

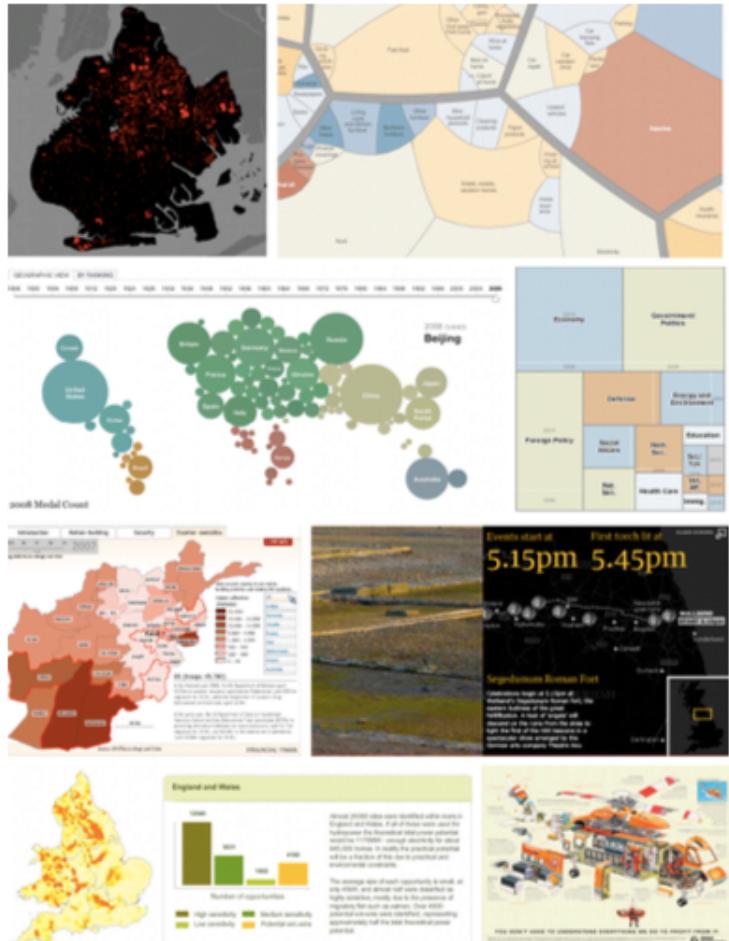
S. Rinzivillo – rinzivillo@isti.cnr.it

# **DATA VISUALIZATION AND VISUAL ANALYTICS**

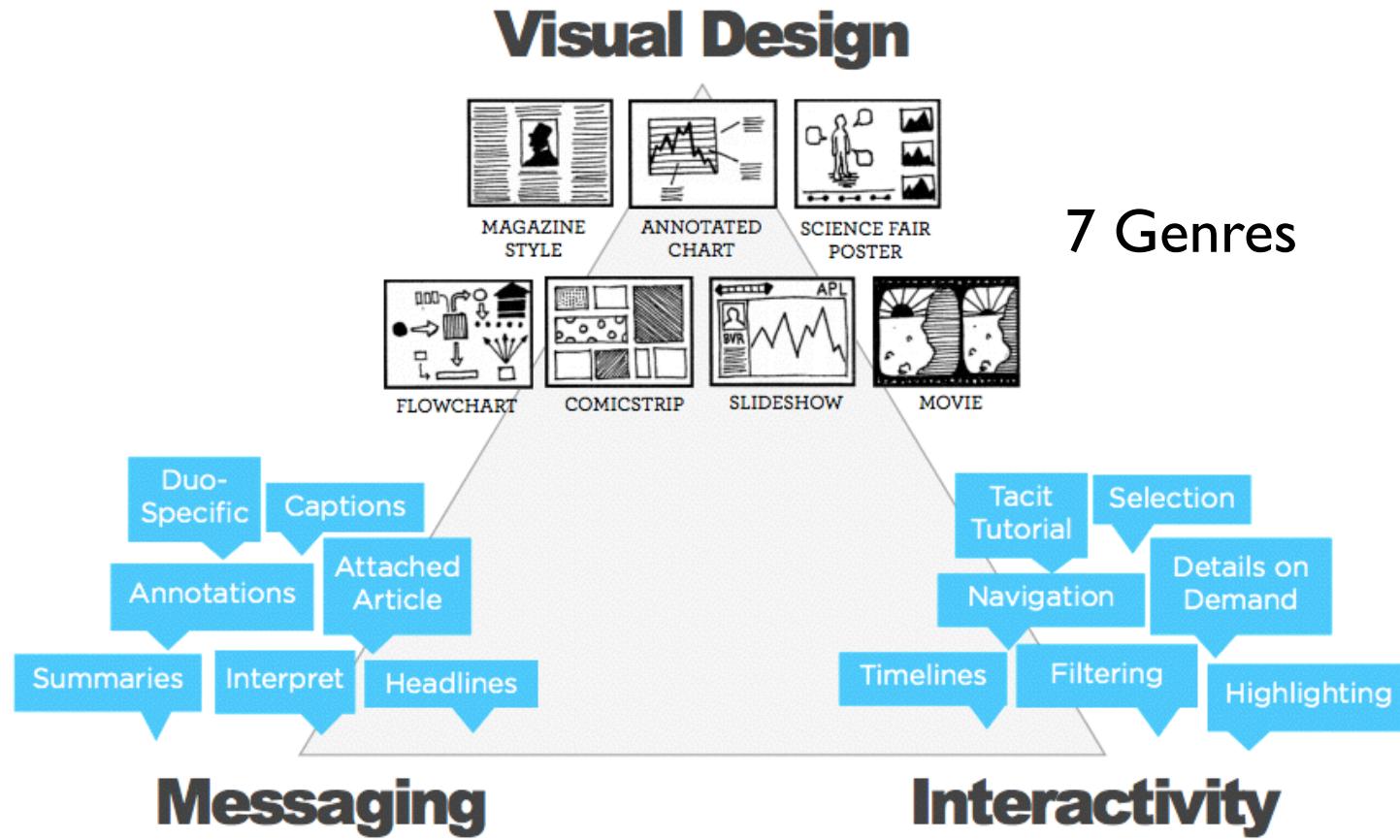
## **Visual Storytelling**

Adapted from “Narrative Visualization: Telling Stories with Data”  
E. Segel and J Heer (DOI:10.1109/TVCG.2010.179)

