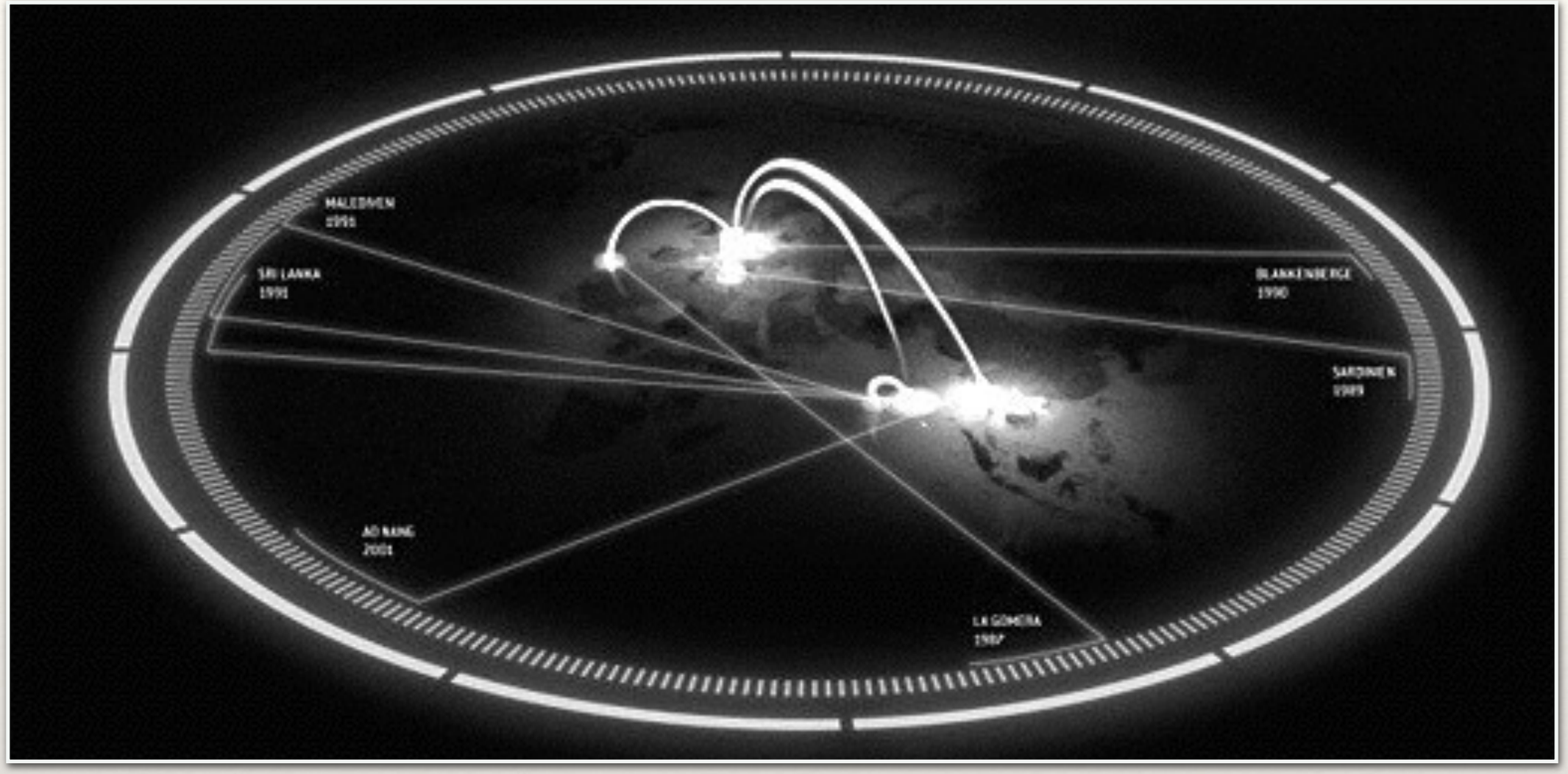


Communicating Research via Data Visualization

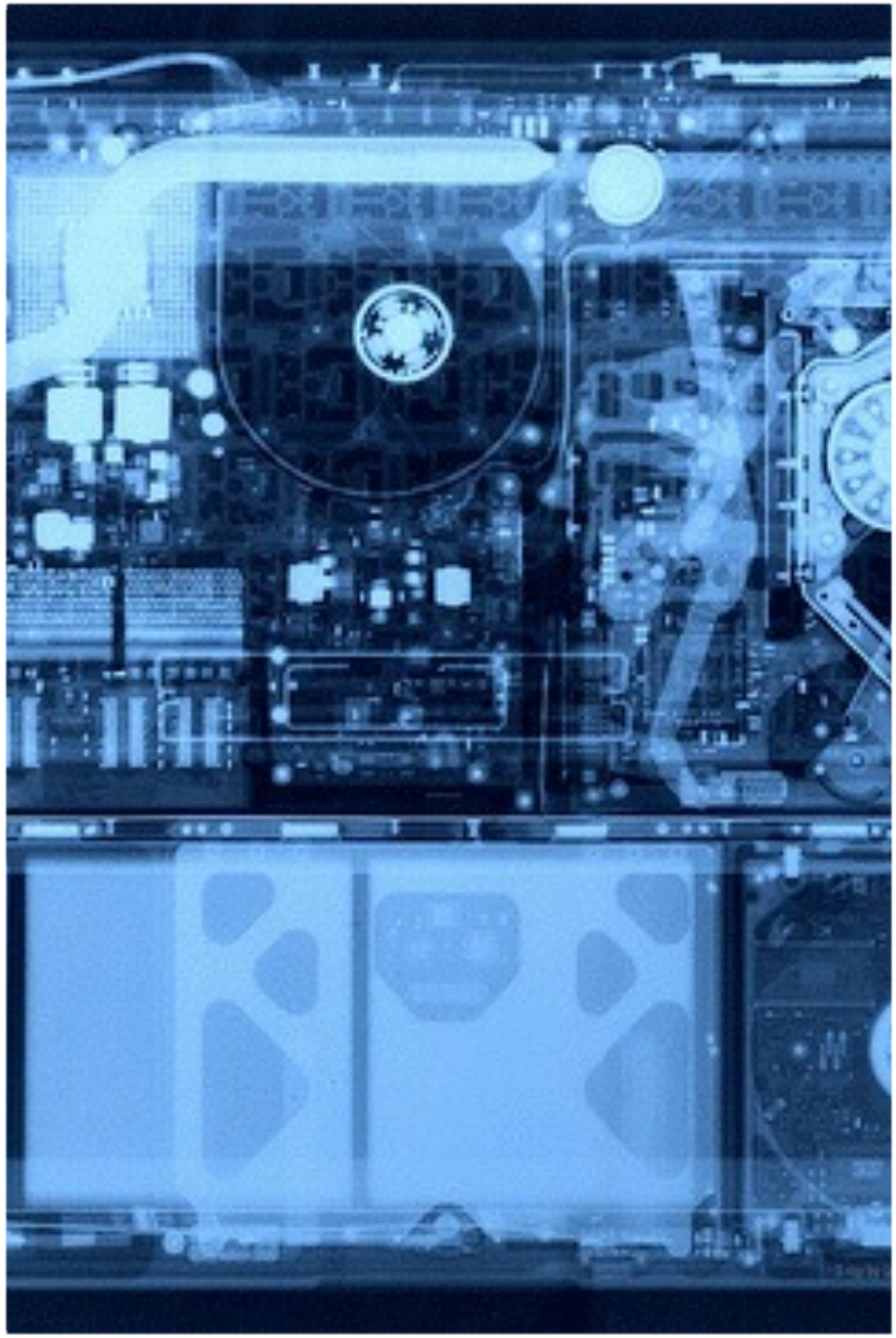
Joseph Ryan
Center for Statistics and Visualization
University of Denver

