Giving Form to Data

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BU Spark!

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Giving Form to Data

Data visualization is the practice

of giving form

to the abstract and unseen.

Data Visualizations should:

1. **Accurately represent** information, without distortion or undue emphasis.

Data Visualizations should:

2. **Help people understand** something about the data that they might not otherwise have seen.

Quantitative insight

Emotional or subjective truth

Data Visualizations should:

3. Have a purpose.

Audience

Context

Scientific publications

CRYSTAL GROWTH & DESIGN

ARTICLE

pubs.acs.org/crystal

Does Crystal Density Control Fast Surface Crystal Growth in Glasses? A Study with Polymorphs

Published as part of a virtual special issue of selected papers presented at the 2010 Annual Conference of the British Association for Crystal Growth (BACG), Manchester, UK, September 5−7, 2010

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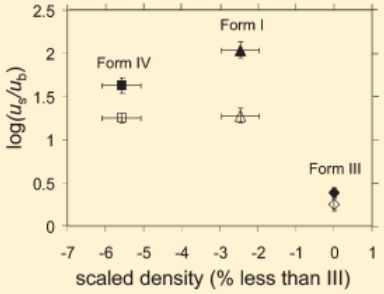
ABSTRACT: As organic liquids are cooled to become glasses, crystal growth at the free surface can be substantially faster than in the interior, a phenomenon uncommon for other materials and for which different explanations exist. We have measured the surface and bulk growth rates of three polymorphs in carbamazepine glasses. Crystal density has no controlling effect on the extent to which surface crystal growth is enhanced over bulk crystal growth, in contradiction to models that relate fast surface crystal growth to the release of crystallization-induced tension.



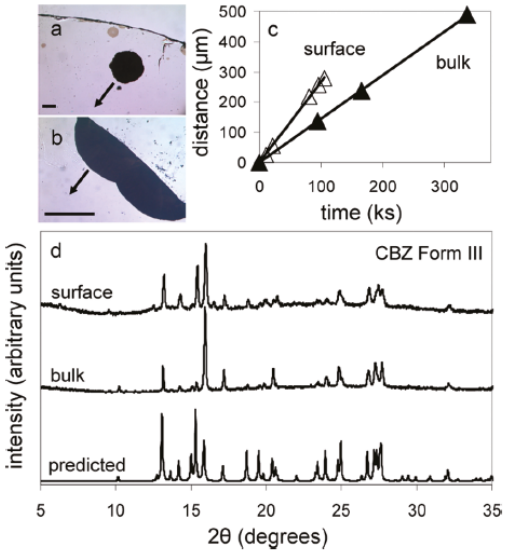
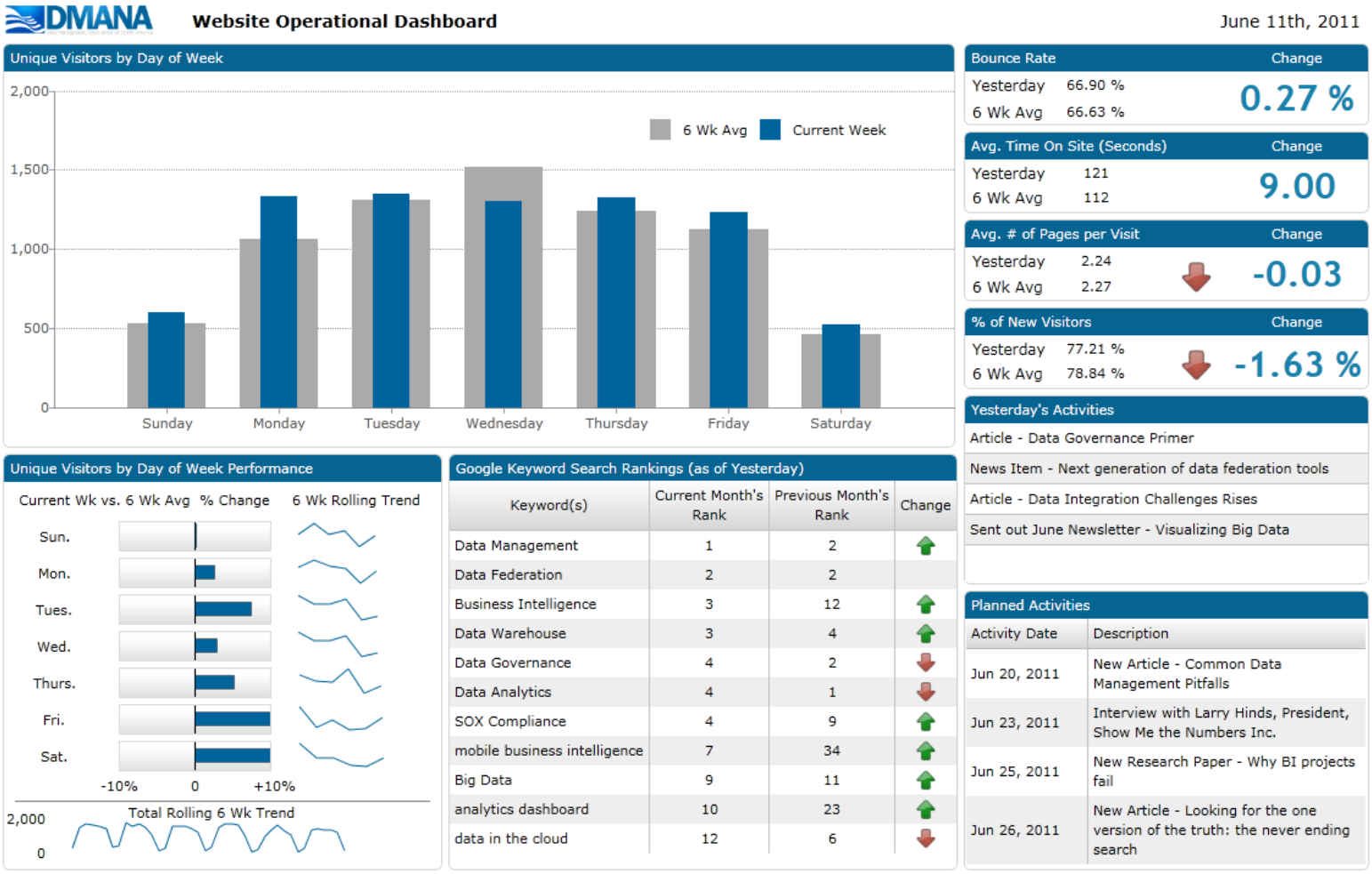


