Human BioMolecular Atlas: Maps and Macroscopes

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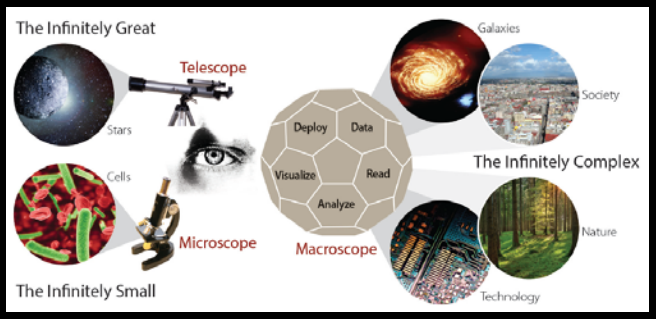
Indiana University, USA

Identifying Key Areas in a Human BioMolecular Atlas NIH Common Fund Planning WS
NIH Campus, Natcher Conference Center, Room D
June 15, 2016



Basic Approach

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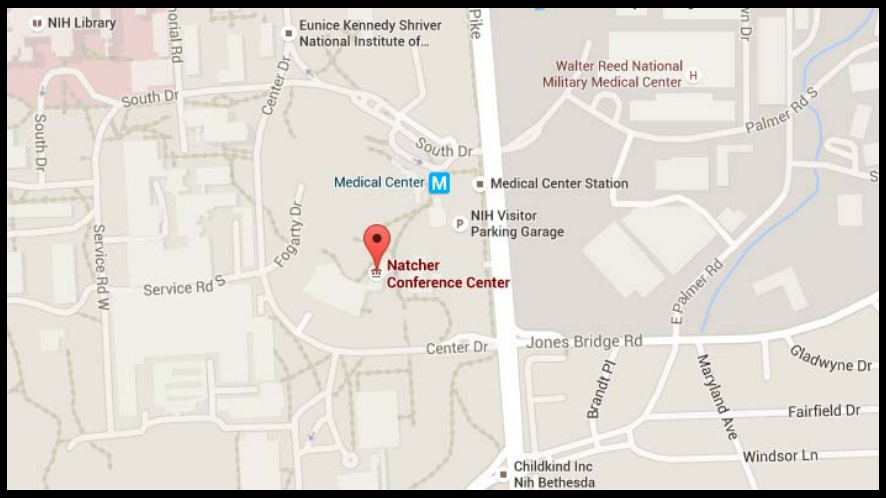
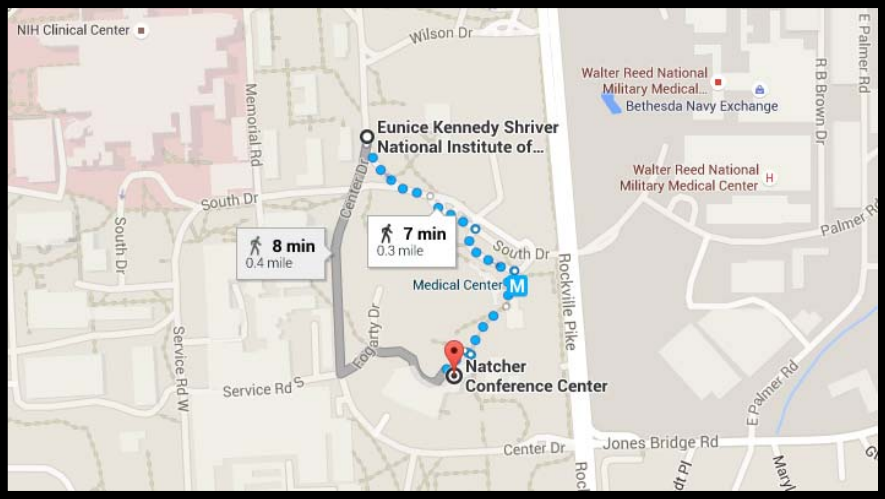
Basic Questions

Basemap vs. Data Overlay



Google map of current geolocation

Different Types of Data Overlays



Path from current geolocation to Eunice Kennedy Shriver

Mapping Data

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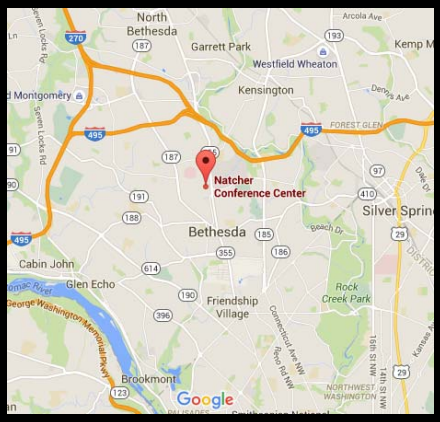
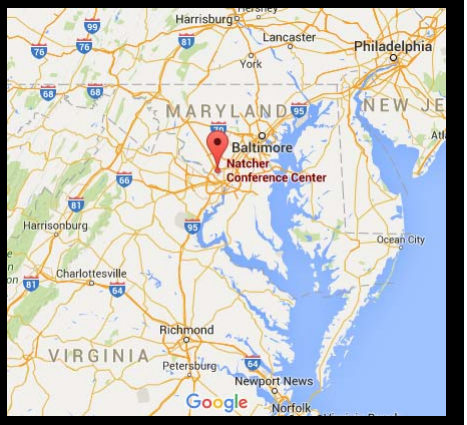
Interacting with Data

Multi-level: Micro to macro





Aim for constant information density.