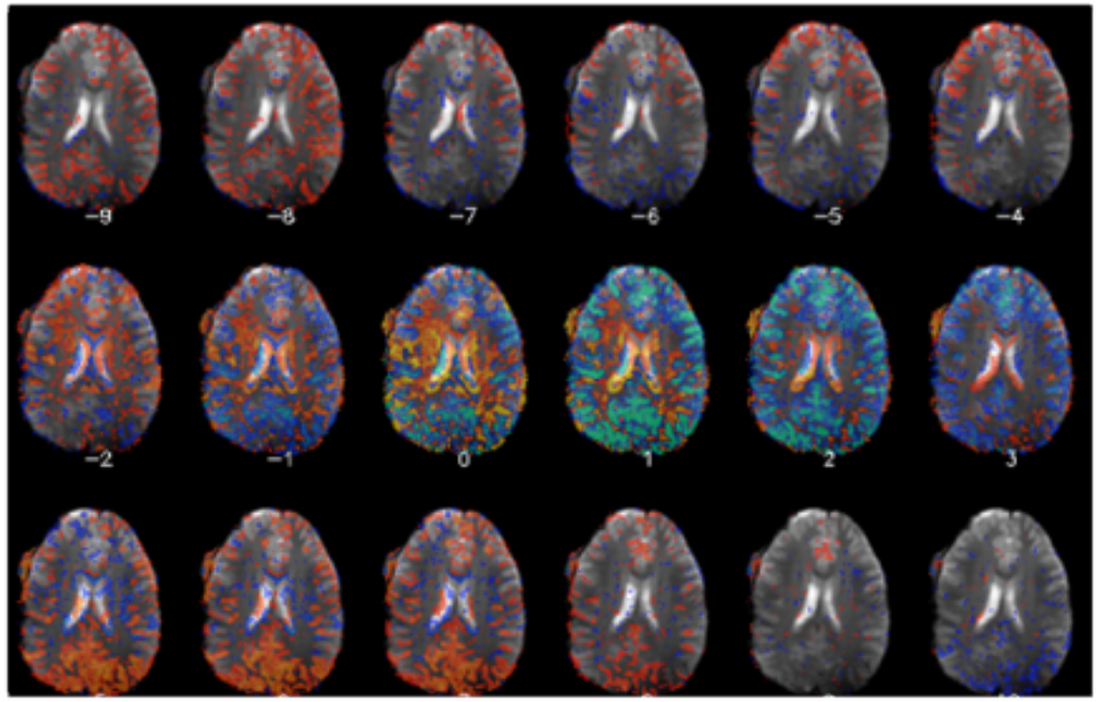
HELLO

Our next 45 minutes

- Introduction of self and center
- Definitions
- Motivations for visualization
- Characteristics of effective visualizations
- Visualizing research data
- Sample projects
- Resources

“Visualization” ?!

