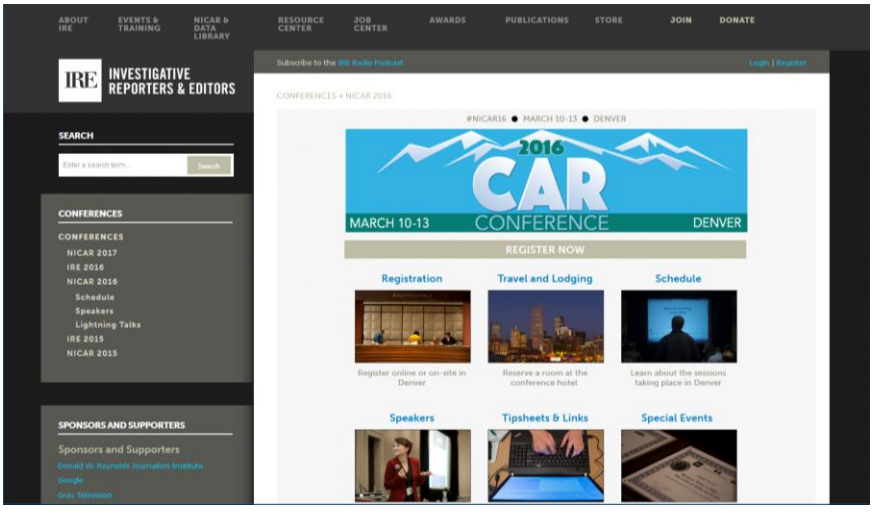
Jessica Hullman, Steven Drucker, Nathalie Henry Riche, Bongshin Lee, Danyel Fisher, and Eytan Adar