- 58 Case Studies
  - 70% Journalism
  - 20% Business
  - 10% Research



# Design Space

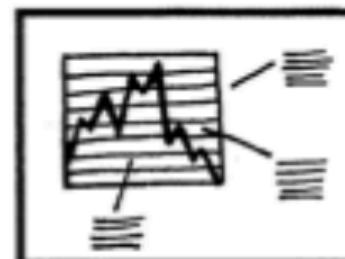


# Genres

Seven  
Genres



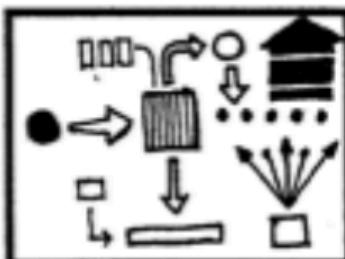
Magazine Style



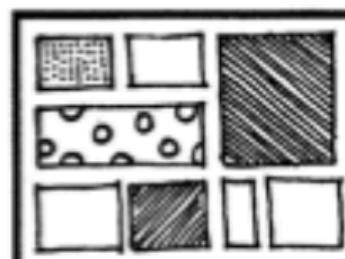
Annotated Chart



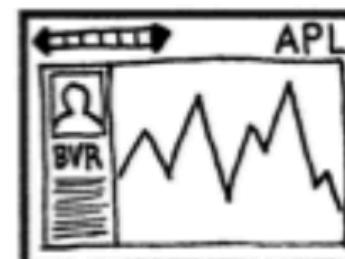
Partitioned Poster



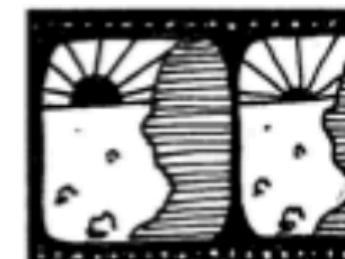
Flow Chart



Comic Strip



Slide Show



Film/Video/Animation

- (a) Number of frames
- (b) Ordering of visual elements

# Genres + Interactivity + Messaging

STORYTELLING

CLARITY

SPEED

**Author Driven**

strong ordering  
heavy messaging  
limited interactivity

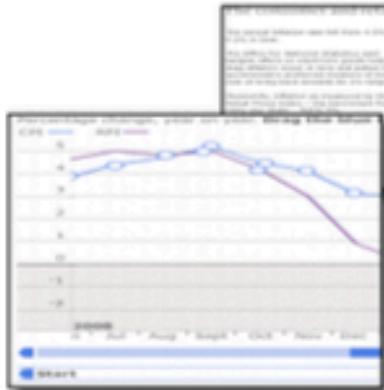
**Reader Driven**

weak ordering  
light messaging  
free interactivity

ASK QUESTIONS

EXPLORE

FIND



martini  
glass

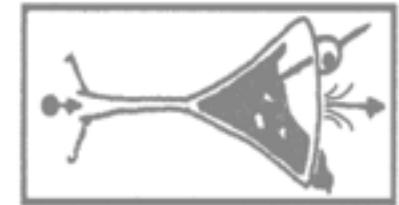


interactive  
slideshow



drill-down  
story

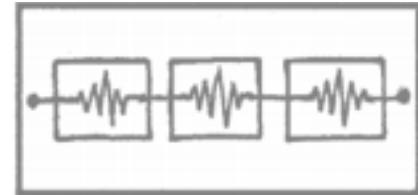
# Martini Glass approach



A screenshot of a web-based application. At the top, there's a navigation bar with tabs: 'Power via', 'Family' (which is highlighted in green), 'Coalitions', and 'Leaders'. Below the navigation, there's a sidebar with the text 'power begins with' followed by several paragraphs of text about Chinese politics and family connections. The main area features a large graphic of green hexagonal nodes connected by lines, forming a network. One specific node is highlighted with a