Multi-resolution: Focus and context

By Fernando Vicente

Level of abstraction

By Fernando Vicente

Bodyworlds by Gunther von Hagens

Projections

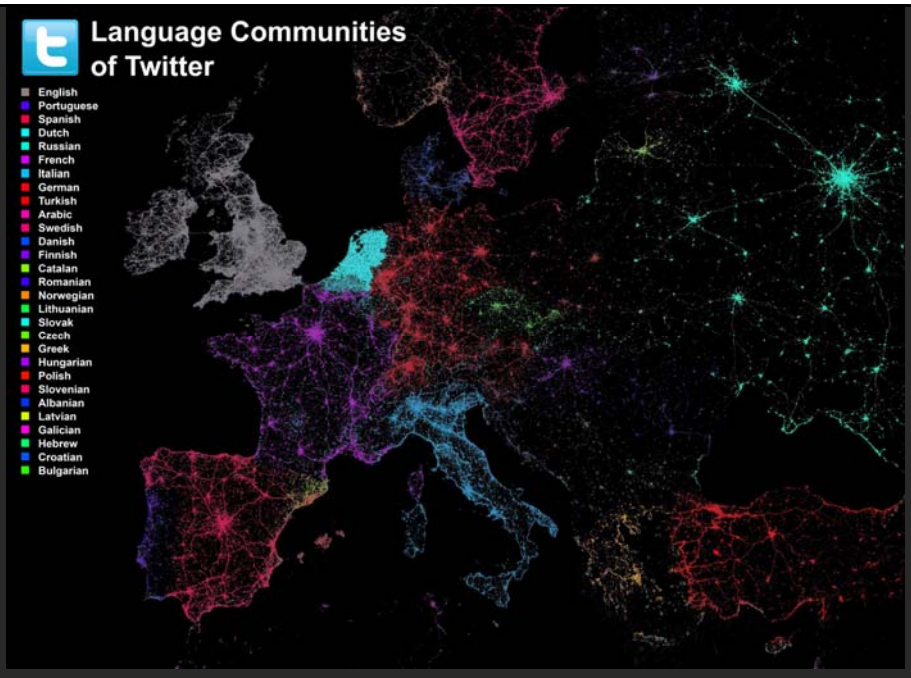
Dymaxion Map by B. Fuller

Bodyworlds by Gunther von Hagens

Seeing Patterns and Trends

&

Connecting Experts



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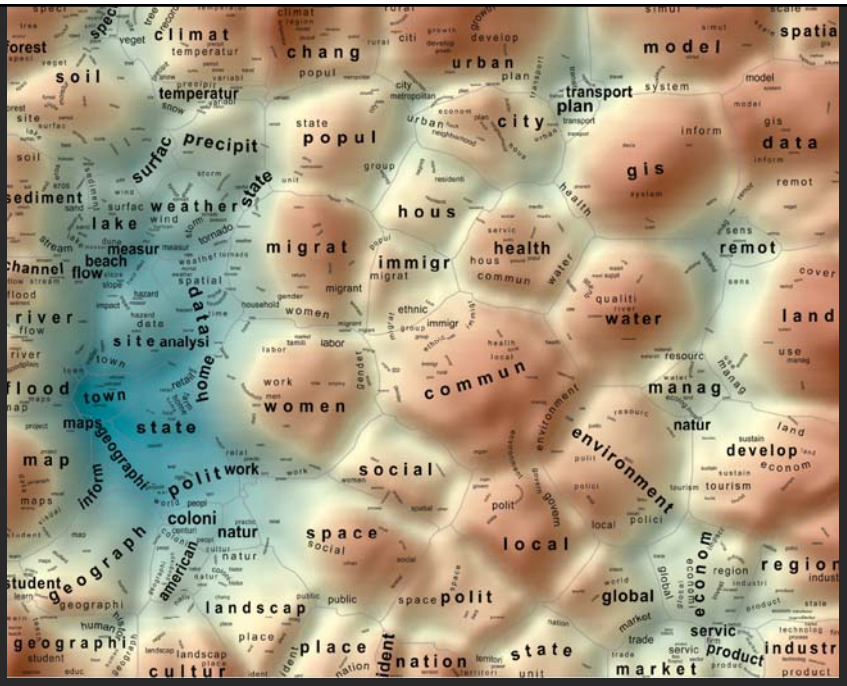
11



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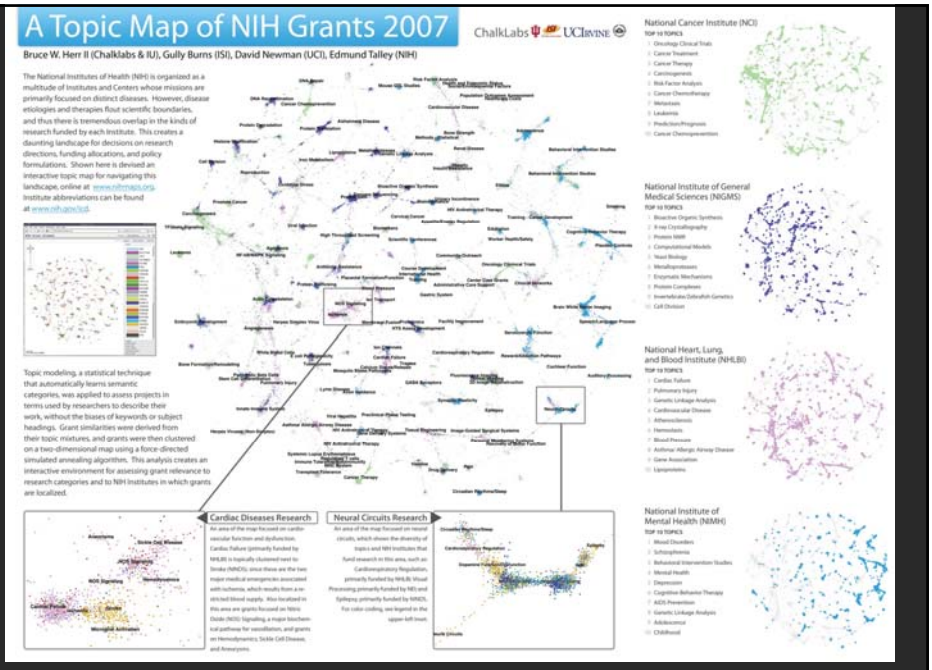