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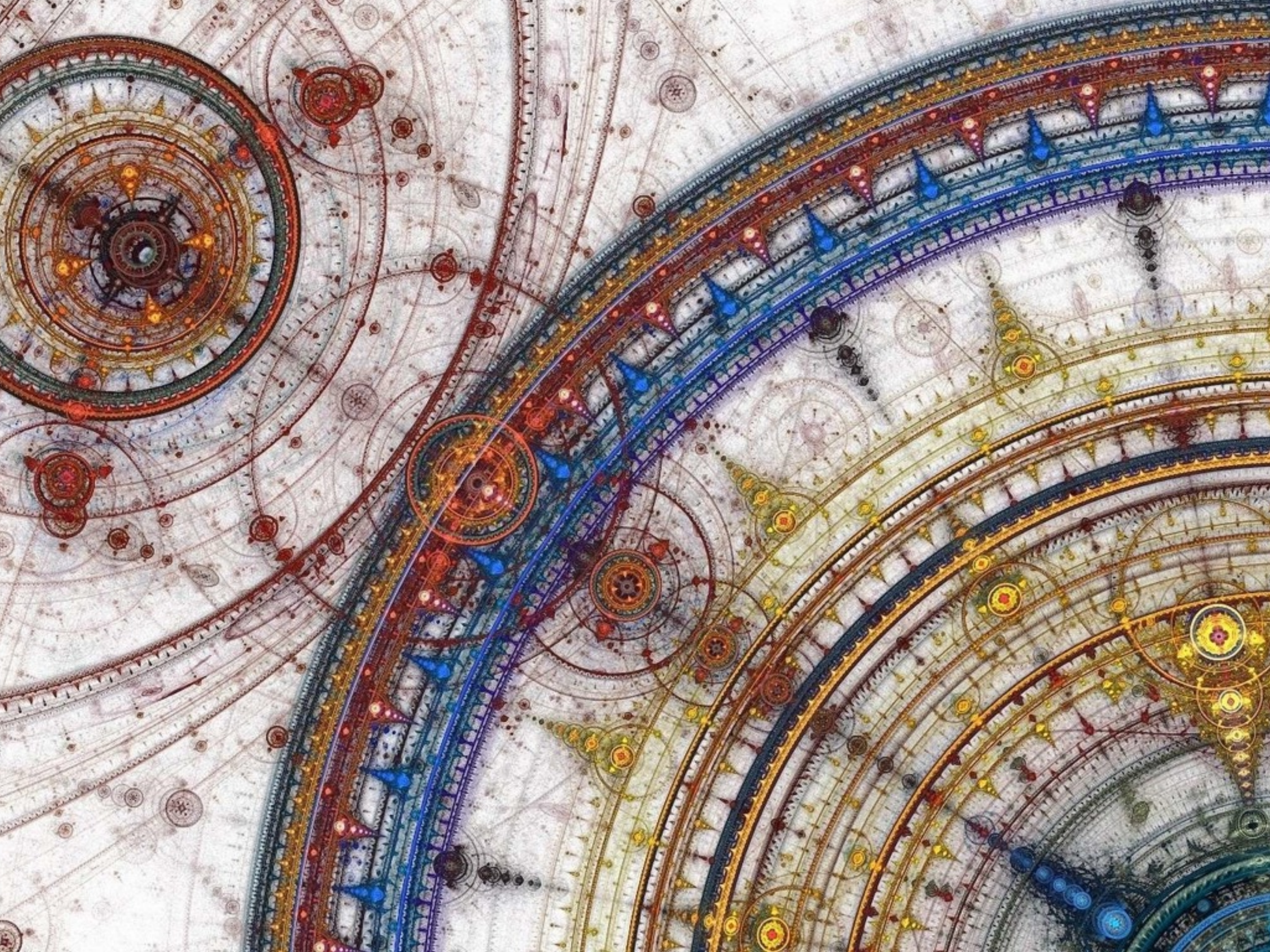
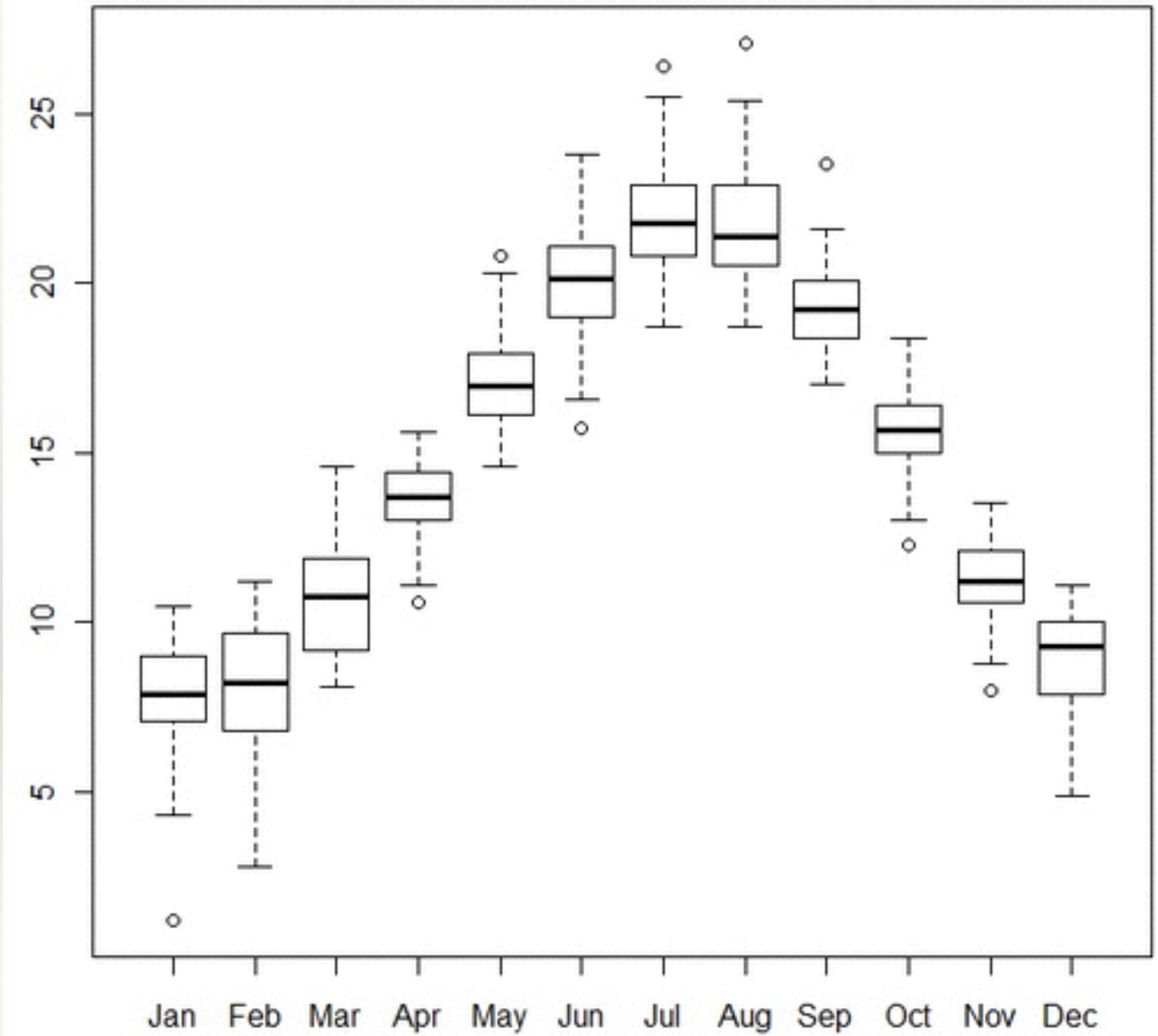
"the use of computer-supported, interactive, visual representation of abstract data to amplify cognition."