larger hexagon and labeled 'Princelings'. At the bottom, there are more tabs: 'Politburo' (with a green icon), 'Current' (with a green icon), 'Former' (with a green icon), and 'Leaders' (with a green icon). A 'NEXT' button is visible at the bottom left.

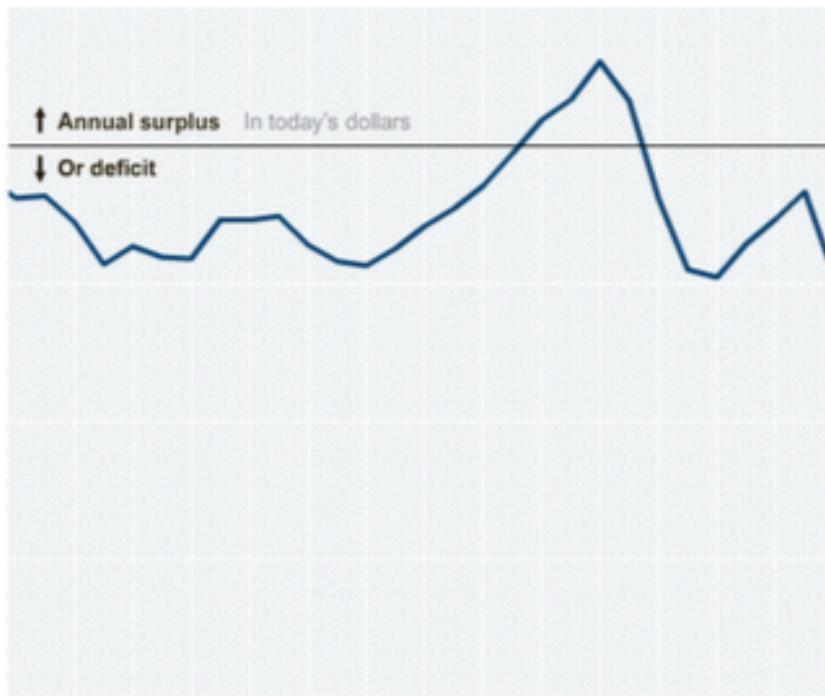
- Strongly Author-driven
  - First author narrative
  - Then reader may explore
- Different levels
  - Authoring
  - Short or long stem
  - Wide or narrow reader exploration

# Interactive Slideshow



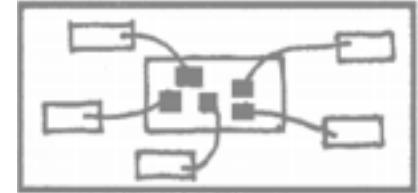
## Compared With Reality

re predicted by 2012. How accurate have past White House budget forecasts been?



- Slideshow with mid-narrative interactions confined in each slide
- A single slide may be organized as a Martini Glass style
- Efficient for complex data and narrative
  - Complex data: author may guide reader to different dimensions of data
  - Complex narrative: author may draw discrete boundaries

# Drill Down Story



**On the Map: Five Major North Korean Prison Camps**

North Korea has operated political prison camps for more than 50 years, twice as long as the Gulag in the former Soviet Union. People suspected of opposing the government are forced to do slave labor in the camps, which hold an estimated 200,000 prisoners. North Korea's government says the camps don't exist, but high-resolution satellite images show otherwise.

Click on the map markers below for more information on each site.