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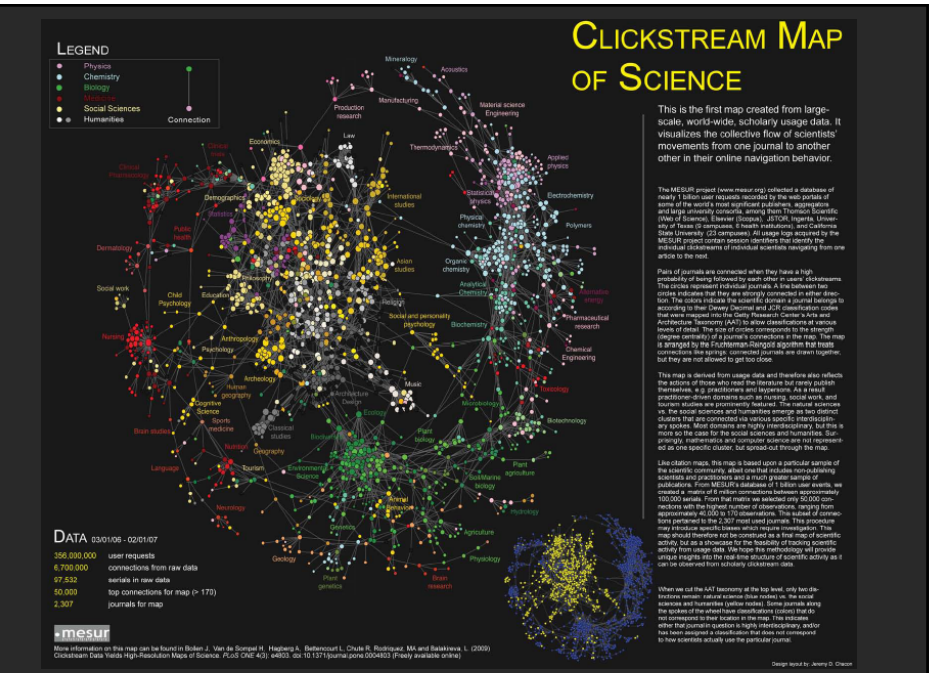

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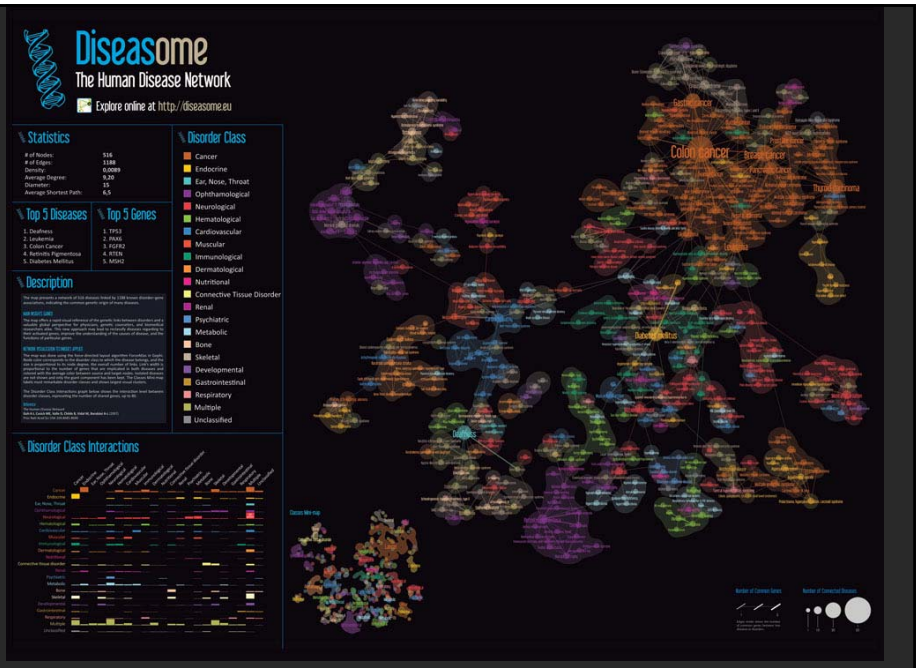

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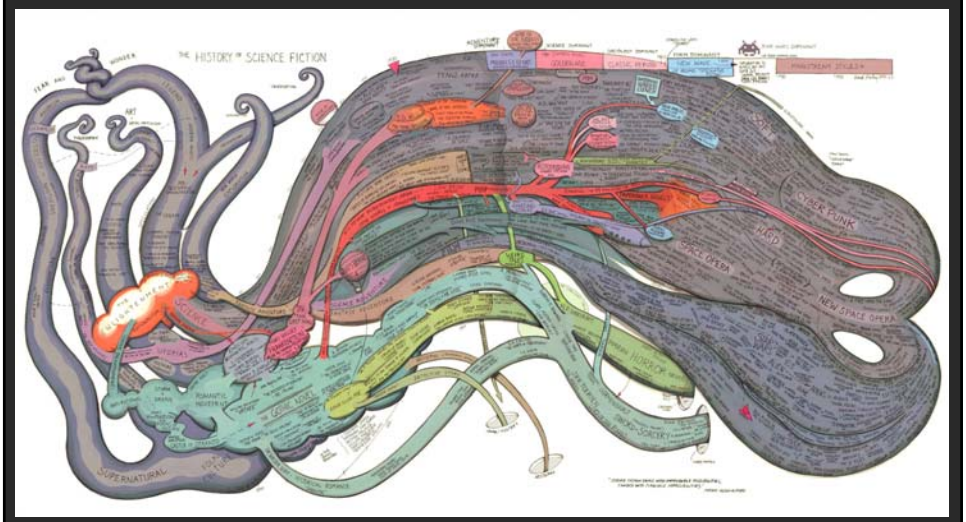

Ward Shelley . 2011. History of Science Fiction.