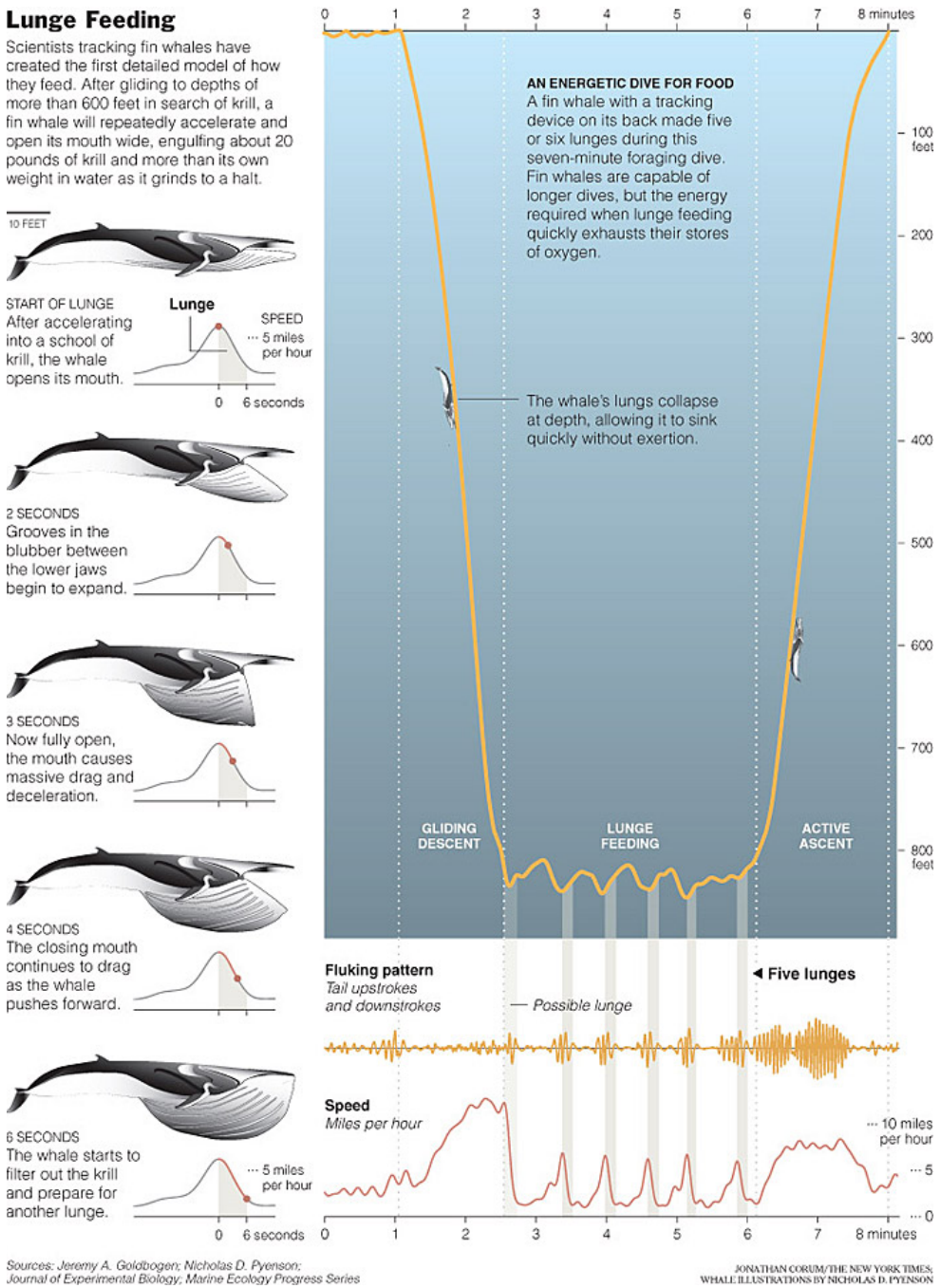
Figure 3. Form III crystals growing (a) at the surface and (b) in the bulk at 313 K. Scale bar = 200 μm. Arrows indicate growth directions. (c) Distance of growth vs time for crystals in (a) and (b). (d) Observed and predicted XRD patterns of Form III crystals.

Business reports



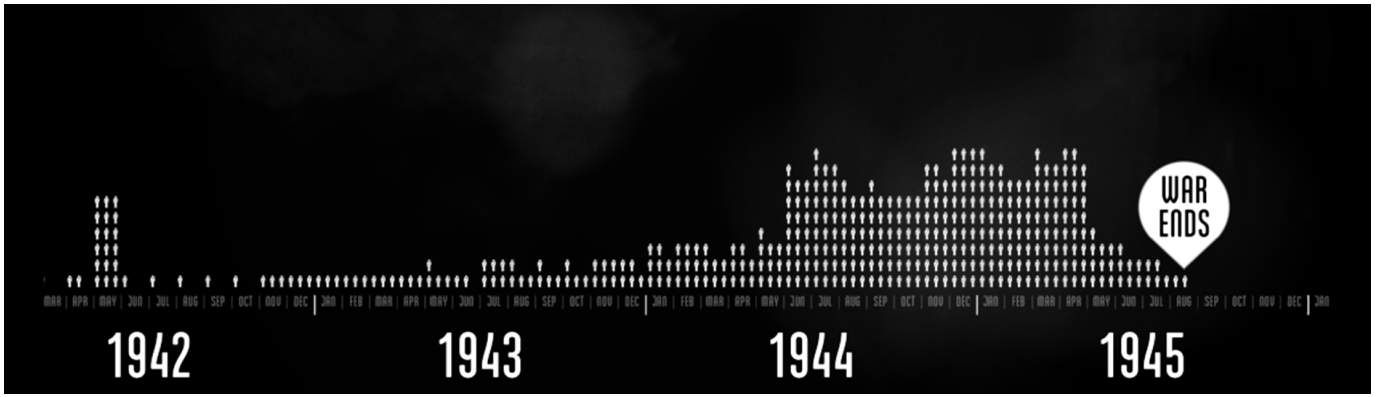
http://www.dashboardinsight.com/articles/digital-dashboards/fundamentals/what-is-a-dashboard.aspx