**Major Prison Camps**

The existence of five main camps has been confirmed by survivors, escapees and former guards. Most prisoners work 12-hour days, making military uniforms, filling trees or tilling fields until they die of malnutrition-related illnesses, usually before the age of 50. North Korea allows no outsiders into the remote, mountainous camps.

Learn more about five major prison camps at right, or take a closer look at life in Camp 15.

Scale varies in this perspective.  
Distances from Pyongyang: 120 miles to Seoul, 427 miles to Vladivostok

SOURCES: North Korea Uncovered; Korean Bar Association ("2008 White Paper on Human Rights in North Korea"); "The Hidden Gulag," David Hawk, U.S. Committee for Human Rights in North Korea; Associated Press; One Free Korea; interviews with former prisoners and guards; Satellite Images: Google Earth; GRAPHIC: Kat Downey, Leslie Harden, Liz Heron, Lars Karlke and Francke Uebele - The Washington Post

- Presents a general theme and allows to explore particular instances
- More emphasis to the reader
- Author should select which interactions are possible and which explorations are feasible

# **VISUAL DESIGN**

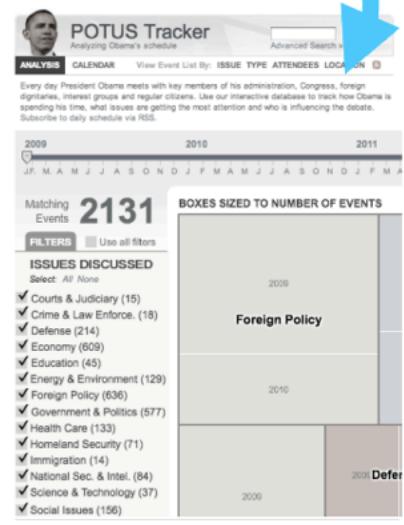
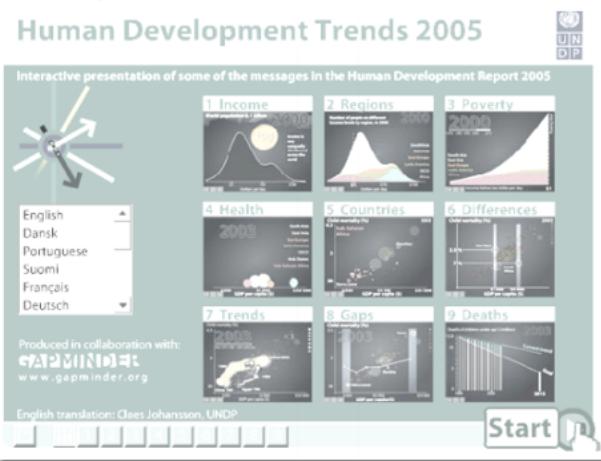
Make it clear  
where to  
start.

Don't let  
readers  
defect.

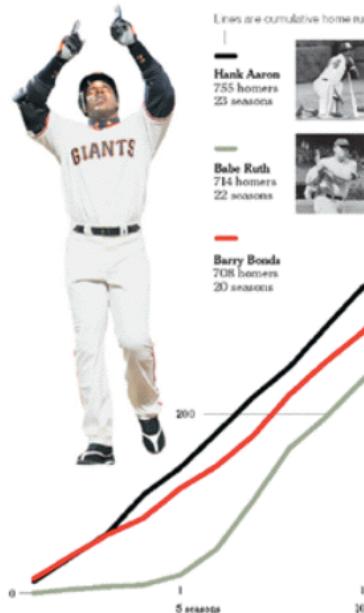


where?

## Human Development Trends 2005

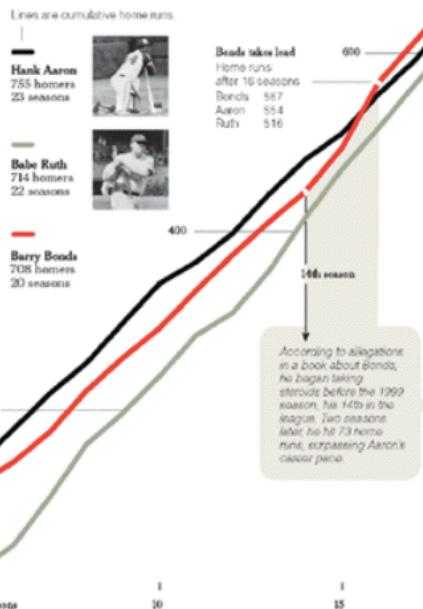


755



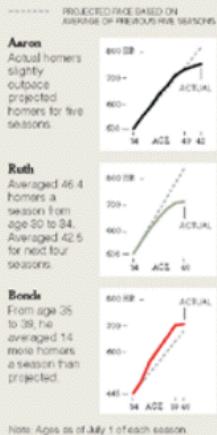
## Steroids or Not, the Pursuit Is On

Barry Bonds is taking aim at the career home run record. He needs only six more to tie Babe Ruth and 47 to equal Hank Aaron.

