

# Visualization

## Introduction to Big Data for Social Science

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# Communication

- Audience
- Content
- Style
- Attitude

- Presentations
  - Static charts, maps, etc. for reports
  - Infographics for public impact
  - Animations, videos & interactives
  - Data journalism & public advocacy
- Dashboards for Continuing Management
- Exploration for Discovery

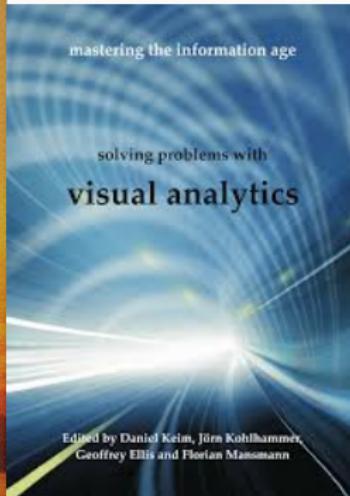
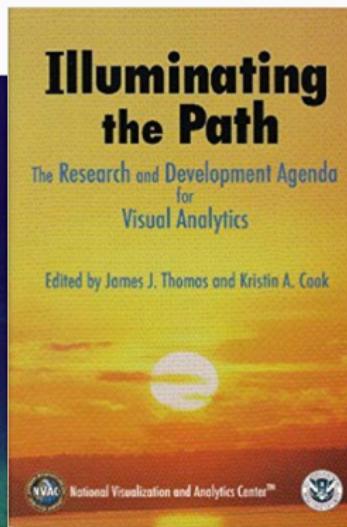
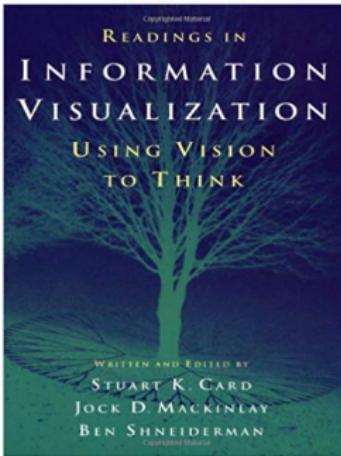
## General design principles

- Overview first, zoom and filter, details on demand
- Immediate feedback
- Tightly coupled views (selection in a view updates others)
- Careful use of color
- Truthfulness (watch for biases, occlusion, distortion)
- Meaningful labels and legends
- Careful explanations of novel layouts
- High data to ink ratio
- 3D only when justified
- Adapt to different screen sizes (reactive design)

# Process

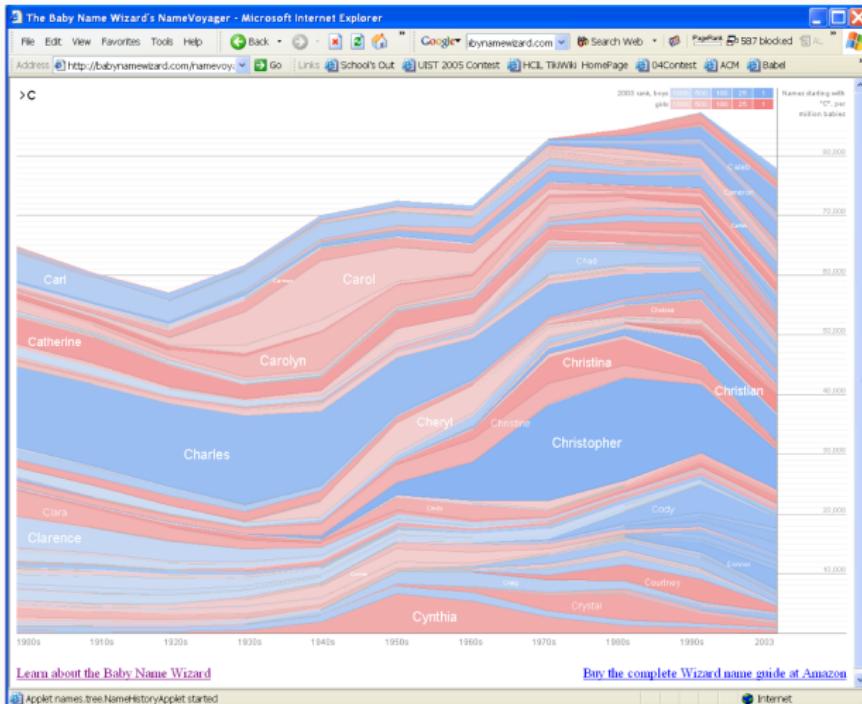
- Iterative development process
- Specify users needs and tasks
- Prepare data
- Design visual representations
- Design interaction
- Plan for sharing
- Prototype/Evaluate
- Deploy and monitor usage