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Visualization Design

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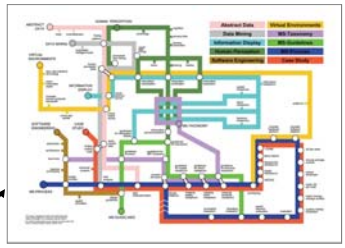
Interactivity Design

Different Question Types

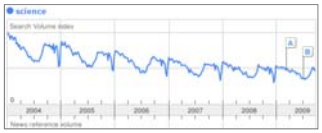
Terabytes of data

Descriptive & Predictive Models



Find your way

Find collaborators, friends



Identify trends

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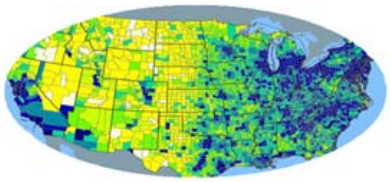
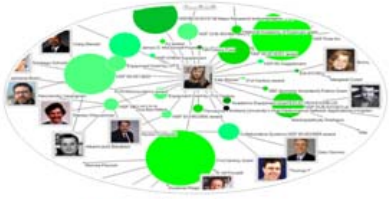
Different Levels of Abstraction/Analysis

Macro/Global
Population Level



Meso/Local
Group Level



Micro
Individual Level

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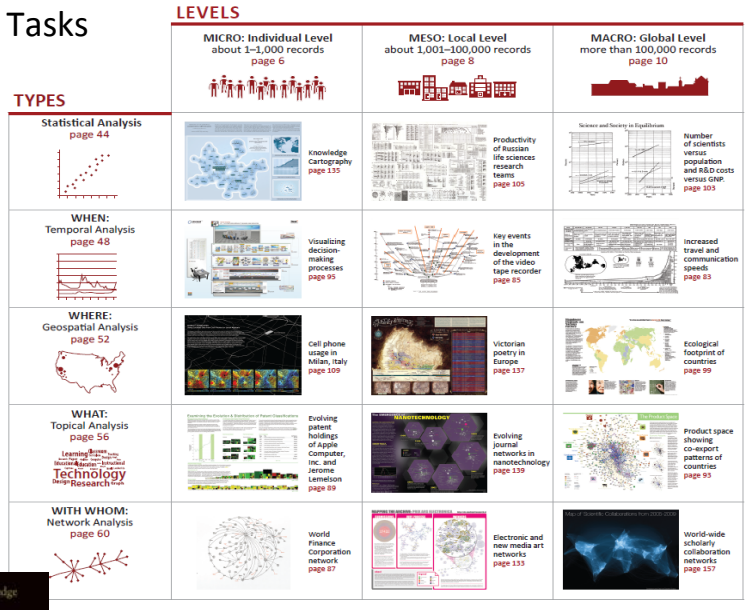
Tasks



See page 5

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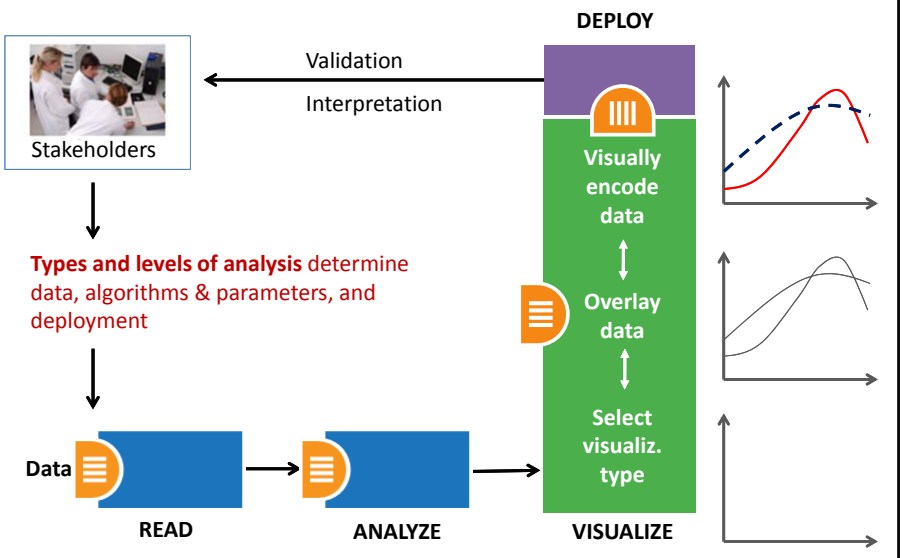
Needs-Driven Workflow Design



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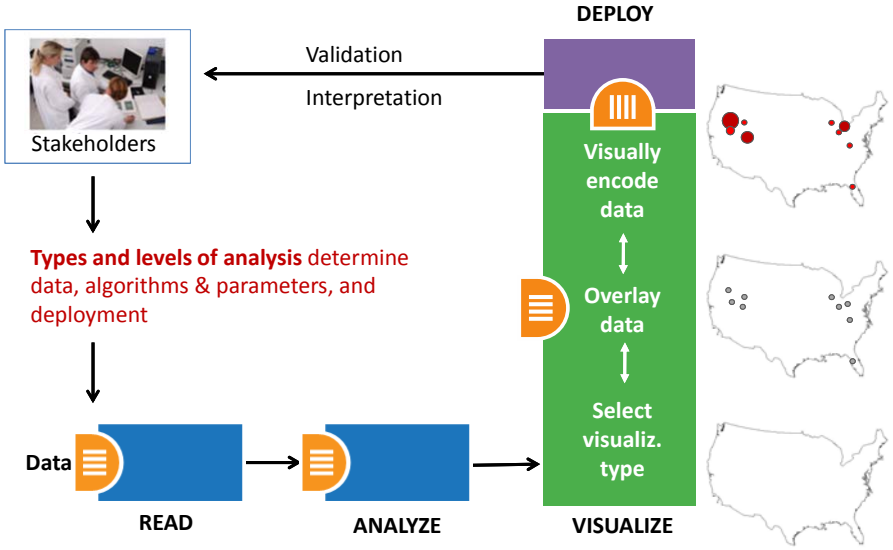
Needs-Driven Workflow Design