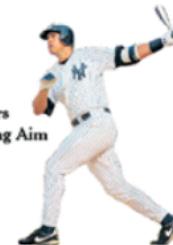


### Homer Pace After Age 34

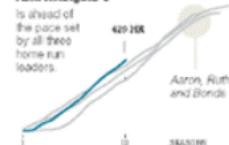
If the accusations are correct, Bonds was 34 in his first season on steroids. Here are projected home run paces for each player after age 34.



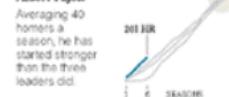
## Others Taking Aim



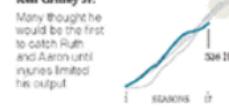
Alex Rodriguez



Albert Pujols



Ken Griffey Jr.



## Differing Paths to the Top of the Charts

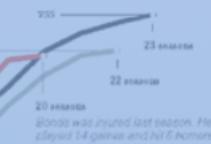
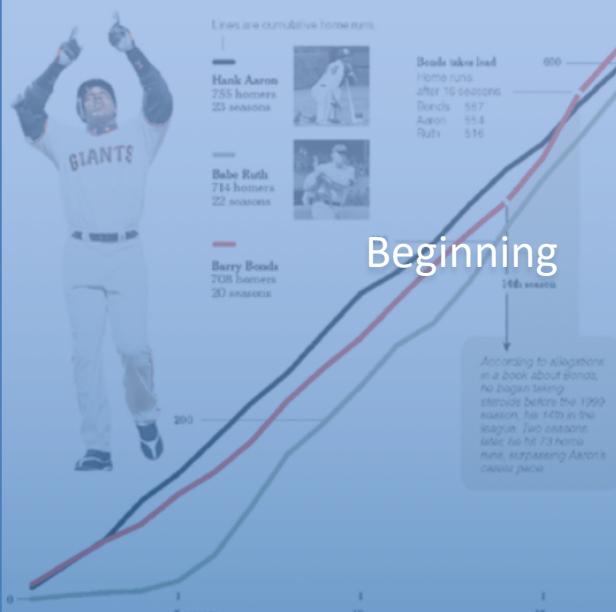
**Differing Paths to the Top of the Charts.** The ten seasonalists on the career home run list, along with a look at Coffey (1298), Bourque (2274), and Davis / Sain (2426).



# 755

## Steroids or Not, the Pursuit Is On

Every Bonds is being aim at the career home run record. He needs only six more to tie Babe Ruth and 47 to equal Hank Aaron.



PROJECTED LINE BASED ON AVERAGE OF PREVIOUS FIVE SEASONS

### Aaron

Actual homers slightly exceed projected homers for five seasons.

### Ruth

Averaged 66.4 homers a season from age 30 to 34. Averaged 42.5 for next four seasons.

### Bonds

From age 35 to 39, he averaged 14 more homers a season than projected.

Note: Ages as of July 1 of each season



## Others Taking Aim



### Alex Rodriguez

Is ahead of the pace set by all three home run leaders.

### Albert Pujols

Averaging 40 homers a season, he has started stronger than the three leaders did.

### Ken Griffey Jr.

Many thought he would be the first to catch Ruth and Aaron, but injuries limited his output.

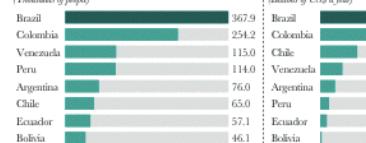


## THE DEFENSE OF THE NEIGHBORS

An overview of the armed forces of countries around Brazil

**Brazil has the strongest armed forces in South America in absolute terms—**

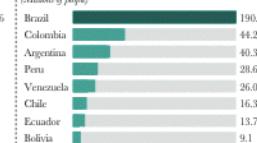
ARMED FORCES  
(Thousands of people)



DEFENSE BUDGET  
(Billions of US\$ a year)

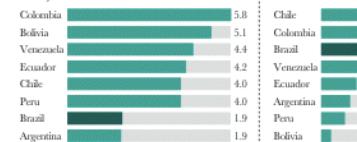


POPULATION  
(Millions of people)



**—but not in relative terms**

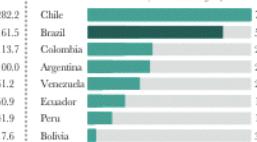
ARMED FORCES EMPLOYEES  
PER 1,000 PEOPLE