# Books



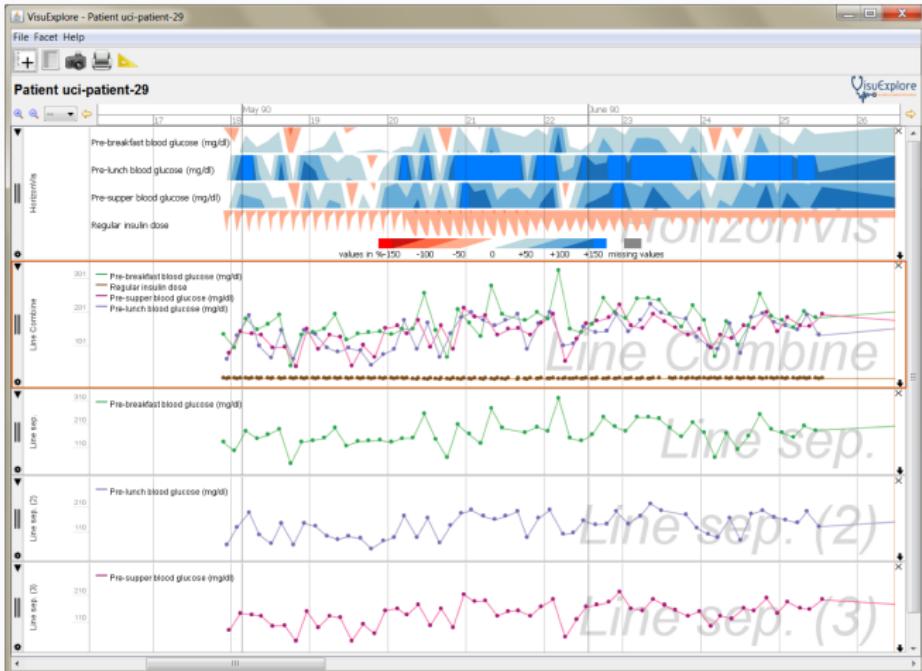
- Temporal visualization
  - Numerical data
  - Event sequences
- Accessibility
- Evaluation
- Scalability
- Discussion