http://datadrivenjournalism.net

Journalism Angle



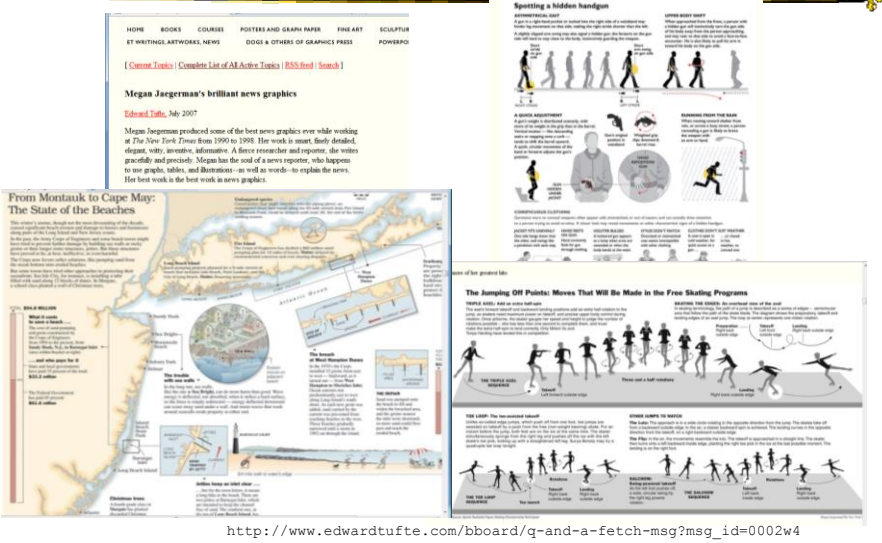
Computer-Assisted Reporting



Some Examples

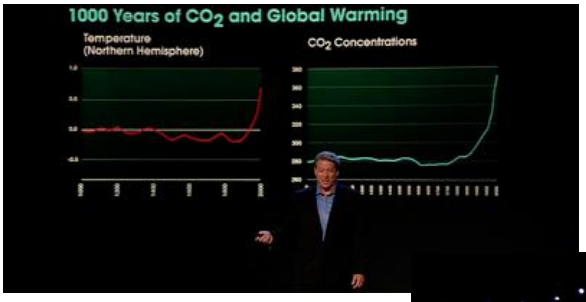
News Stories

Tufte praises the work of Megan Jaegerman at NY Times

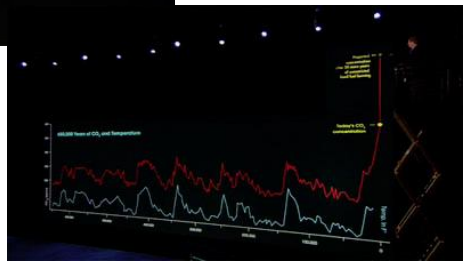


http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0002w4

Films

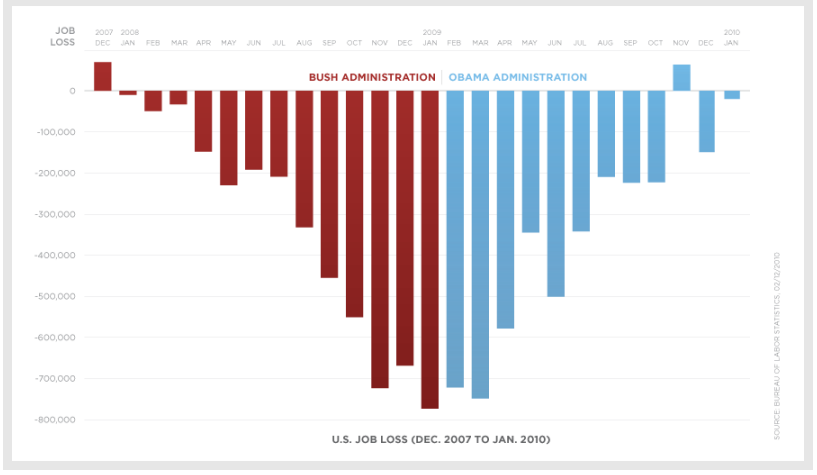


An Inconvenient Truth



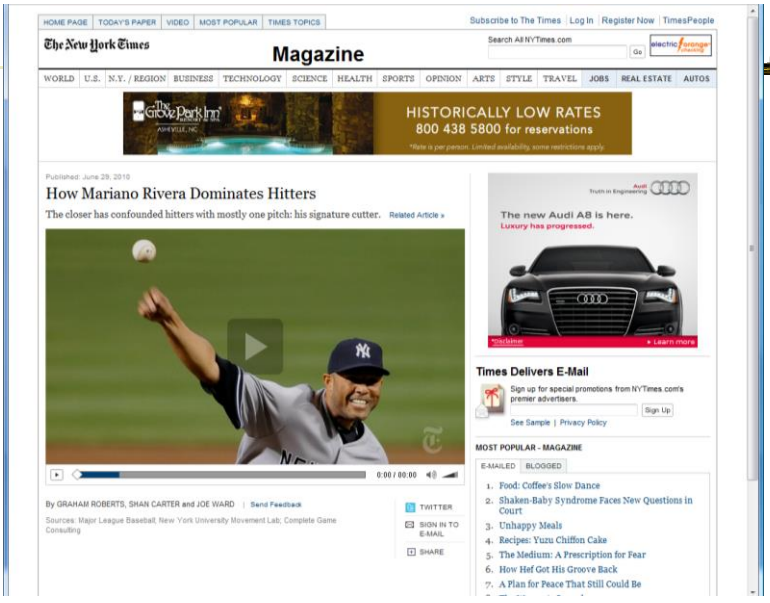
Gore made extensive use of data graphics

Infographics (with a message)

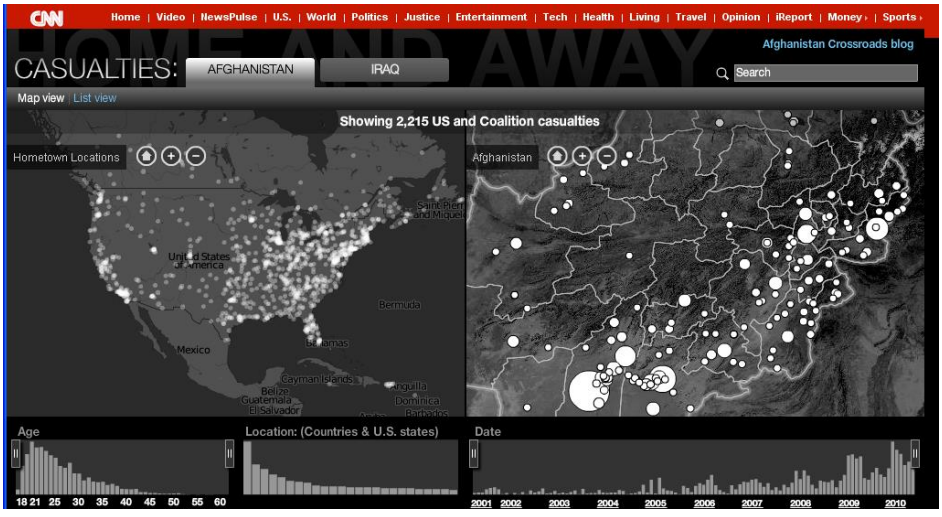


Controversial, see http://soquelbythecreek.blogspot.com/2010/02/what-does-obama-job-chart-really-mean.html

http://www.nytimes.com/interactive/2010/06/29/magazine/rivera-pitches.html?ref=multimedia