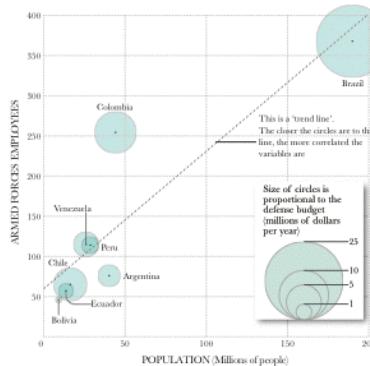
PER CAPITA SPENDING  
IN ARMED FORCES (in US dollars a year)



MONEY SPENT ON EACH ARMED  
FORCES EMPLOYEE (in US dollars a year)



**A different look at the data**



### Future investments

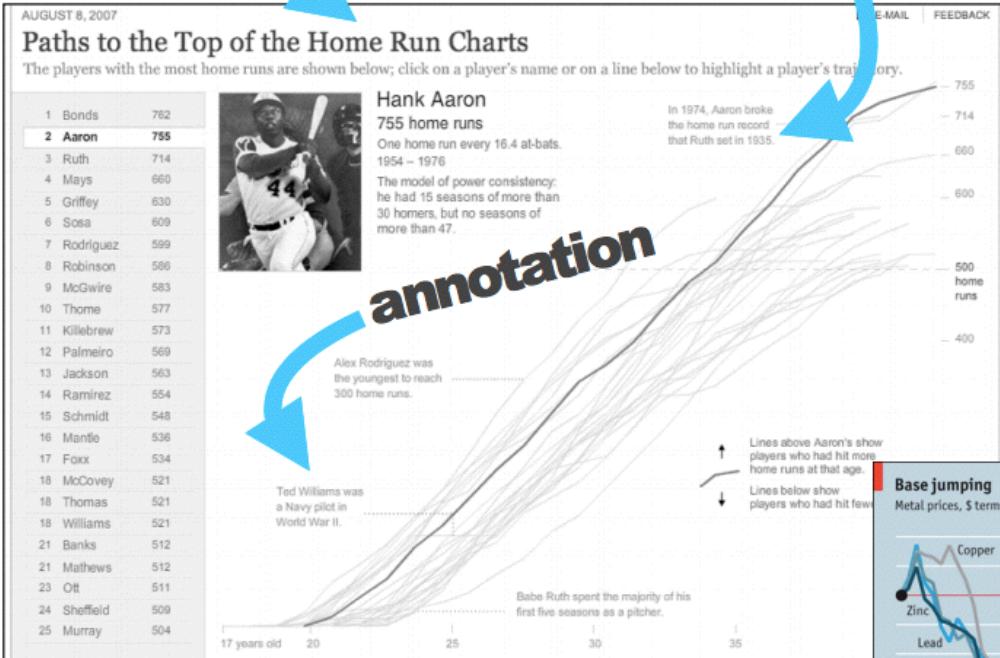


SOURCES: FOLHA DE SÃO PAULO, BRAZILIAN CENTER FOR STRATEGIC STUDIES

# MESSAGING

# headline

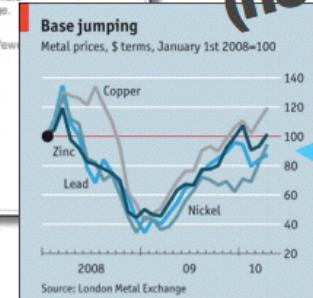
## caption

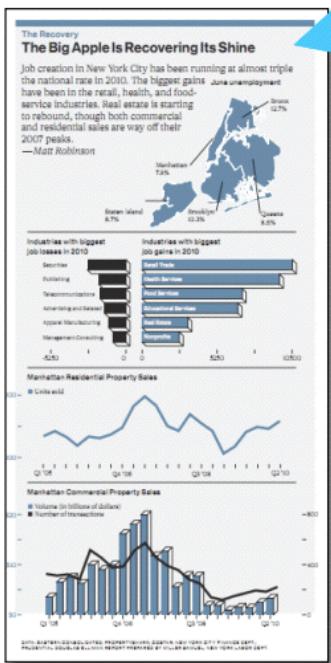


Use headlines, captions, & annotations. Quickly draw attention to what's important.

annotation

(nothing)





June 20, 2011

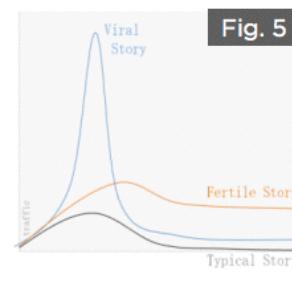
isolated

Weave text into the graphic—not just at the beginning.  
 Text and graphics work better together than apart.