Card, S. K., Mackinlay, J., and Schneiderman, B. (1999) Readings in information visualization: Using vision to think. San Francisco: Morgan Kaufmann.

Why?

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On effectiveness

Effective visualizations

- A visualization == a *communication*. You're sending a message.
- What comprises effective communication?
  - An audience
  - A clear, focused message

"My visualization will help {**my audience**}
understand {**my specific message**}."

In general

- If you can, test out your visualization with your audience. Rinse and repeat until you're where you'd like to be.
- Showing trends? Line charts. Specific values? Tables or bar charts every time.
- Roll up data or omit it until you have a visualization that only shows elements essential to your message.

In particular

- Try to have zero present on both axes if at all possible.
- Maintain constant width of bars in bar charts.
- If you only have a few data points, use bars instead of lines to avoid suggesting a trend.
- 3D. No. Unless…?
- Make sure your set of colors are distinct.
- Keep your backgrounds in the background.

Working with research data

Get to know your researcher

- Why does s/he want to visualize their data?
  - For a grant in process?
  - A grant application?
- Deadlines

Integrity and compliance

- Use a copy, not the canonical data set
- De-identify
- Comply with all applicable regulations: HIPPA, FERPA, etc etc etc
- Visualization as disclosure method of data sets: make sure everyone understands

Manage the project

- Build out schedule
- Create milestones
- Regular progress meetings
- Be prepared to change course as you go