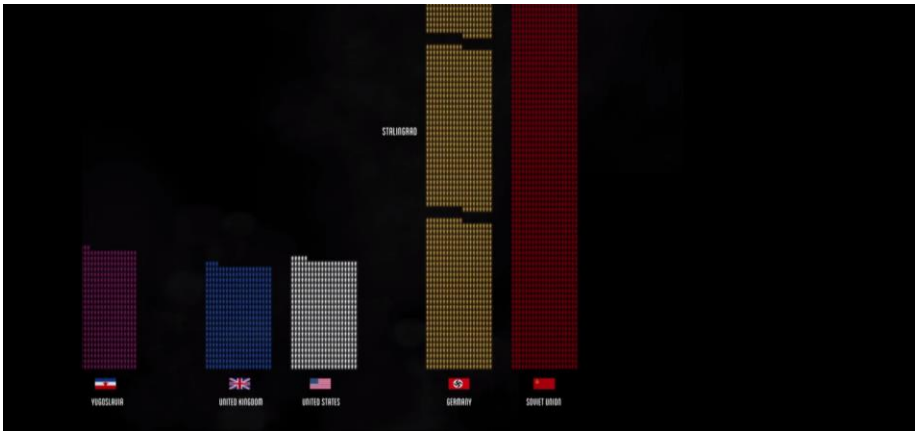


http://www.cnn.com/homeandaway



http://www.bloomberg.com/graphics/2015-whats-warming-the-world/

http://www.fallen.io/ww2/



http://public.tableau.com/views/MinimumWage_3/MinimumWage-StoryPointsEdition?:showVizHome=no

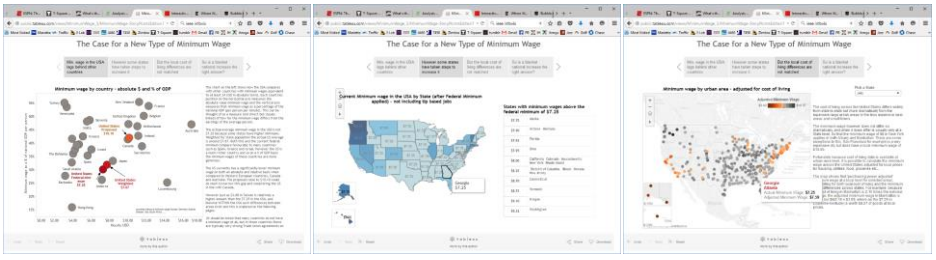
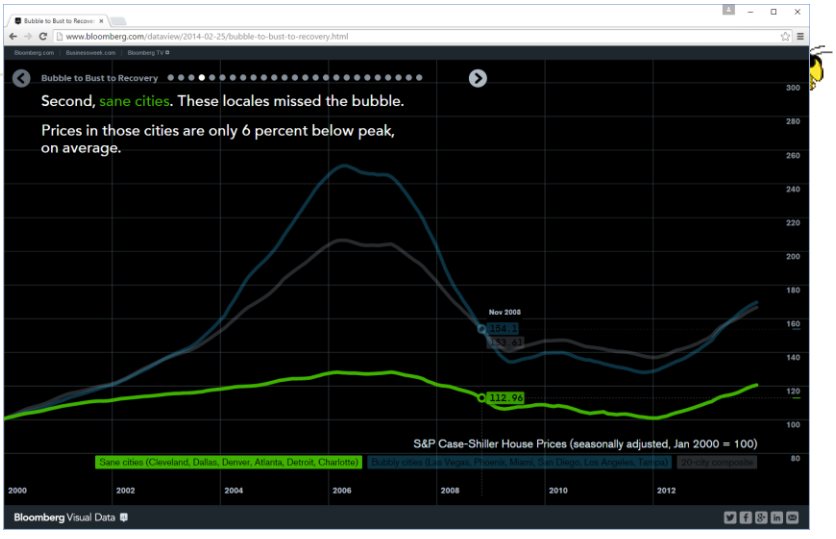