June significantly increased traffic than traditional stories. To make this work, economical visualizations add to stories that are either *persistent* or *viral* in order to generate traffic. **Persistent stories** cover "static themes" that maintain relevance over time (e.g., food, economics, the housing market).

Connect the text to the relevant graphics.  
 See Fig. 5

ology, personalities, or sensational news. To get the buck, produce visualizations for editorial content consistent or viral.



integrated

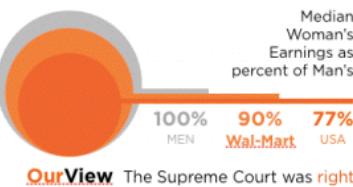
**1.5 million** women sued Wal-Mart for discriminatory pay & promotion practices, using mostly statistics to make their case.

Women filled 70% of hourly jobs...

...but only 33% of management.

Women were paid less than men in every region, even when they had higher ratings and seniority.

But Wal-Mart's numbers showed their women fared better than elsewhere in the country.

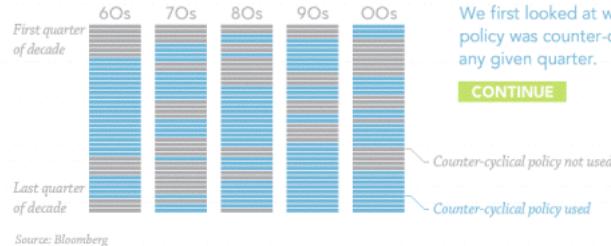
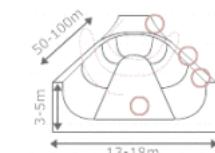
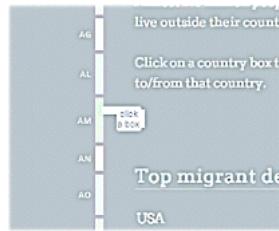
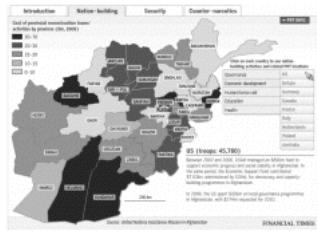


# **INTERACTIVITY**

Interactive features  
should scream  
interactivity.

Avoid a click-and-seek  
experience.

**Be explicit.**  
**Click here.**



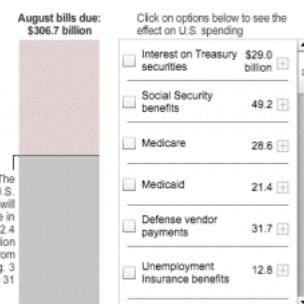
## visual cues

We first looked at whether  
policy was counter-cyclical  
in any given quarter.

**CONTINUE**

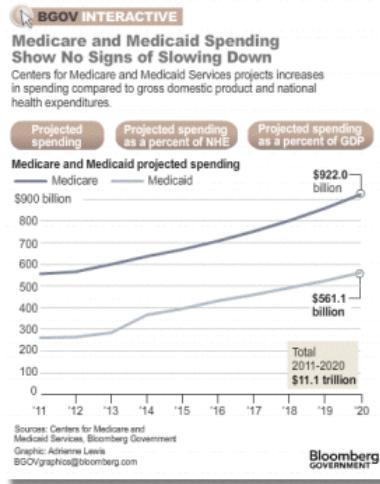
Counter-cyclical policy not used  
Counter-cyclical policy used

## suggested actions

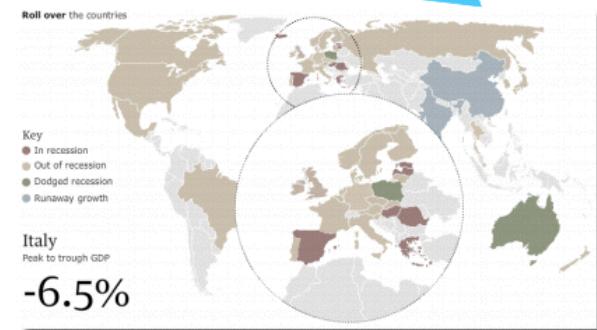


## familiar widgets

# Linked Displays - Brushing

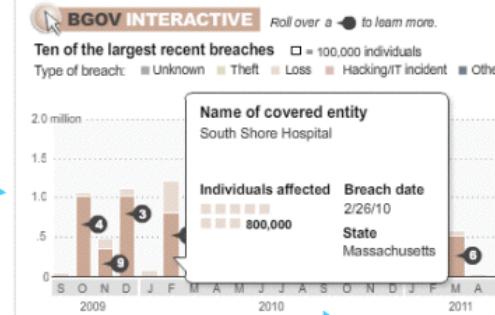


Interactive features should react to the user.  
Depress buttons, highlight items, animate widgets.