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Visualization Framework

Insight Need Types page 26	Data Scale Types page 28	Visualization Types page 30	Graphic Symbol Types page 32	Graphic Variable Types page 34	Interaction Types page 26
• categorize/cluster • order/rank/sort • distributions (also outliers, gaps) • comparisons • trends (process and time) • geospatial • compositions (also of text) • correlations/relationships	• nominal • ordinal • interval • ratio	• table • chart • graph • map • network layout	• geometric symbols point line area surface volume • linguistic symbols text numerals punctuation marks • pictorial symbols images icons statistical glyphs	• spatial position • retinal form color optics motion	• overview • zoom • search and locate • filter • details-on-demand • history • extract • link and brush • projection • distortion

See page 24

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Visualization Framework

Basic Task Types								
Bertin, 1967	Wehrend & Lewis, 1996	Few, 2004	Yau, 2011	Rendgen & Wiedemann, 2012	Frankel, 2012	Tool: Many Eyes	Tool: Chart Chooser	Börner, 2014
selection	categorize			category				categorize/ cluster
order	rank	ranking					table	order/rank/ sort
	distribution	distribution					distribution	distributions (also outliers, gaps)
	compare	nominal comparison & deviation	differences		compare and contrast	compare data values	comparison	comparisons
		time series	patterns over time	time	process and time	track rises and falls over time	trend	trends (process and time)
		geospatial	spatial relations	location		generate maps		geospatial
quantity		part-to-whole	proportions		form and structure	see parts of whole, analyze text	composition	compositions (also of text)
association	correlate	correlation	relationships	hierarchy		relations between data points	relationship	correlations/ relationships

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Visualization Framework

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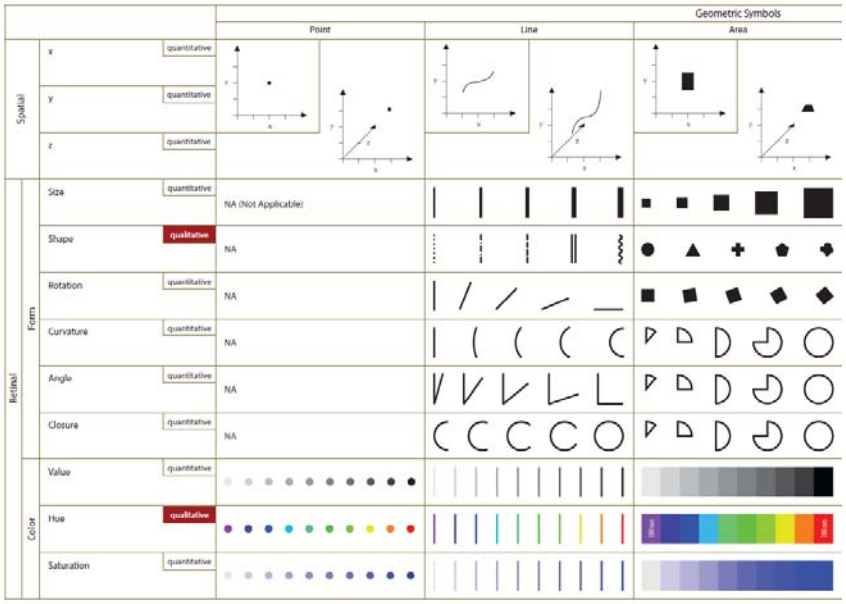
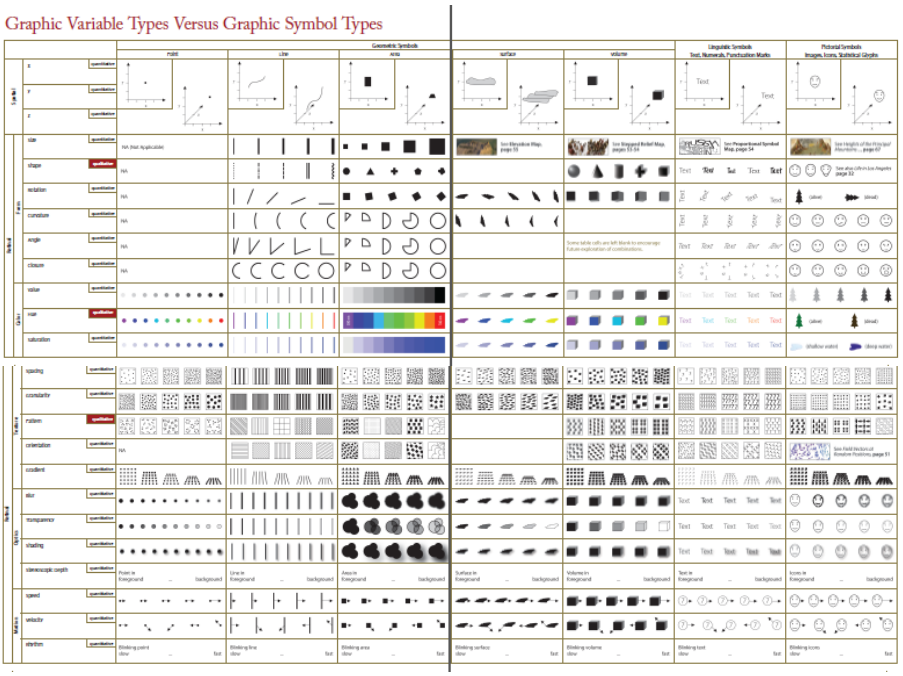
See page 24