Tableau StoryPoints

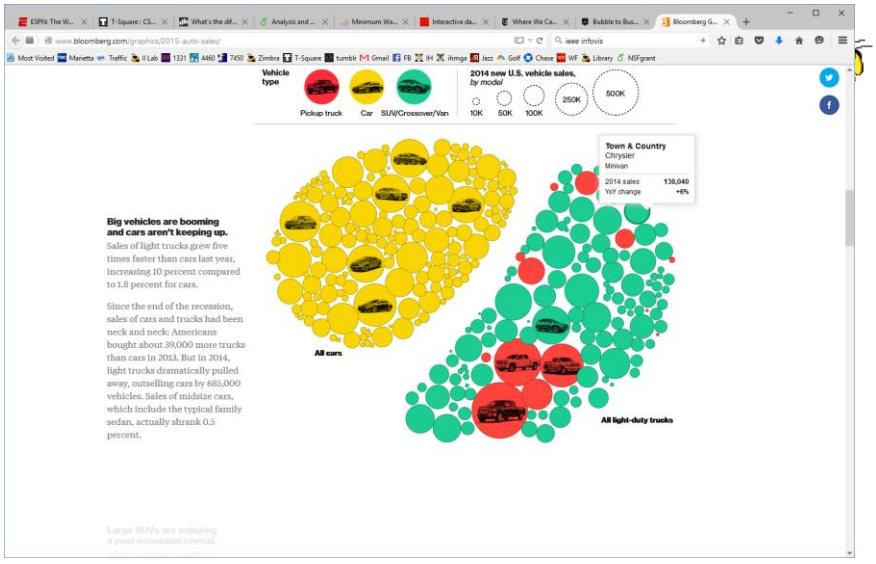
Textual narrative, slides with titles as breadcrumbs, element highlighting, and textual annotation on the chart

http://www.bloomberg.com/dataview/2014-02-25/bubble-to-bust-to-recovery.html



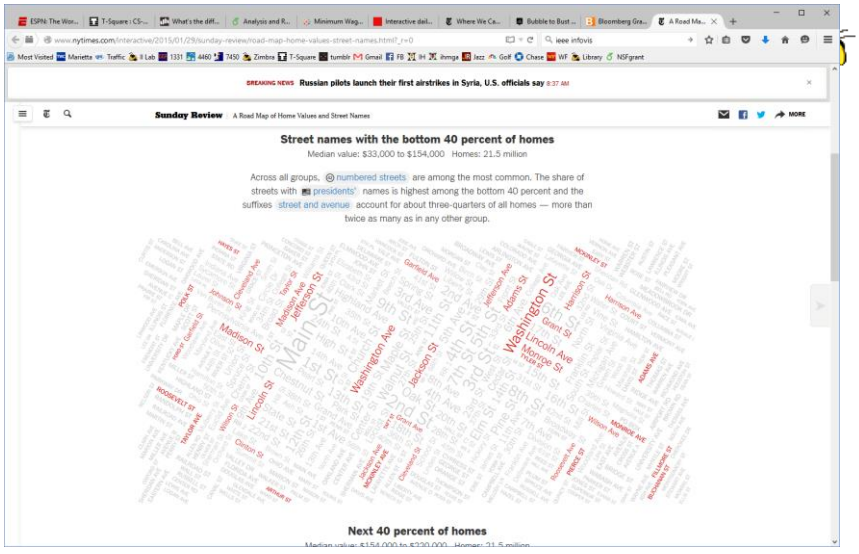
Dot breadcrumbs, interaction on charts, tooltips, …