## Health Care's Growing Concern Over Cyber Security

As health-care providers increasingly adopt electronic records, they are looking for insurance coverage against possible data breaches.

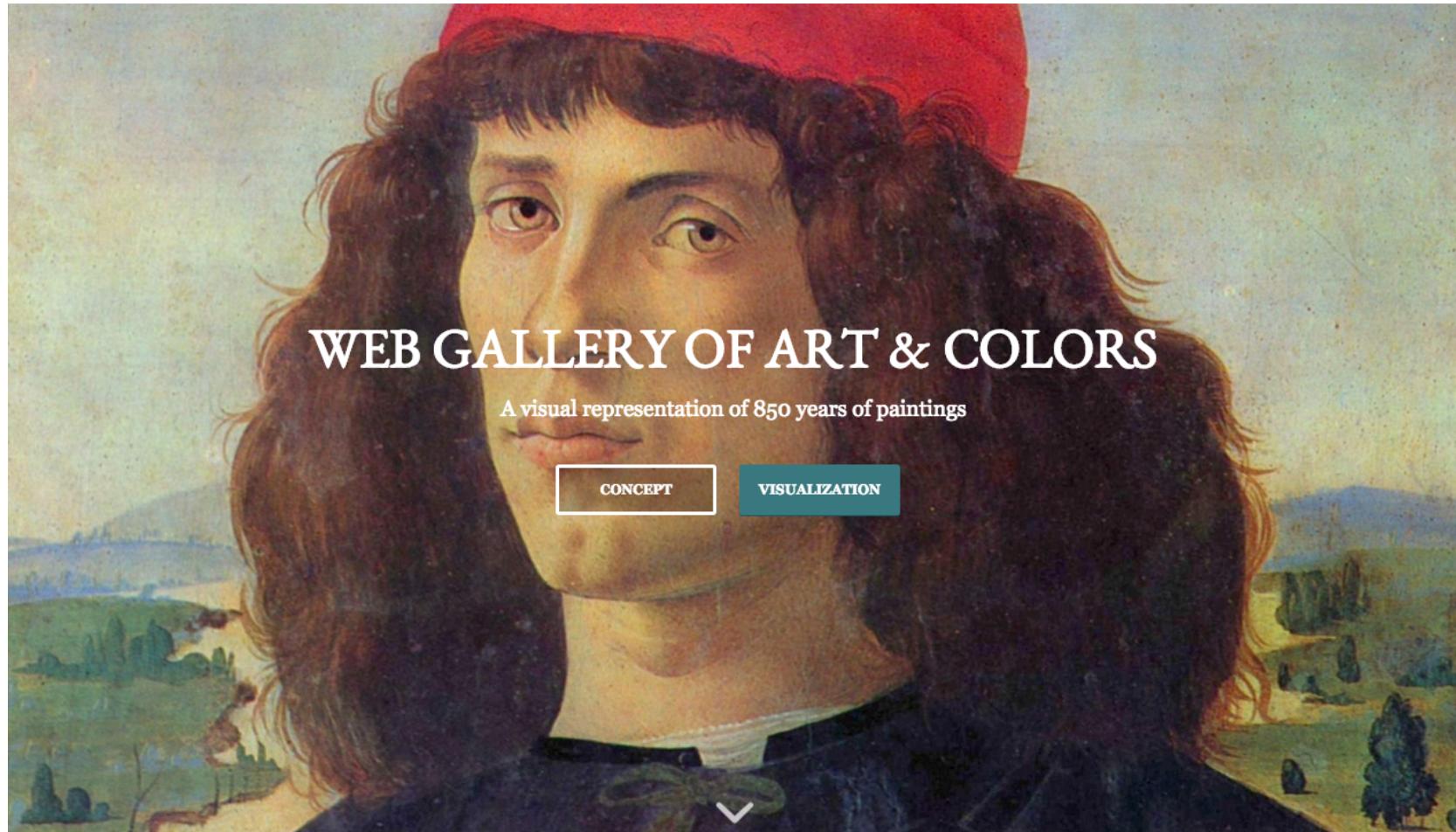


Don't obscure data.  
Avoid letting pop-ups obscure data.

# Example - Crossfilter.js

# **EXAMPLES**

# Art and Colors



<http://sobigdata.danielefadda.com/>