Graphic Variable Types Versus Graphic Symbol Types





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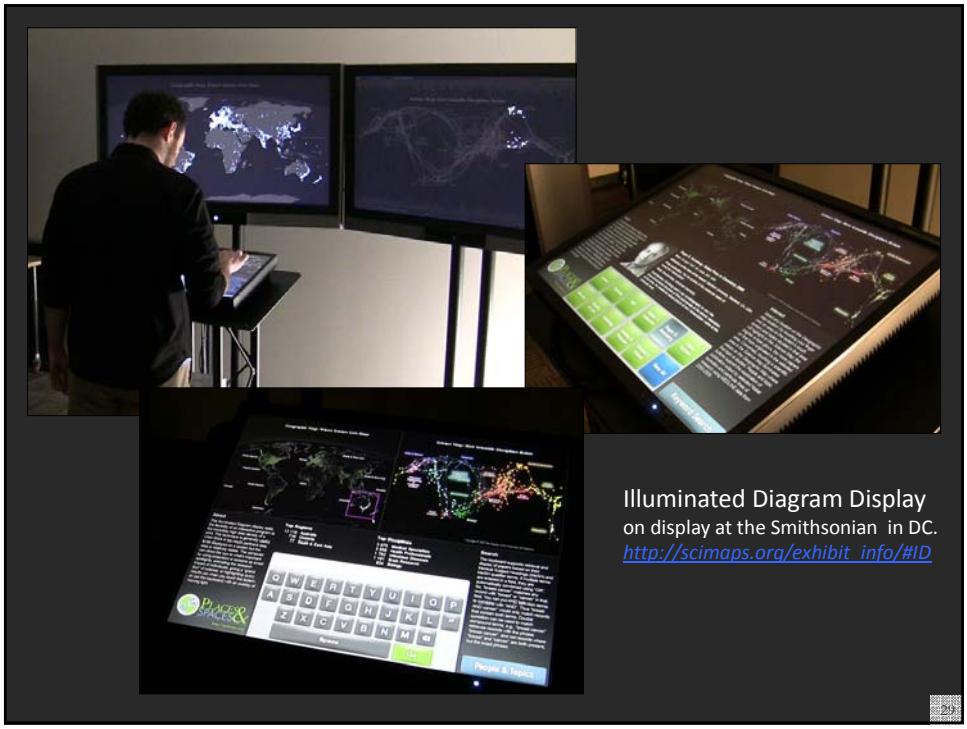
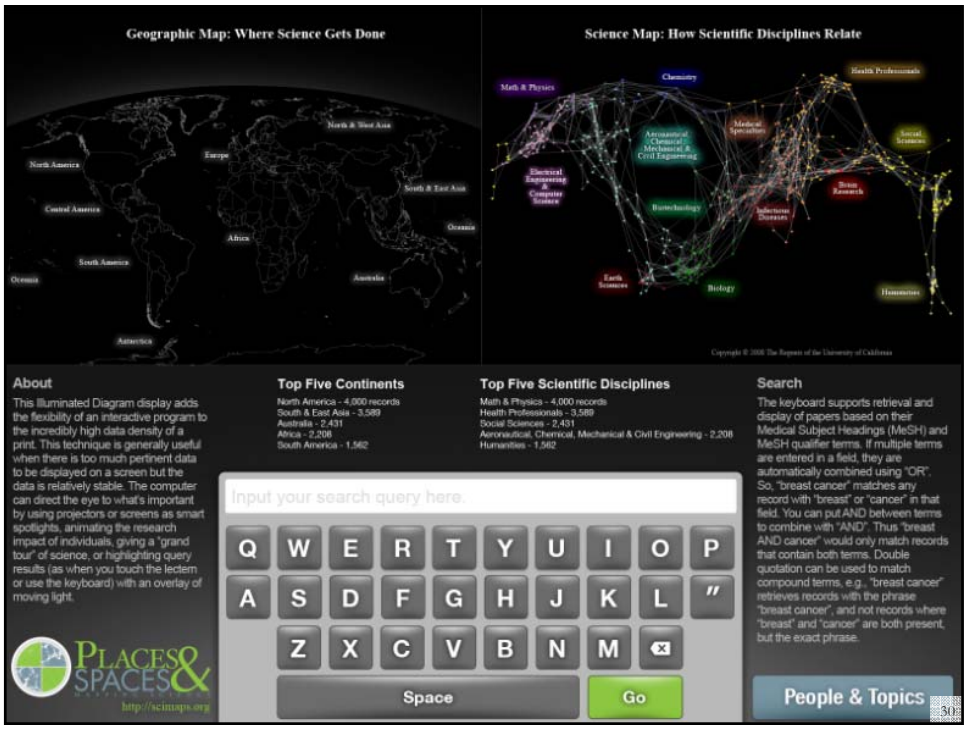
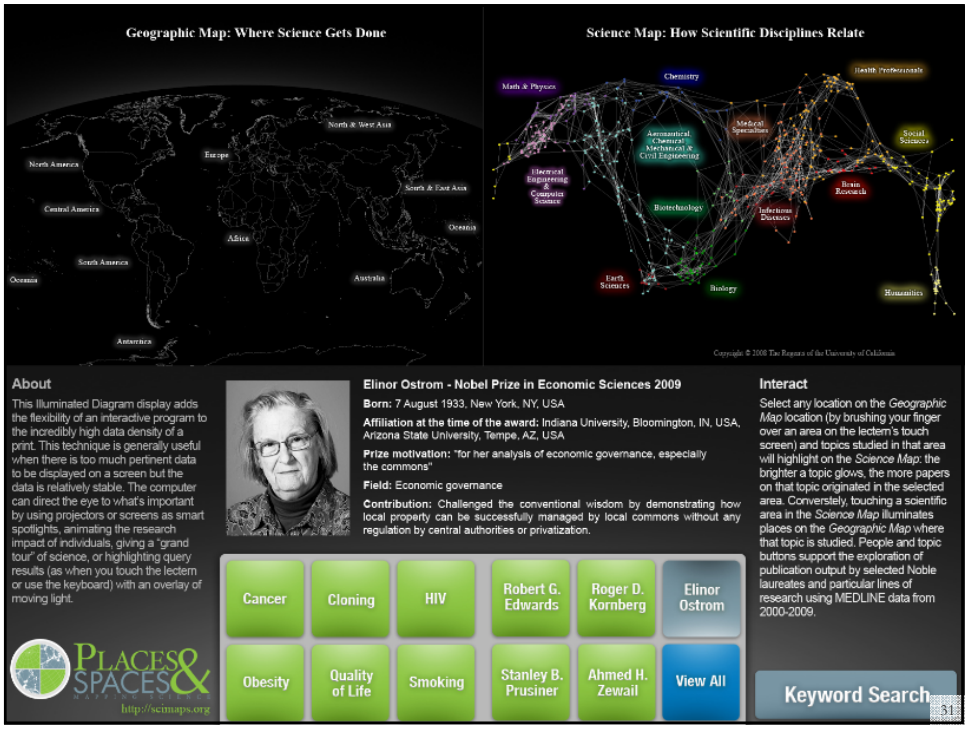


Illuminated Diagram Display
on display at the Smithsonian in DC.
http://scimaps.org/exhibit_info/#ID





Seeing for Action - Using Maps and Graphs to Protect the Public's Health.