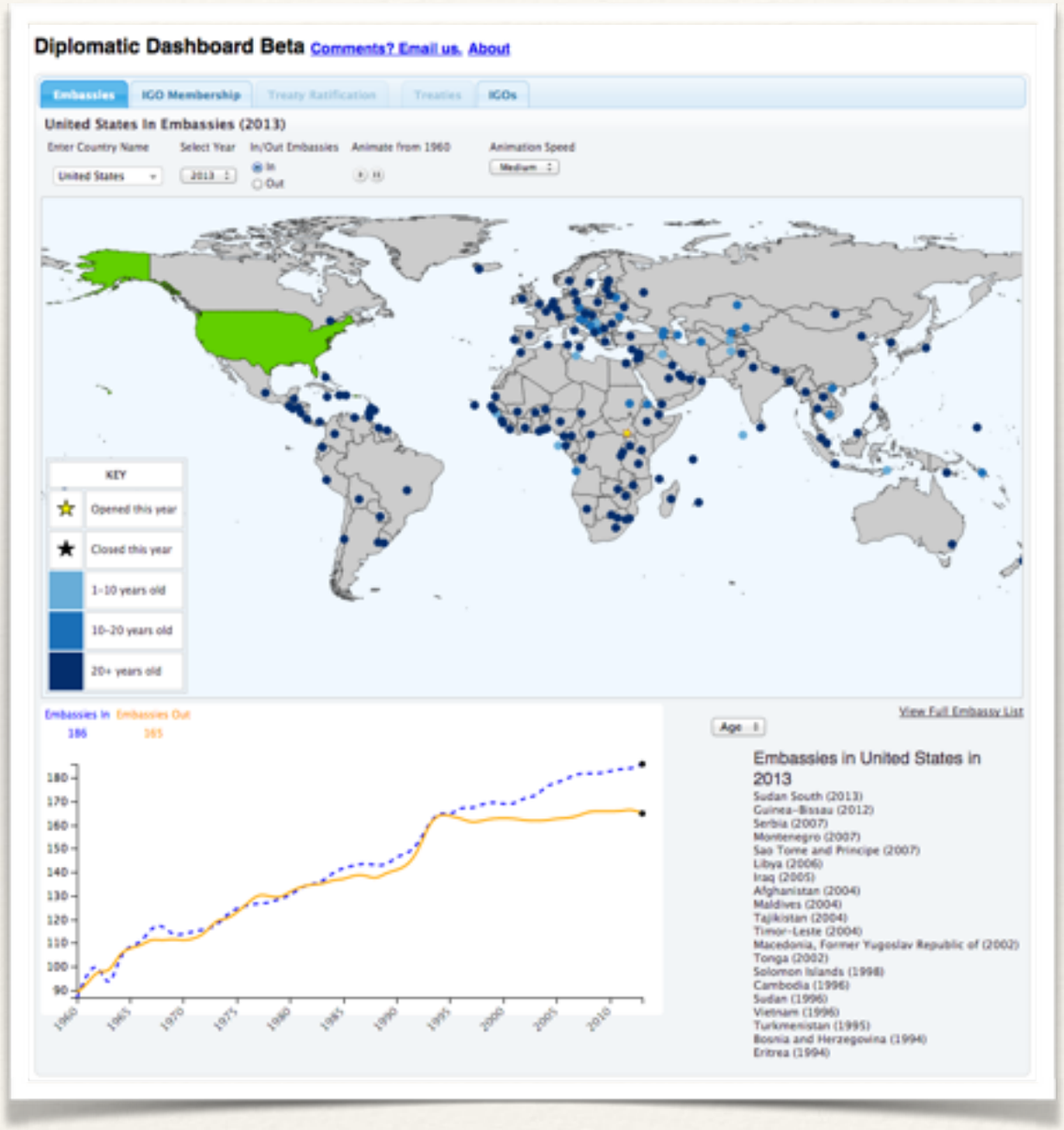
Benefits

- Research exposure outside of traditional academic publishing
- Increased faculty satisfaction
- Retention