http://www.bloomberg.com/graphics/2015-auto-sales/



Page scroller, text annotations, rearranging glyphs

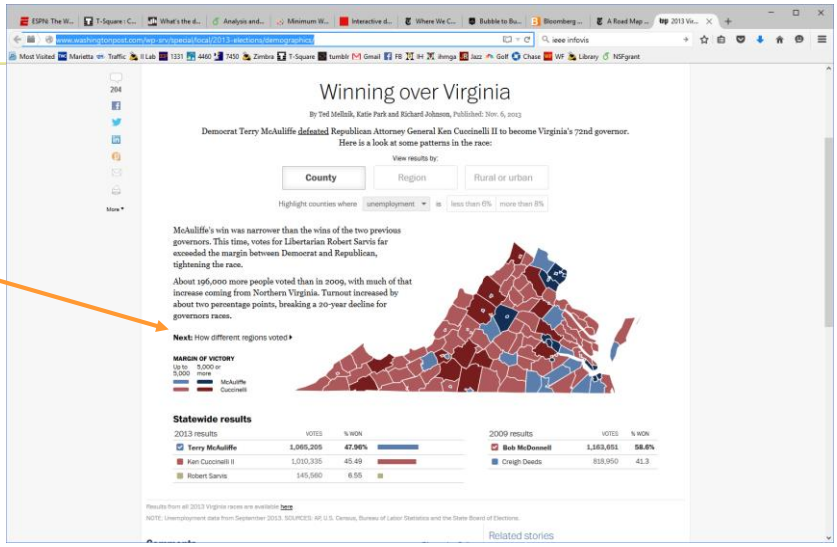
http://www.nytimes.com/interactive/2015/01/29/sunday-review/road-map-home-values-street-names.html?_r=0



Dynamic query widget embedded in textual narrative

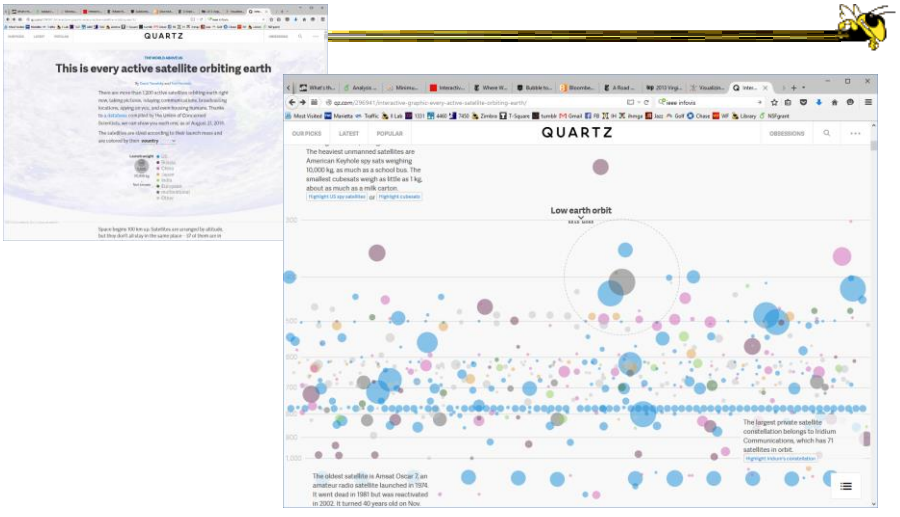
http://www.washingtonpost.com/wp-srv/special/local/2013-elections/demographics/