CDC Opening Event: Maps of Health
Tutorial and Symposium

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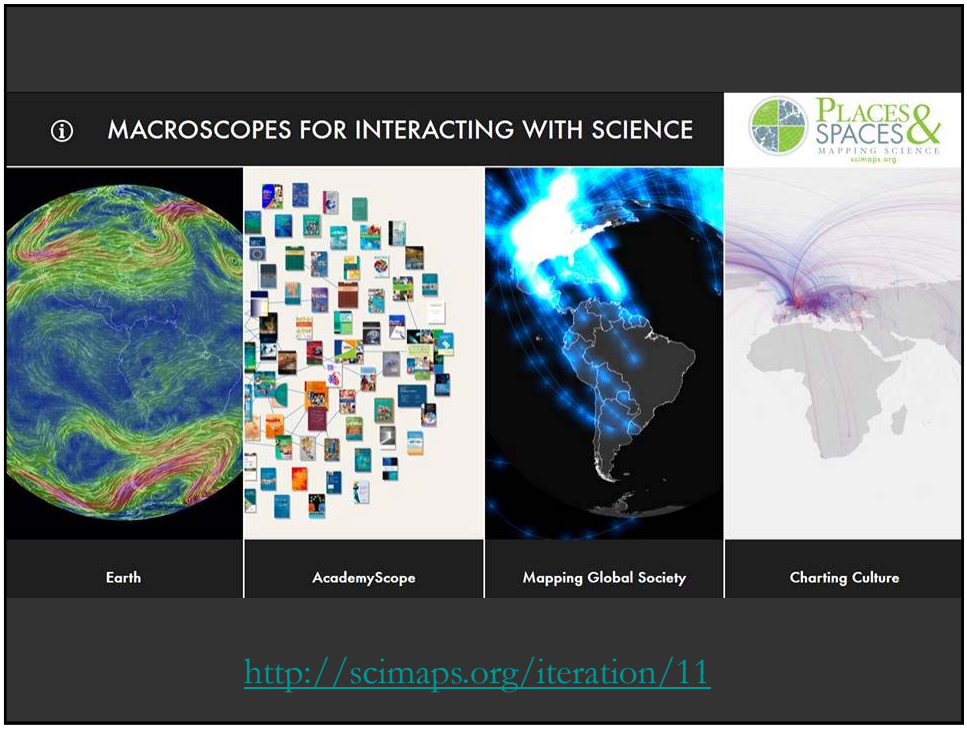
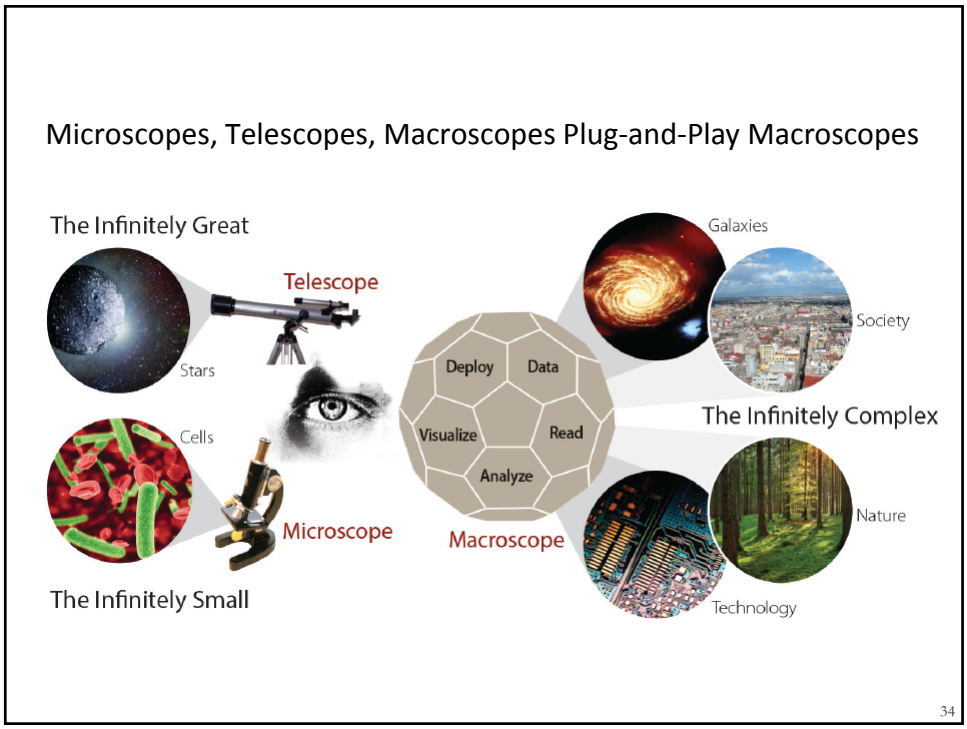
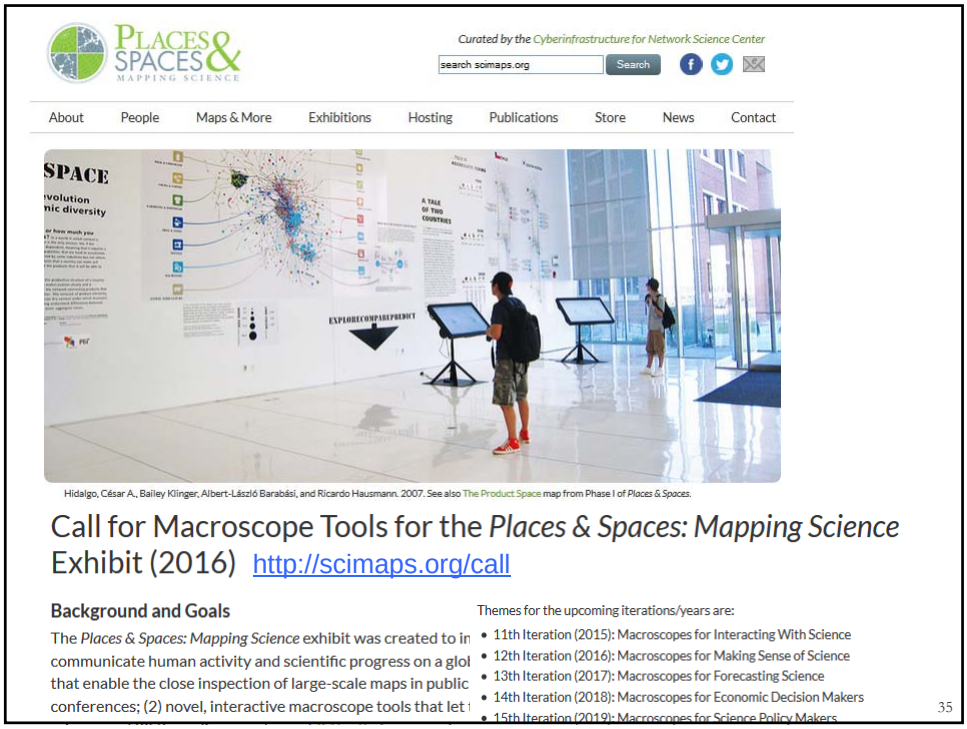