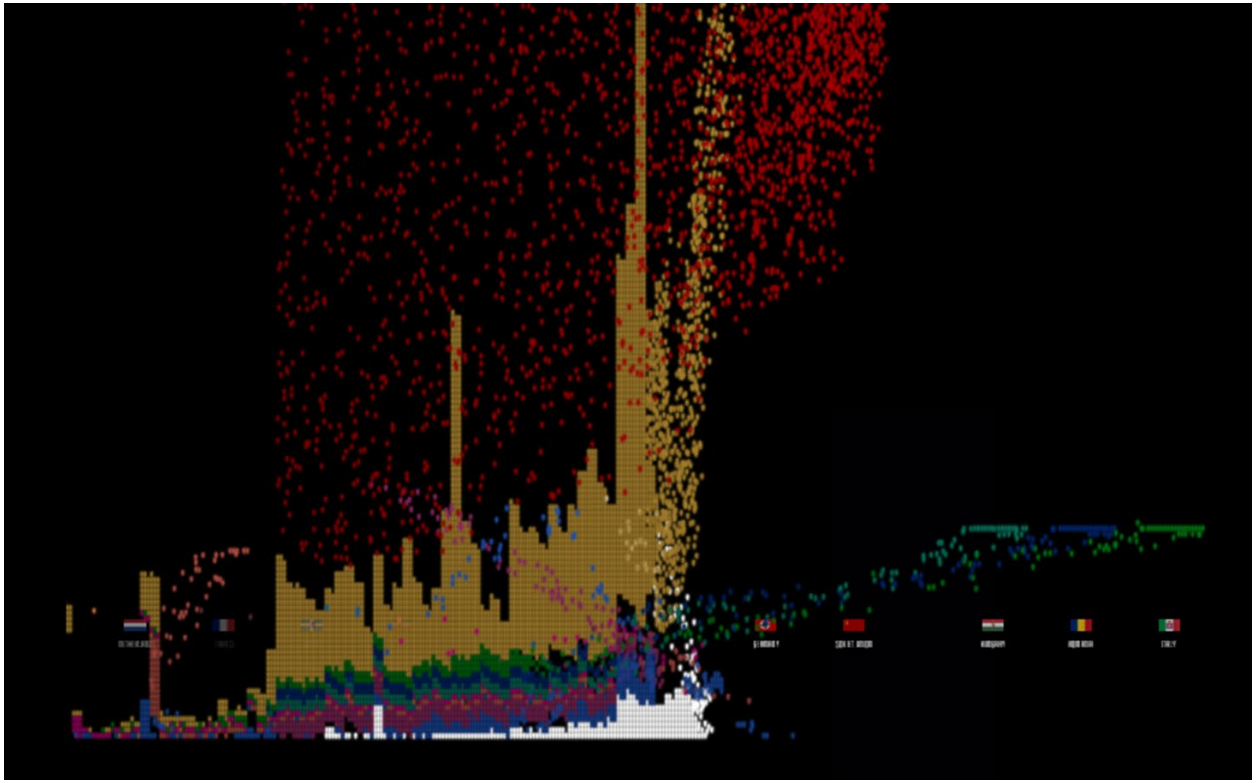
News article



https://www.nytimes.com/2007/12/11/science/11gulp.html

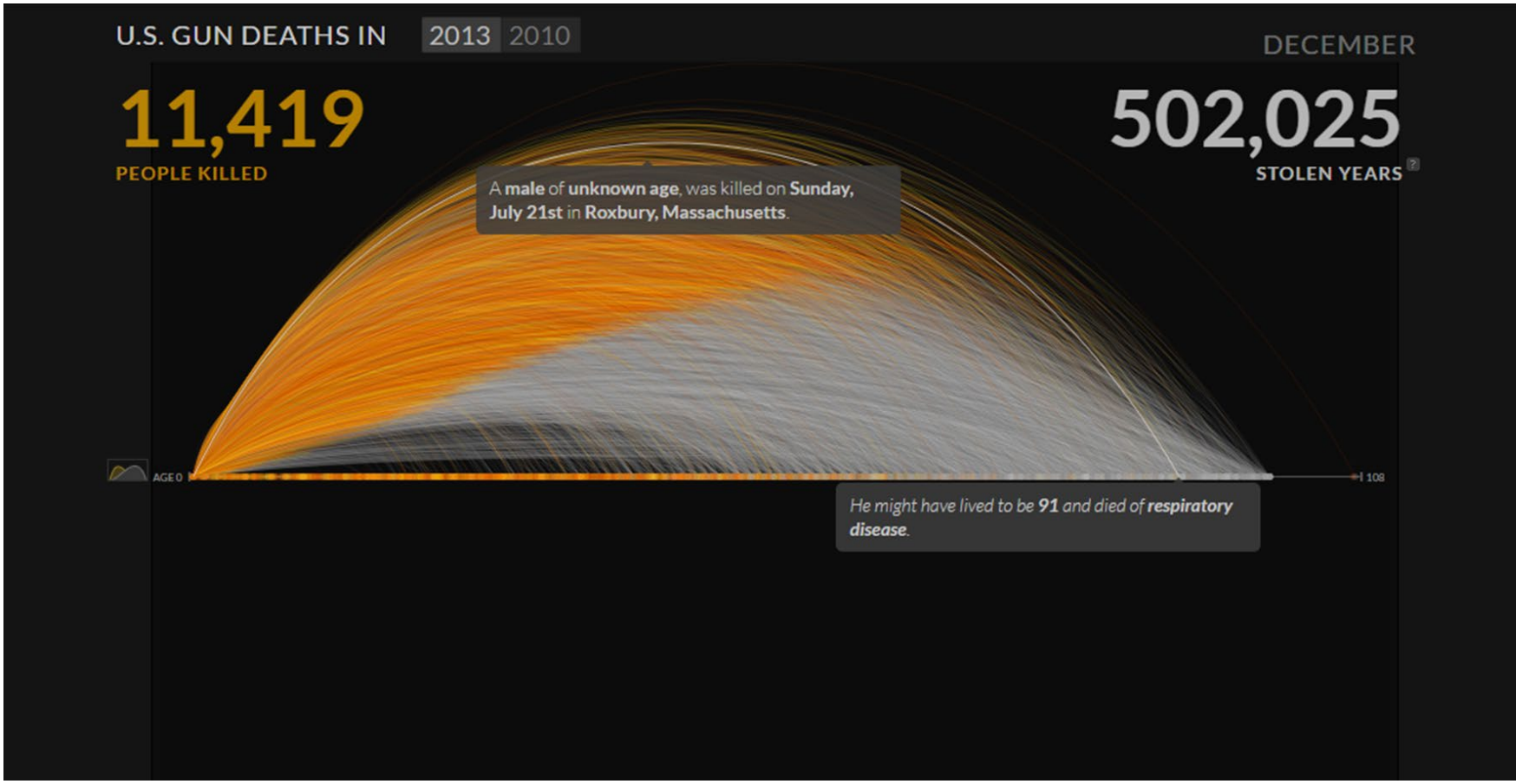
Persuasion





Neil O'Halloran: http://www.fallen.io/ww2/

Activism / Advocacy



Periscopic: https://guns.periscopic.com/?year=2013

Art

Jeff Hemsley. Occupy the Amendment.