# The Baby Name Wizard's Name Voyager

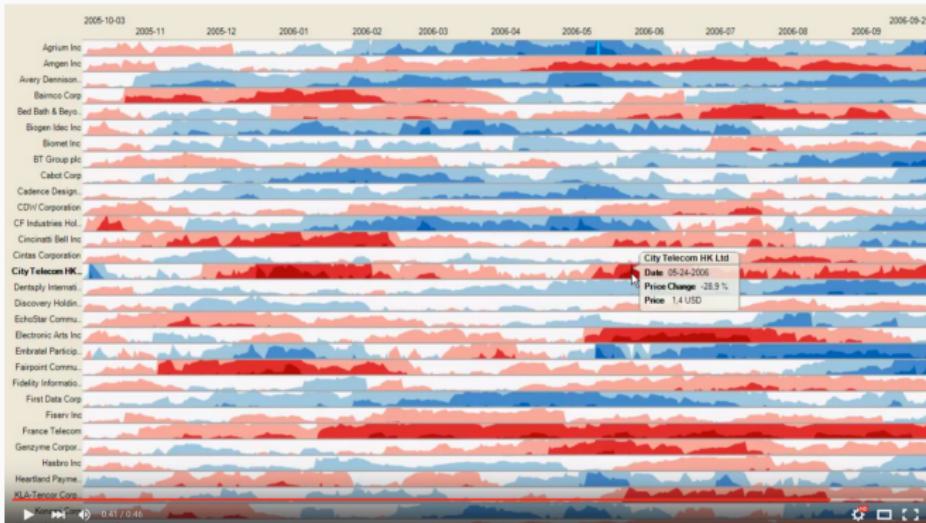


<http://www.babynamewizard.com/voyager#>

# VisuExplore

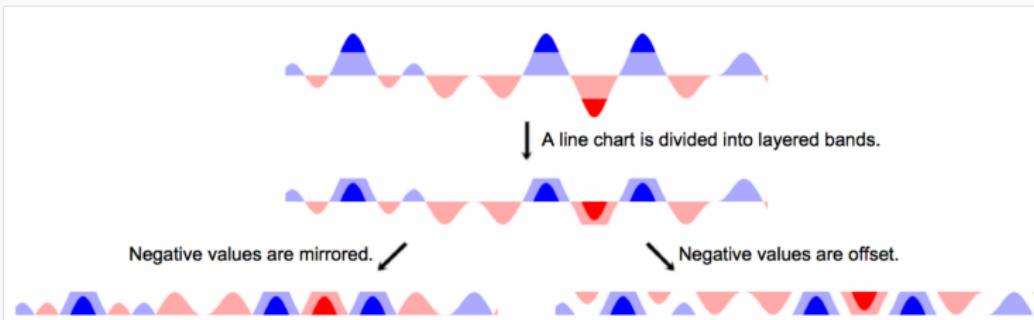


# Horizon graphs



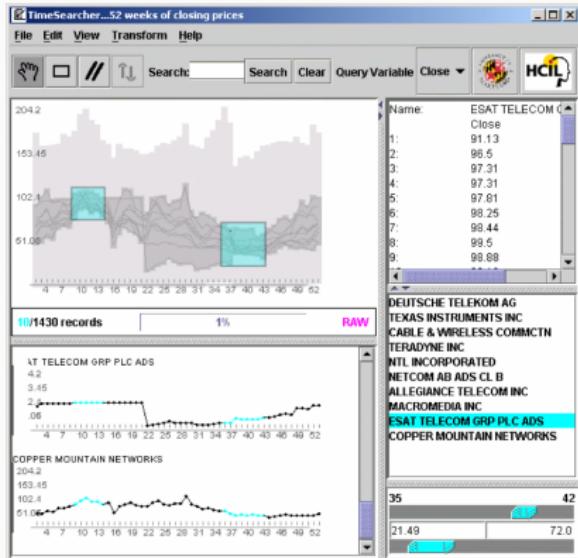
YouTube video: <https://www.youtube.com/watch?v=M53dYUcQbCs>

# Horizon graphs



[Heer, et al., 2009]

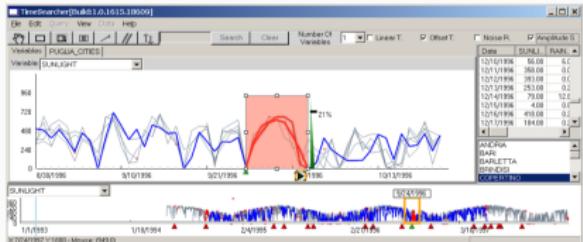
# TimeSearcher – Dynamic queries on numerical temporal data



## TimeSearcher1 - Hochheiser Infovis04

- User-specified patterns
- Rapid search
- video: <https://youtu.be/VWx1TMcrb74>

# TimeSearcher – Dynamic queries on numerical temporal data



## TimeSearcher2 - Buono VDA05

- Long Time series
- Multiple variables
- Controlled precision in match
- (Linear, offset noise, amplitude)

[www.cs.umd.edu/hcil/timesearcher](http://www.cs.umd.edu/hcil/timesearcher)

# Coordinated views

## USDA Food Safety Awards



# Colorbrewer

Number of data classes: 3

Nature of your data:  sequential  diverging  qualitative

Pick a color scheme:



Only show:  colorblind safe  print friendly  photocopy safe

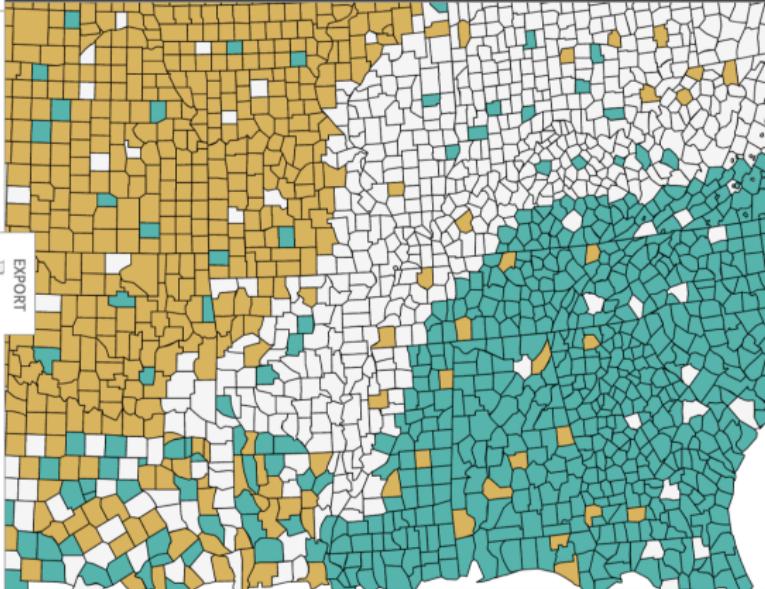
Context:  roads  cities  borders

Background:  solid color  terrain

color transparency

3-class BrBG    #d8b365  
#f1f1f1  
#5ab4ac

© Cynthia Brewer, Mark Harrower and The Pennsylvania State University Support Back to Flash version Back to ColorBrewer 1.0



axismaps

<http://colorbrewer2.org/>

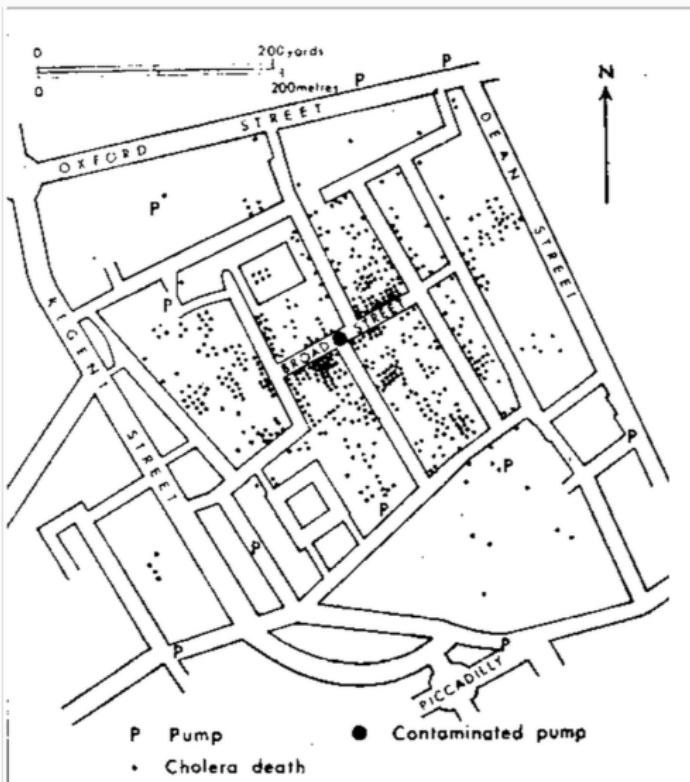
Challenge – Accessibility e.g.  
Visualization literacy

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# 1482 Claude PTOLEMEE, Cosmographia. Ulm, L. Holle, 1482