Steps



Linear steps with much interaction, comments

http://qz.com/296941/interactive-graphic-every-active-satellite-orbiting-earth/

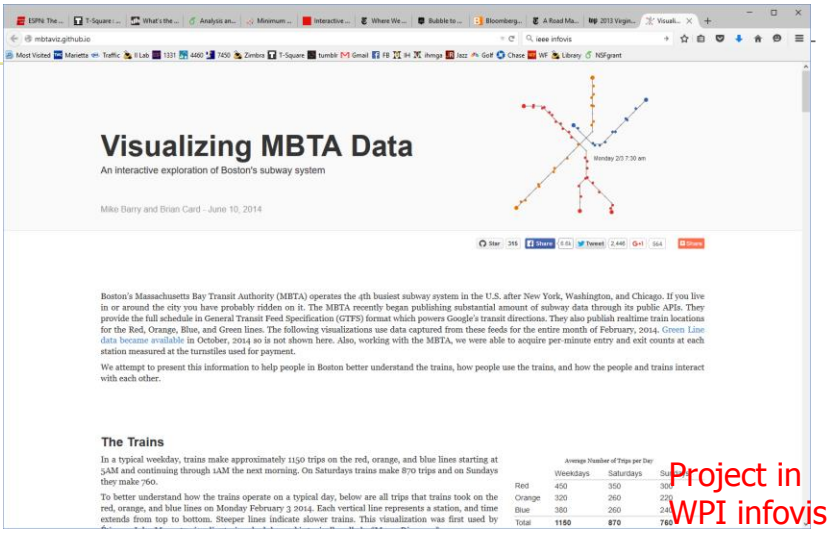


Animated interaction, tooltips, scrolling

http://www.facesoffracking.org/data-visualization/

Scrolling page with geovis updates

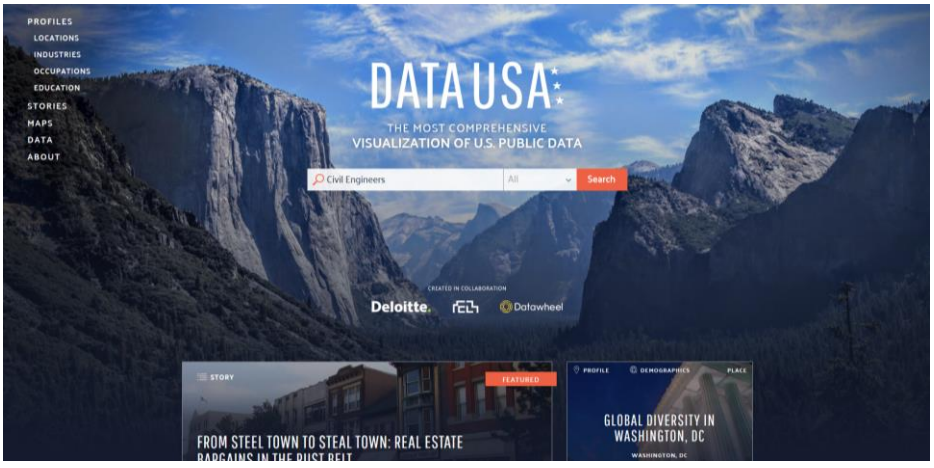
http://mbtaviz.github.io/



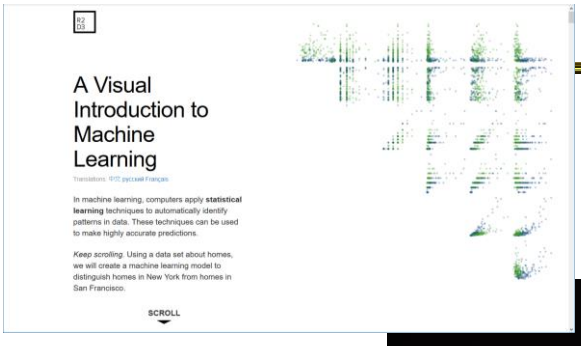
Project in WPI infovis class

Scrolling page with many visualizations, much interaction

https://datausa.io/



http://www.r2d3.us/visual-intro-to-machine-learning-part-1/

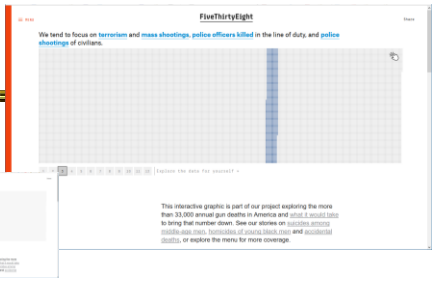


Design discussion

https://www.youtube.com/watch?v=Z4tB6qyxHJA

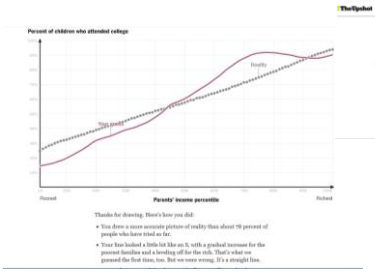
http://polygraph.cool/films/

http://fivethirtyeight.com/features/gun-deaths/

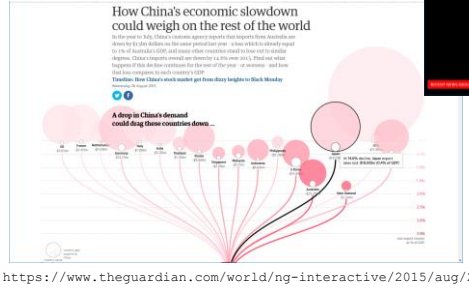


http://www.georgelmurphy.com/berrics/

http://www.nytimes.com/interactive/2015/05/28/upshot/you-draw-it-how-family-income-affects-childrens-college-chances.html



http://drones.pitchinteractive.com/



https://www.theguardian.com/world/ng-interactive/2015/aug/26/china-economic-slowdown-world-imports

Even the President Goes Interactive

2011 State of Union Address

Side channel data visualizations accompanied speech

COVER FEATURE

Storytelling: The Next Step for Visualization

Robert Kosara and Jock Mackinlay, *Tableau Software, Seattle*

Presentation—specifically, its use of elements from storytelling—is the next logical step in visualization research and should be a focus of at least equal importance with exploration and analysis.