Data Visualizations should:

4. Have a perspective.

Who is represented, how, and why?

Data humanism

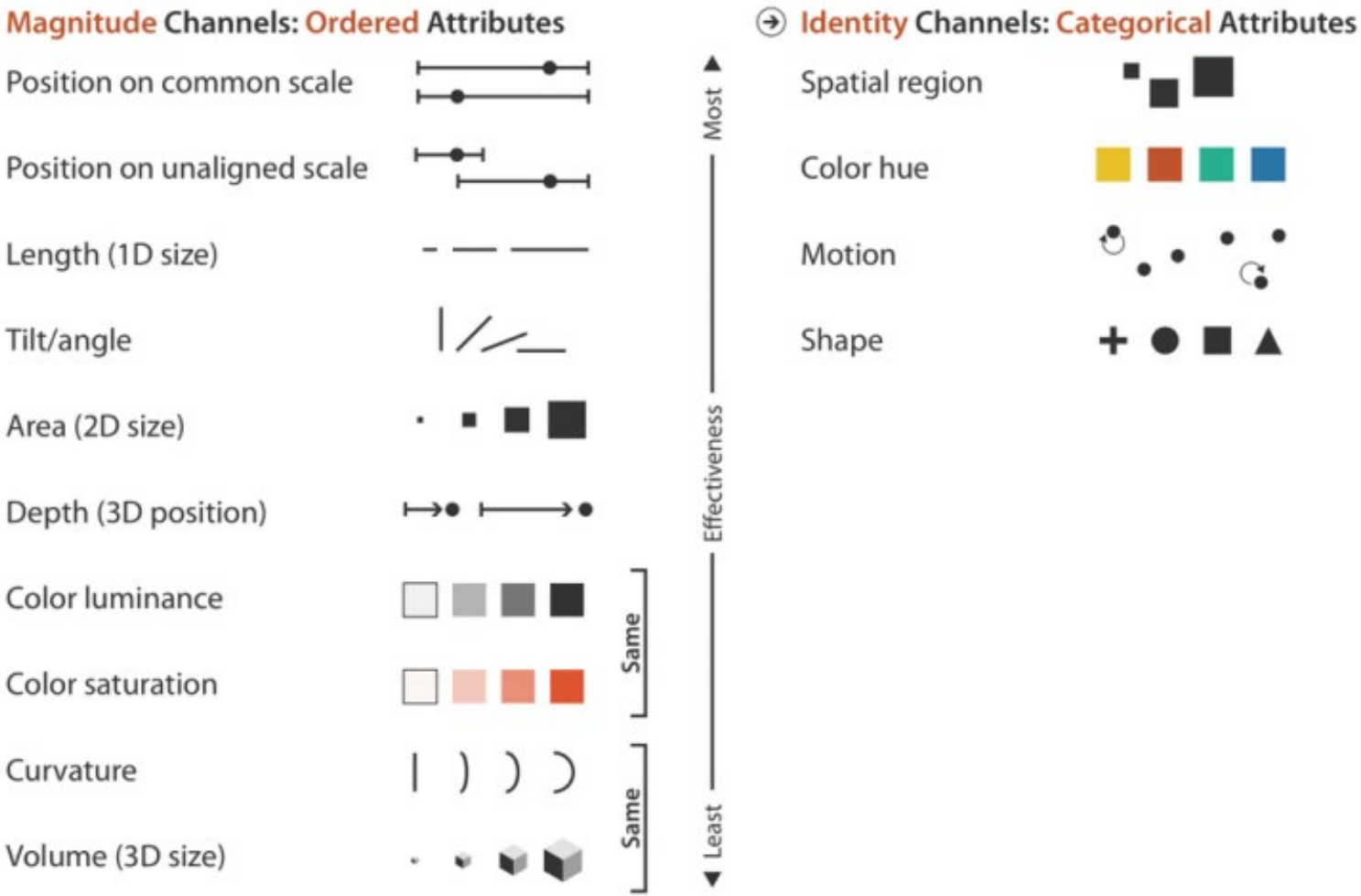
Georgia Lupi: http://giorgialupi.com/bruises-the-data-we-dont-see/

Johanna Drucker: Graphesis. Visual Forms of Knowledge Production

What is a data visualization?

- **Encodes** information
- Converts data **channels** (variables) into visual form
- Uses **marks** to represent the data values

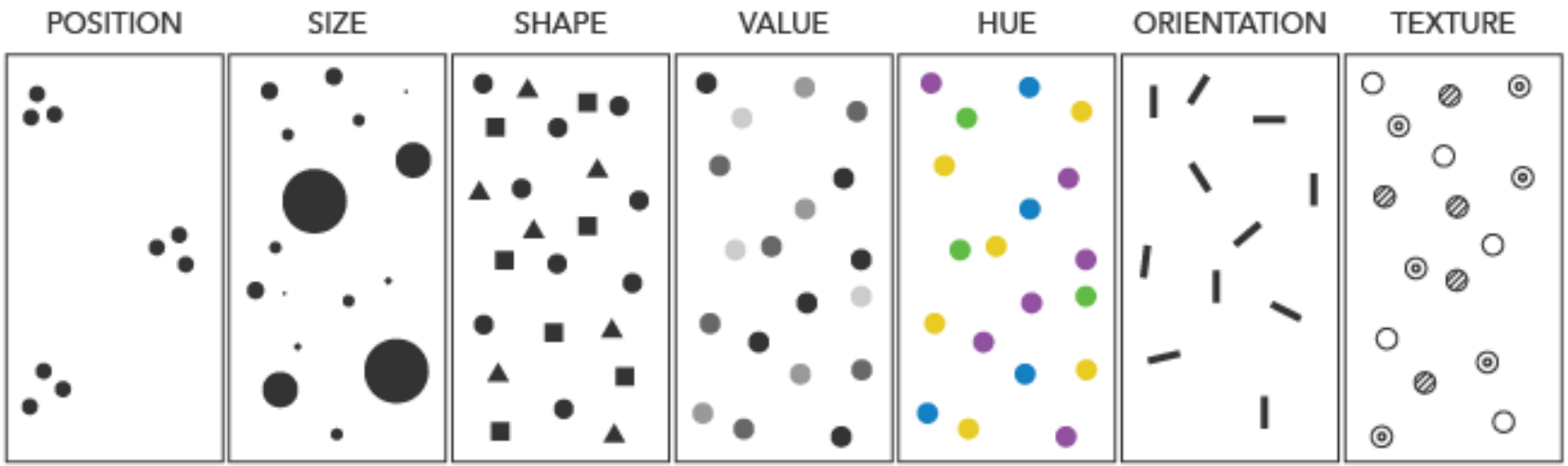
Methods of encoding data



Tamara Munzner. Visualization Analysis and Design.