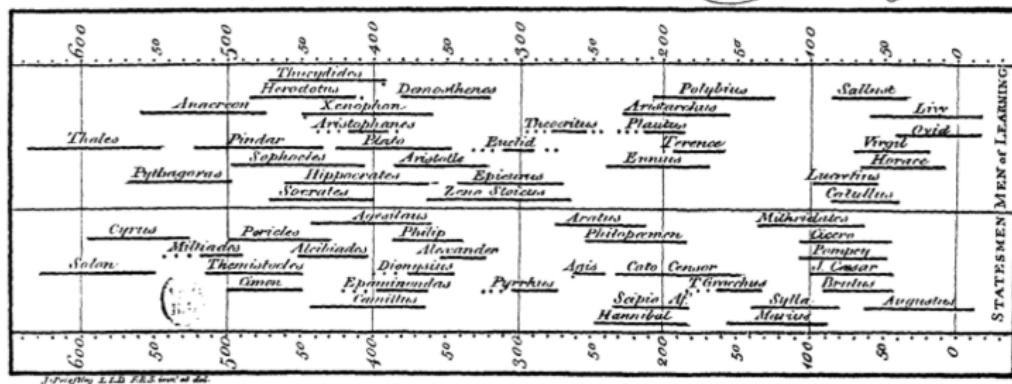


# John Snow, 1854 - Clusters of cholera cases in the London



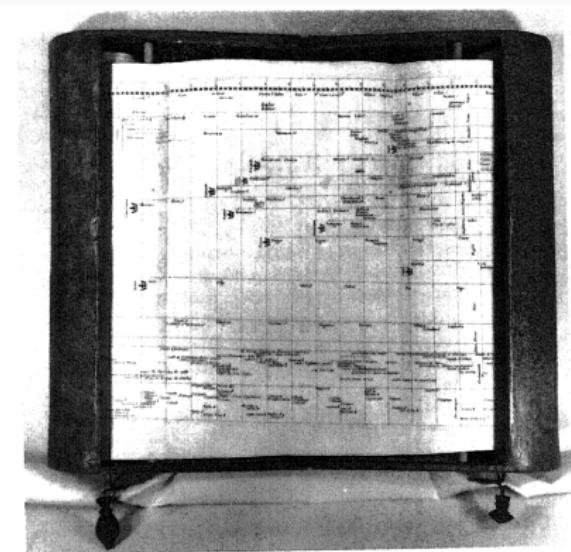
1765

## *A Specimen of a Chart of Biography.*



# Jacques Barbeu Du Bourg - 1753

1753



Jacques Barbeu-Dubourg's *Machine chronologique*, opened to the years A.D. 360 to A.D. 510 on the *Carte chronographique*, showing the kingdoms of the Huns, Sweden, Scotland, England, Swabia, the Visigoths, the Vandals, Bourgogne, France, and Italy.  
Rare Books and Special Collections, Princeton University Library.

# Patient Timeline



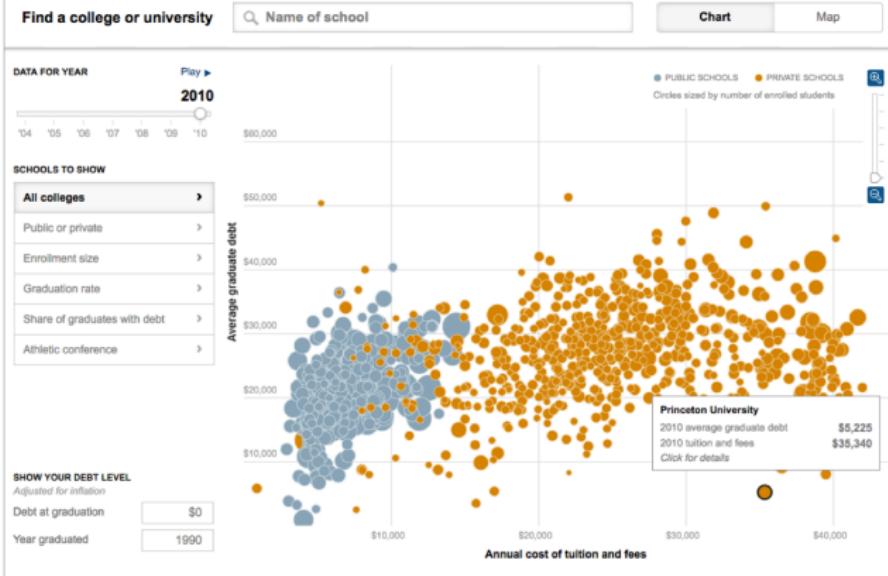
The Wand Timeline view of a patient record in Allscripts' ambulatory EHR iPad application. Used with permission of Allscripts.

# New York times interactive

UPDATED May 12, 2012

## Student Debt at Colleges and Universities Across the Nation

The average amount of debt that students have at graduation has increased at a vast majority of colleges and universities in the United States, according to data compiled by an advocacy group, the Institute for College Access and Success. The data on student debt is self-reported by the schools, and many institutions don't participate. Other figures, like graduation rates, come from the Education Department. [Related Article »](#)