Much of the early visualization research focused on novel techniques, leading to questions about which one to use and for what task. This gave rise to evaluation papers that compared techniques and tried to ascertain the perceptual mechanisms behind them.

Today, researchers have a good understanding of the visualization design space, to the point where they can find suitable techniques for most datasets and tasks. Although more research is clearly needed in this area, the body of existing work provides useful ways of working with data. However, solid knowledge about the best ways to present and communicate data is still lacking.

Humans have always tied facts together into stories, effectively presenting information and making a point in a memorable way. In addition to offering an incredibly popular way of conserving data and passing it on, stories also provide the connective tissue between facts that make them memorable.[1] The use of elements from storytelling is therefore the next logical step in visualization research, specifically because storytelling can offer an effective way to present data.

STORY DEFINITION AND MODELS

At its essence, a story is an ordered sequence of steps, each of which can contain words, images, visualizations, video, or any combination thereof. Here, we focus on stories that primarily consist of visualization steps, which can include text and images but essentially are based on data.

In traditional stories, order roughly corresponds with time, which is crucial for understanding causality: events that happen earlier can influence later events, but not the other way around.[1] Stories often are not told in a linear fashion, but rather use flashbacks and other literary devices. However, within each segment, the order must be consistent—and the order of different segments clear—for the story to be comprehensible.

This working model of story construction is the basis of the way journalists work. They collect information through research and interviews, which gives them the key facts, and then they tie those facts together into a story. Because the goals and tasks during the research phase differ from those in the writing phase, so do the tools. For example, if the journalist works on a TV show, some of the material from the research phase, such as pieces of video, might end up in the final story, but most of the source material only serves as raw background information.

Data analysts can use visualization for exploration, analysis, or presentation. However, the way they use the technology can differ, so the choice of technique will differ, as will how much and which data is shown. Although visualization researchers often tacitly assume that the tools they use for analysis are suitable for presentation

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Defined by ordered sequence of steps

Usually, but not always, told in linear fashion

Kosara & Mackinlay *Computer* `13

Storytelling Scenarios

- Self-running presentations for a large audience
- Live presentations
- Individual or small group presentations

Research Directions

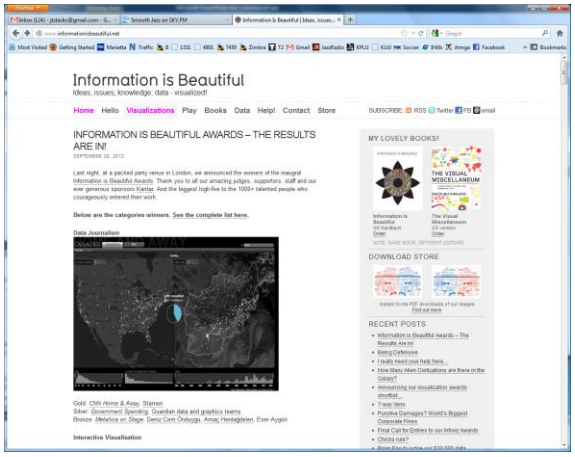
- Storytelling approaches and affordances
  - What vis affordances can help guide reader through story?
- Evaluation
  - How to measure effectiveness?
- Memory, context, & embellishments
  - What makes one memorable, and is that good?
- Interaction
  - How to allow without interfering with story?
- Annotations & highlights
  - How to balance text and visualization?
- Learning from other disciplines
  - What can we learn from journalism, choreography, directing, etc.?
- Techniques specific to storytelling
  - Which vis techniques are good matches?
- Stories & collaboration
  - How to facilitate more collaboration?