Making marks

Marks are usually drawn using some combination of visual variables.



Jacques Bertin. Semiology of Graphics. Image from AxisMaps.com

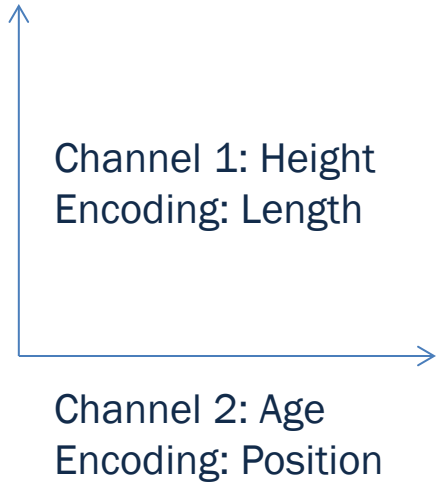
From object to visualization

Objects (people themselves)

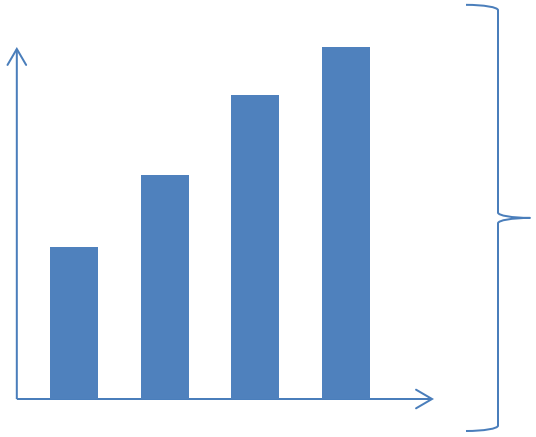
Data (measurement/icon)