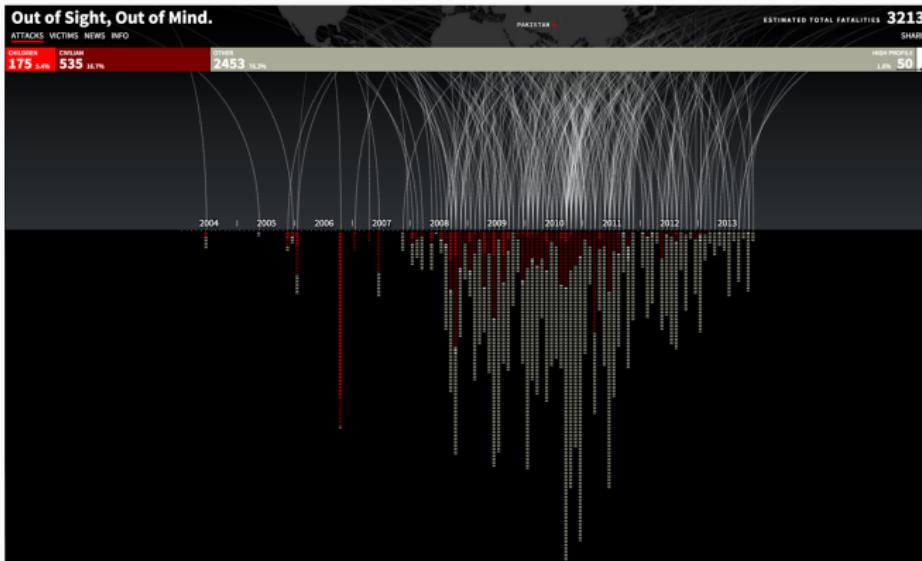
[http://www.nytimes.com/interactive/2012/05/13/business/  
student-debt-at-colleges-and-universities.html](http://www.nytimes.com/interactive/2012/05/13/business/student-debt-at-colleges-and-universities.html)

## To reach diverse users

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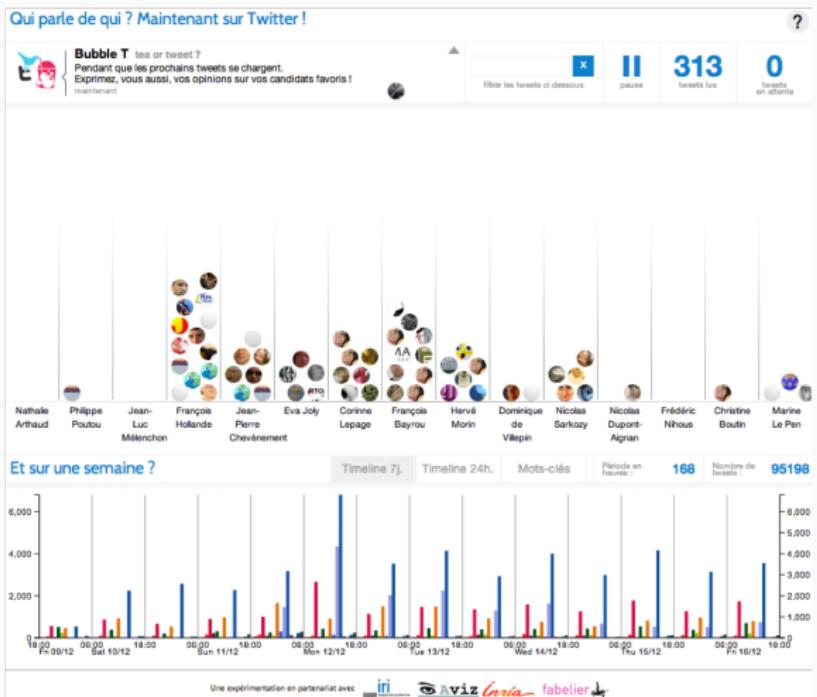
- Provide training when possible
  - Video demonstrations
  - Explanations
- Even classics like bar charts benefit from
  - explanations
  - animations
  - textual summaries
- Use story telling
- Also provide tables, text versions

# Drones



<http://drones.pitchinteractive.com/>

# Twitter



Samuel Huron, Romain Vuillemot, Jean-Daniel Fekete, "Visual Sedimentation," IEEE Transactions on Visualization and Computer Graphics, vol. 19, no. 12, pp. 2446-2455, Dec., 2013. Video at: <https://www.youtube.com/watch?t=262&v=jVjN4LM7qKc>

Challenge – Evaluation: How  
USEFUL/USABLE is THIS?

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# Current evaluation practices

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- Classics
  - Usability evaluations
  - Controlled experiments
    - *comparing design elements*
    - *comparing 2 or more systems*
  - Usage data logging, interviews, surveys
- Newer directions
  - Insight based controlled experiments
  - MILCs (Multilayerer, In-depth, Long term, Case studies)

## Summary

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