MACROSCOPES FOR INTERACTING WITH SCIENCE
PLACES & SPACES
MAPPING SCIENCE
Earth
AcademyScope
Mapping Global Society
Charting Culture
http://scimaps.org/iteration/11


Microscopes, Telescopes, Macroscopes Plug-and-Play Macroscopes
The Infinitely Great
Telescope
Stars
Cells
Microscope
The Infinitely Small
Deploy
Data
Visualize
Read
Analyze
Macroscope
Galaxies
Society
The Infinitely Complex
Nature
Technology
34



Hidalgo, César A., Bailey Klinger, Albert-László Barabási, and Ricardo Hausmann. 2007. See also The Product Space map from Phase I of *Places & Spaces*.

Call for Macroscope Tools for the *Places & Spaces: Mapping Science* Exhibit (2016) http://scimaps.org/call

Background and Goals

The *Places & Spaces: Mapping Science* exhibit was created to in
communicate human activity and scientific progress on a glol
that enable the close inspection of large-scale maps in public
conferences; (2) novel, interactive macroscope tools that let

Themes for the upcoming iterations/years are:

- 11th Iteration (2015): Macroscopes for Interacting With Science
- 12th Iteration (2016): Macroscopes for Making Sense of Science
- 13th Iteration (2017): Macroscopes for Forecasting Science
- 14th Iteration (2018): Macroscopes for Economic Decision Makers
- 15th Iteration (2019): Macroscopes for Science Policy Makers

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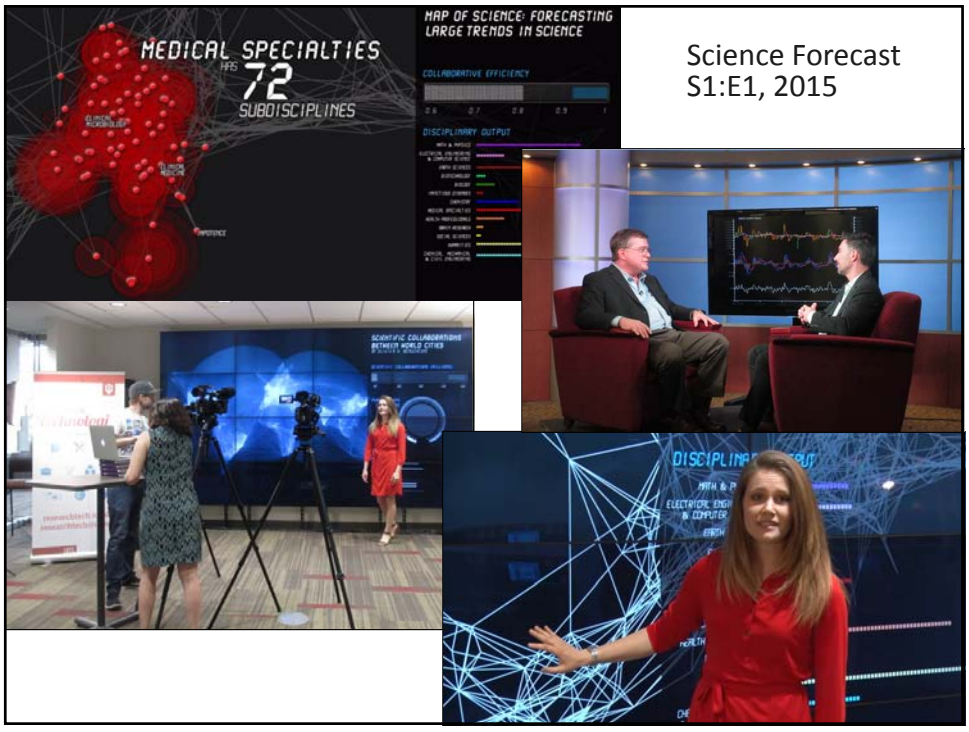

Science Forecast
S1:E1, 2015

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All papers, maps, tools, talks, press are linked from http://cns.iu.edu
These slides will soon be at http://cns.iu.edu/docs/presentations

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