Data Matters

David McCandless

http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html

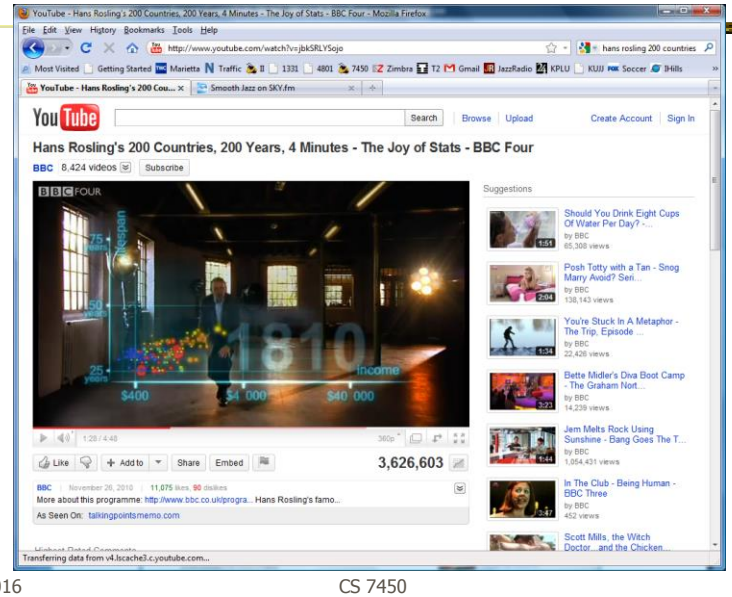
McCandless Website



http://www.informationisbeautiful.net/

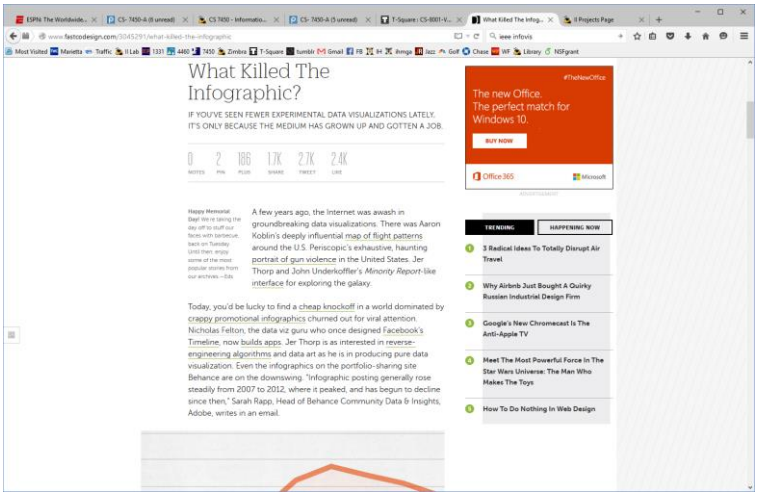
http://www.youtube.com/watch?v=jbkSRLYSojo

Back to Where We Started



http://www.fastcodesign.com/3045291/what-killed-the-infographic

Changing Trends



Questions

- How do these types of visualizations differ from "traditional" infovis?

Questions

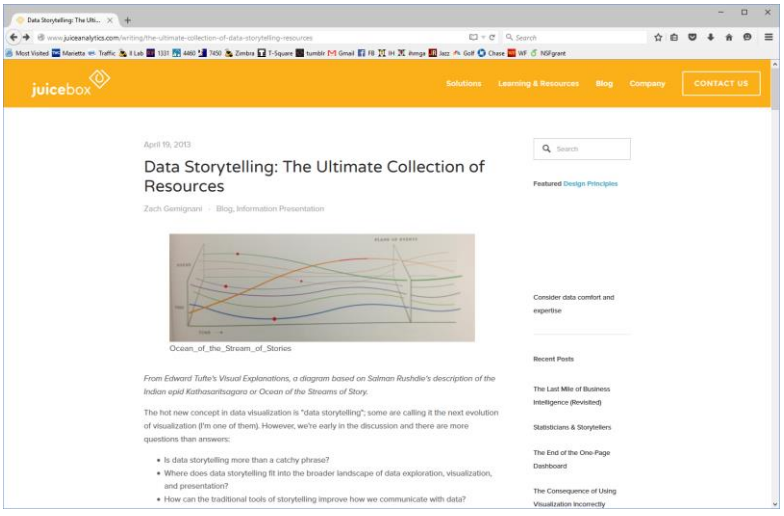
- Would you characterize all of these as information visualizations?
  - Consider some of the different examples

My Reflections

- InfoVis for analysis and presentation are different
  - Apples & oranges (both fruit though)
- How?

http://www.juiceanalytics.com/writing/the-ultimate-collection-of-data-storytelling-resources

Resources



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  - Mariano Rivera, What's Warming World?, Home and Away, Bubble Bust to Recovery, Fallen of WWII, …

Project Design Document

- Ingredients
  - Clarify the data
  - Objectives, user tasks & queries, …
  - Designs from your poster and more
  - A suggested design to implement
- Bring 3 copies

Reading

- Explore the data-driven storytelling websites not shown in class
- Watch the videos we didn't show

Upcoming

- Tufte's design principles
- Geospatial visualization