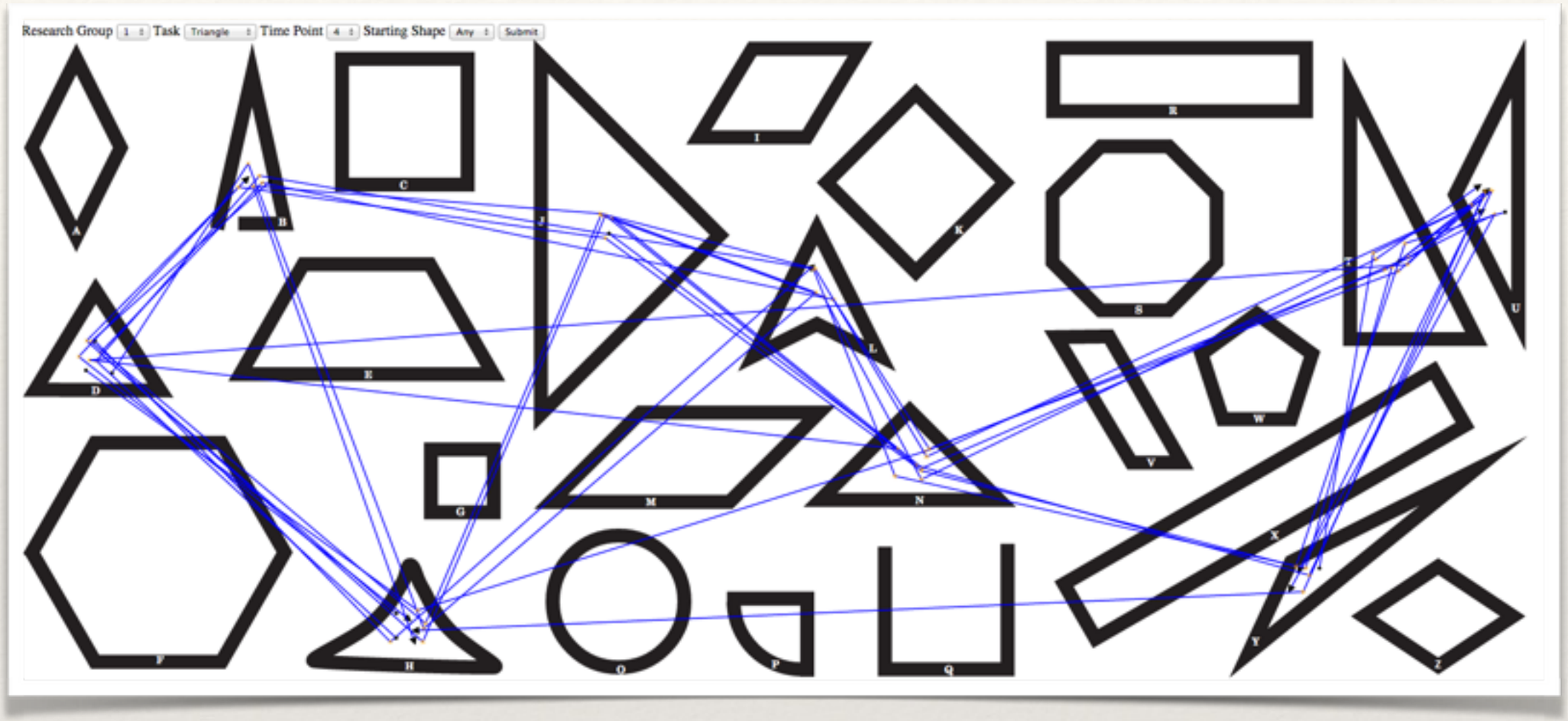
Sample projects

Diplomatic Dashboard

- Birds-eye view of diplomatic connections between two countries
- Data 1960-present, with some data series starting in 19th century
- Client: Pardee Center for International Futures