Age (y)	Height (in)
4	40
8	51
12	58
16	67.5

Channel and Encoding

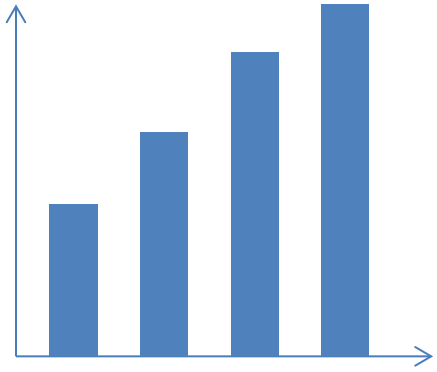


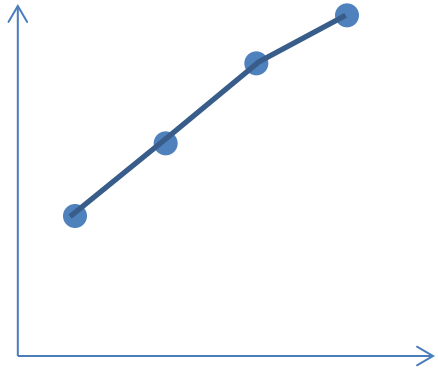
Marks

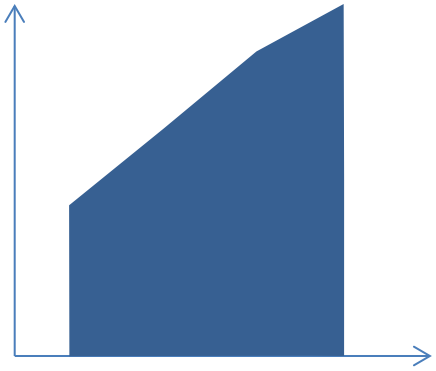


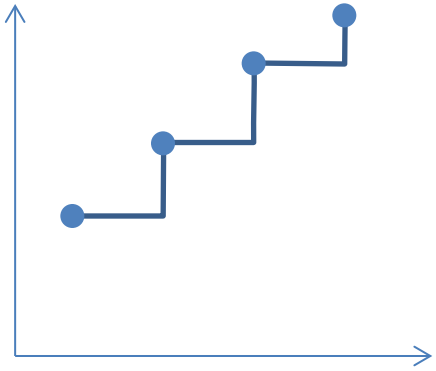
Changing the mark

The mark chosen can emphasize different aspects of the data



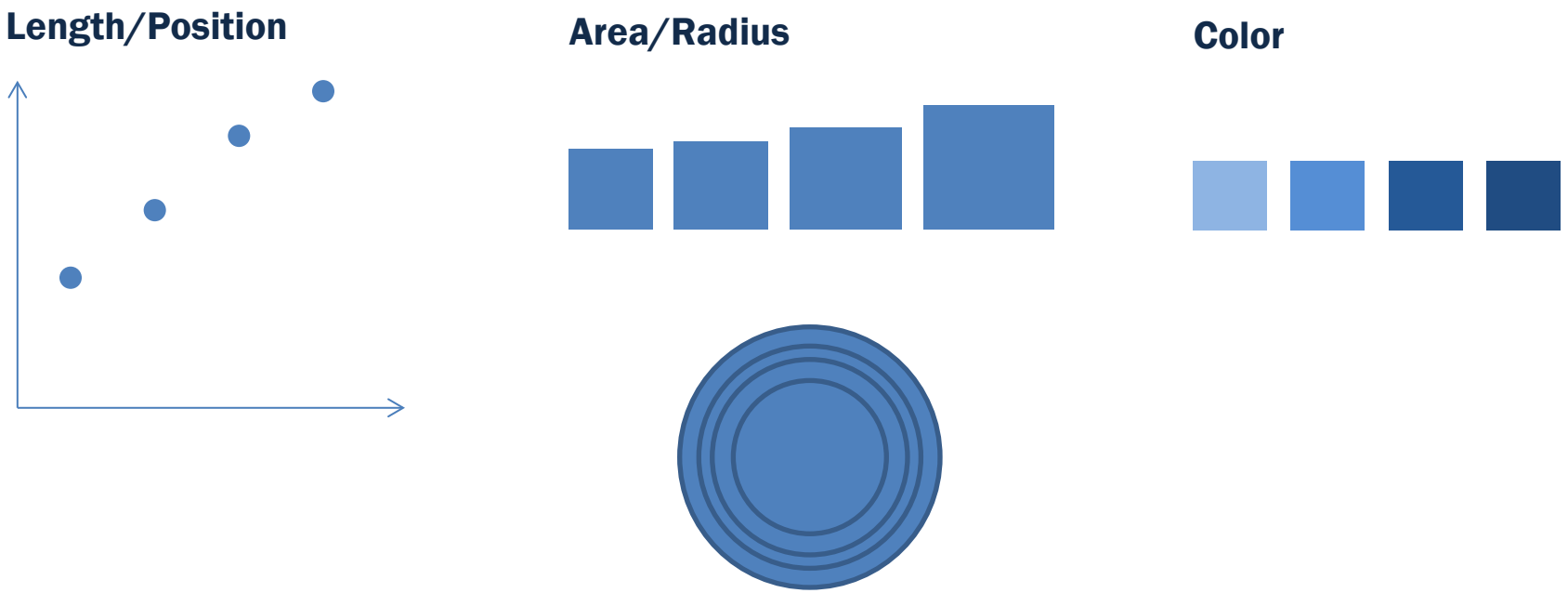






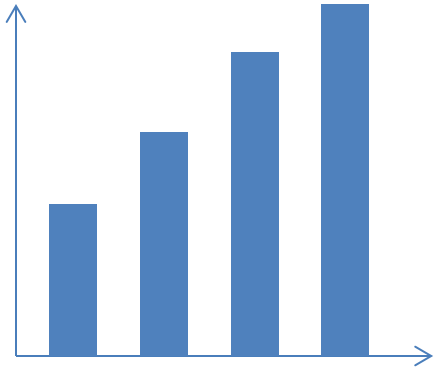
Changing the encoding

Changing the way we encode data also affects how we perceive it, and what we can actually see.

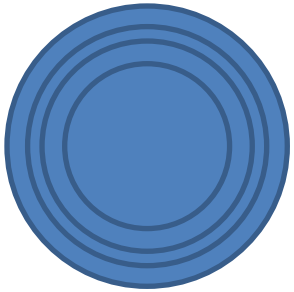


The importance of metaphor

Matching the encoding metaphor to your data makes a visualization more readable.



Metaphorical connection is clear



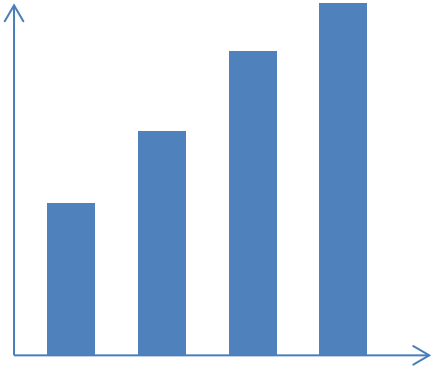
Pure symbols – no automatic meaning

Data Visualizations should:

5. Support a user task.

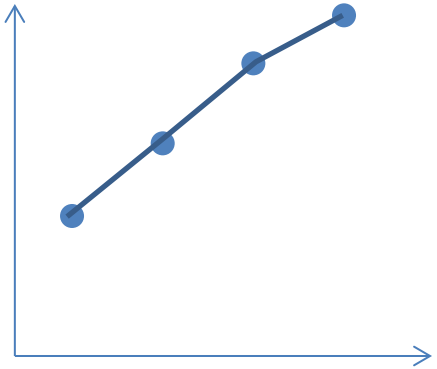
User tasks

Compare bar height

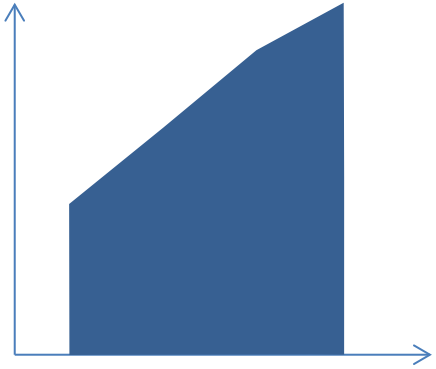


Read dot values

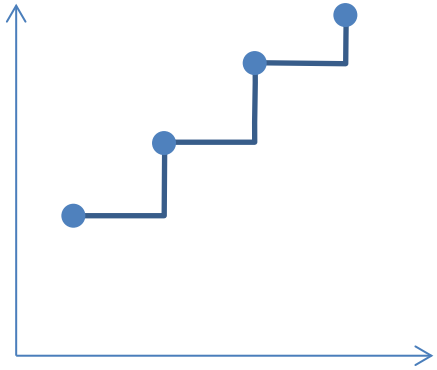
See change btwn points



Focus on area under curve



See size of change



Data visualization as story

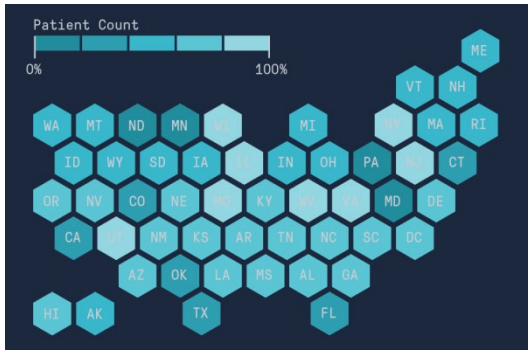
What kind of story does your data tell?

- Compare objects side by side
- Group things together
- Narrate a sequence of events
- Show membership
- Explain how things change
- Show how individuals are connected.

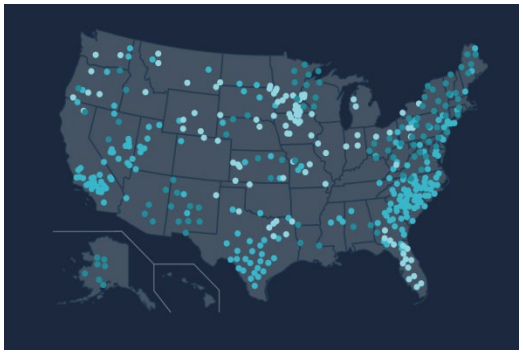
Kinds of maps

Choosing how you represent your data affects what the user will see and understand.