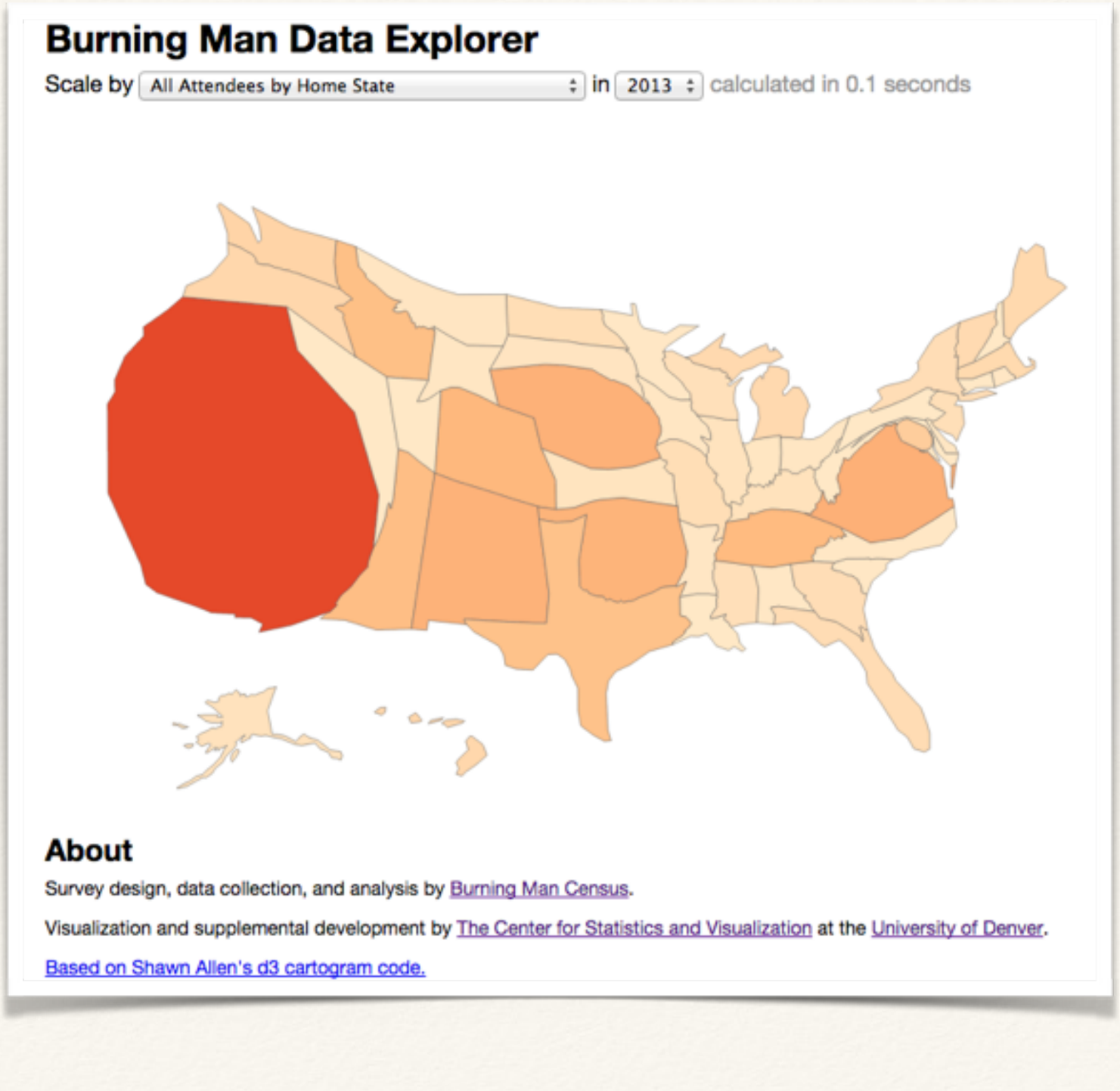
Shapes Explorer



- Early childhood shape recognition study
- Client: Kennedy Institute, Morgridge College of Education

Burning Man

- Burning Man attendees by home state
- Client: Kateri McRae, Psychology



Tools

Visualization tools @ DU

- Tableau Desktop
- d3.js
- Google Chart API
- Leaflet.js

Resources

- Books
  - *Visual Insights* by Katy Börner & David E. Polley
  - *Now you see it: Simple Visualization Techniques for Quantitative Analysis* by Stephen Few
    - Tufte?
- Tutorials
  - Tableau web tutorials
  - Scott Murray's d3 tutorials
  - Flowingdata
  - *lynda.com* ($)

Thank you!

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