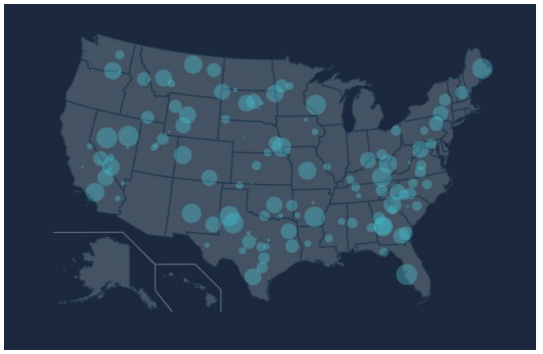
Tile map



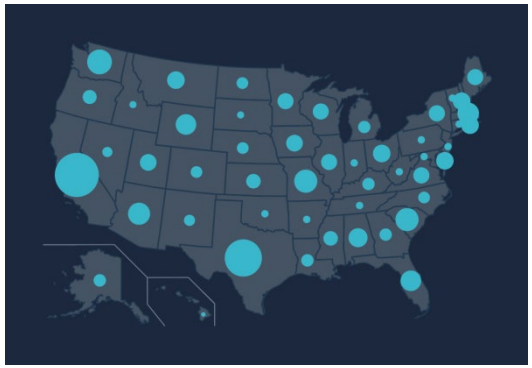
Point density map



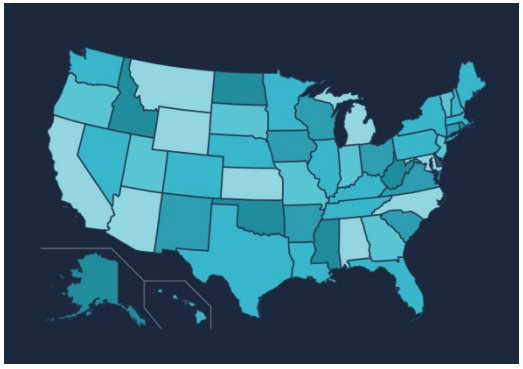
Scaled point map



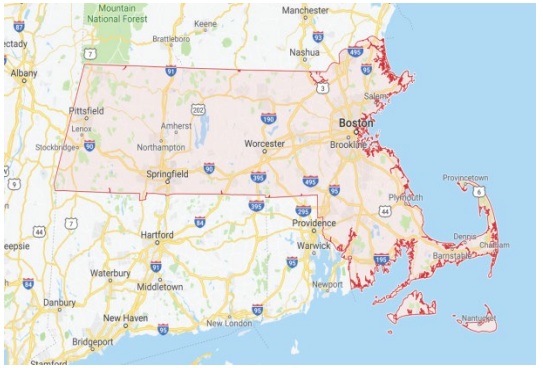
Dorling cartogram



Choropleth

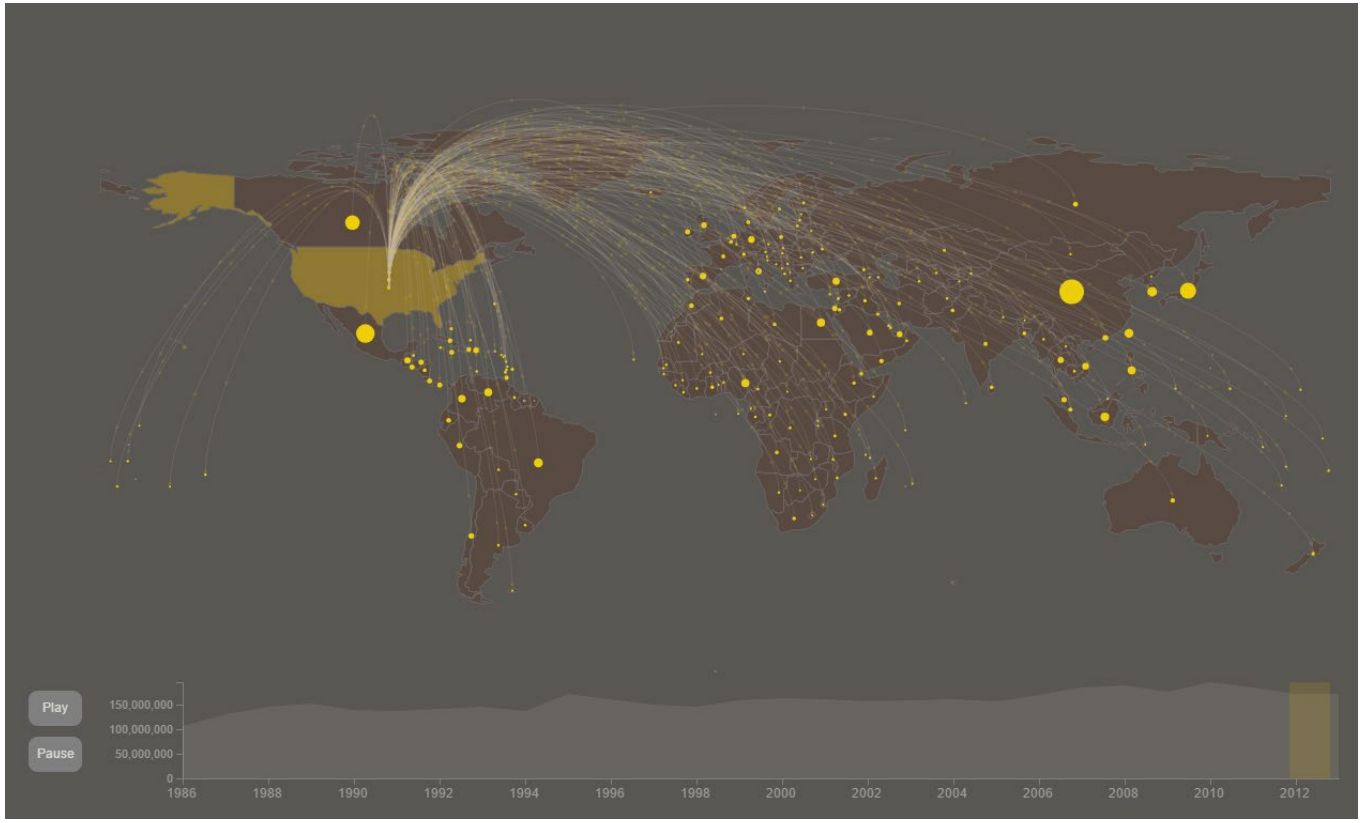


Navigation map



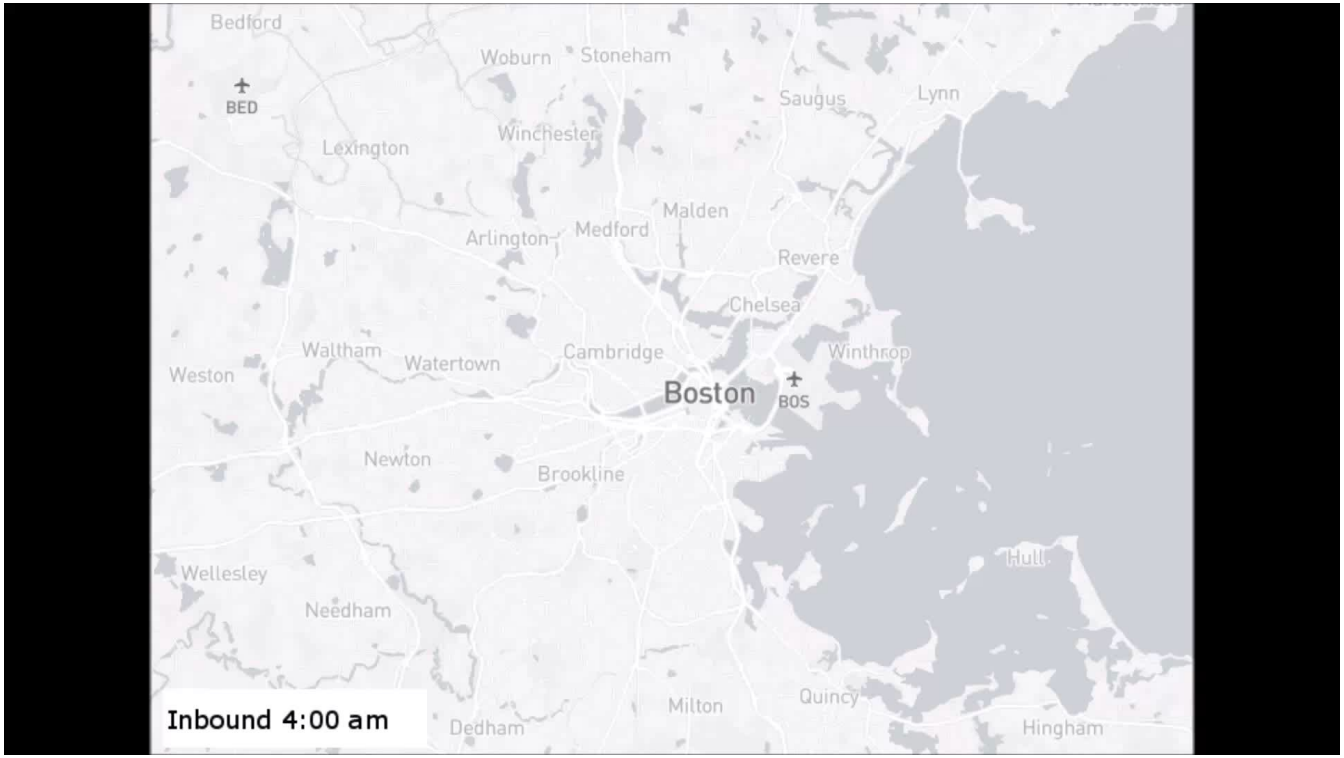
Companion or Linked Charts

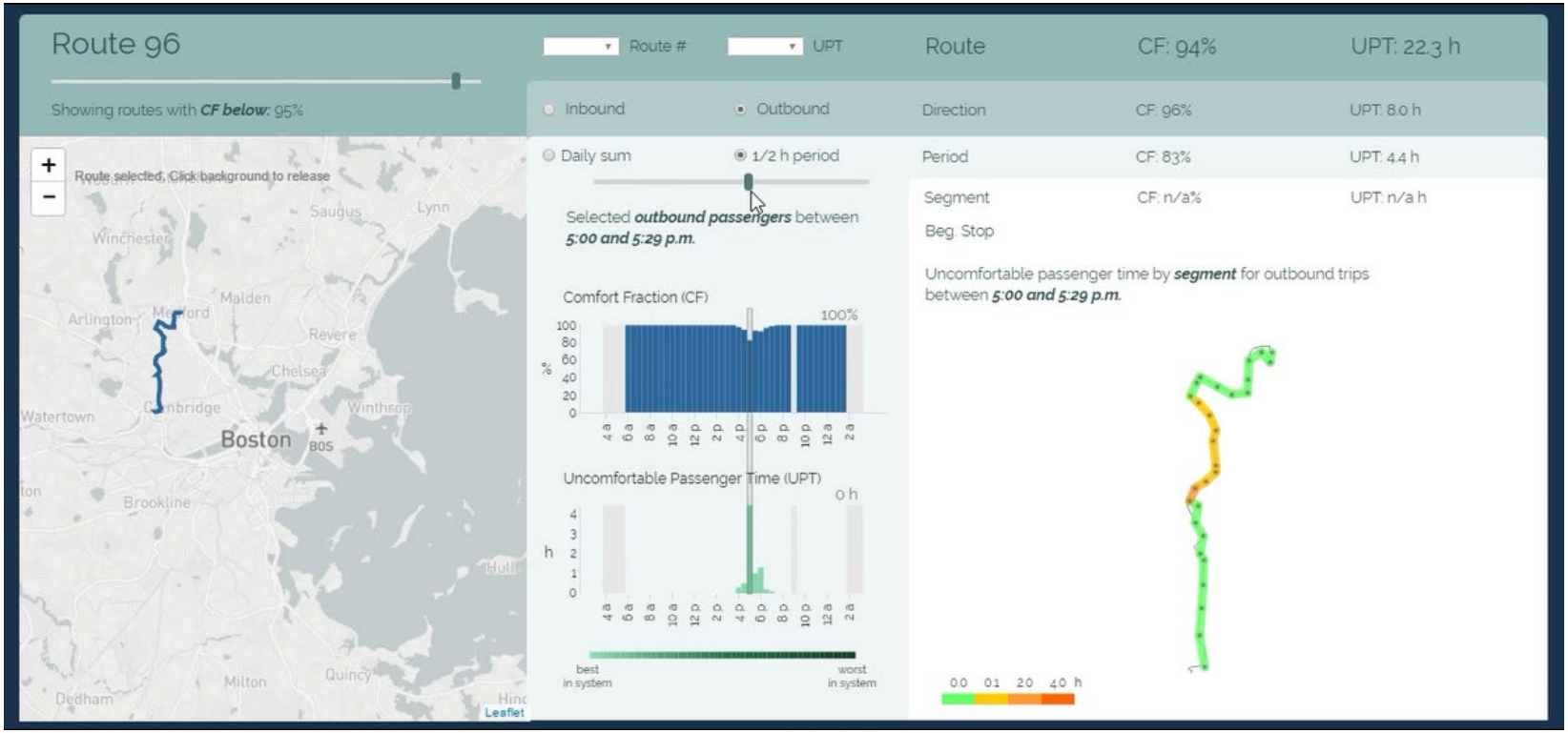
Combining a map with other charts can help to support a user task, while still creating a sense of geographic context.



Companion or Linked Charts - II

This map shows an overview of bus crowding in the MBTA system throughout the day.



Companion or Linked Charts - III

This dashboard visualization helps users navigate crowding data for the MBTA bus system, for various times throughout the day