Science from Above

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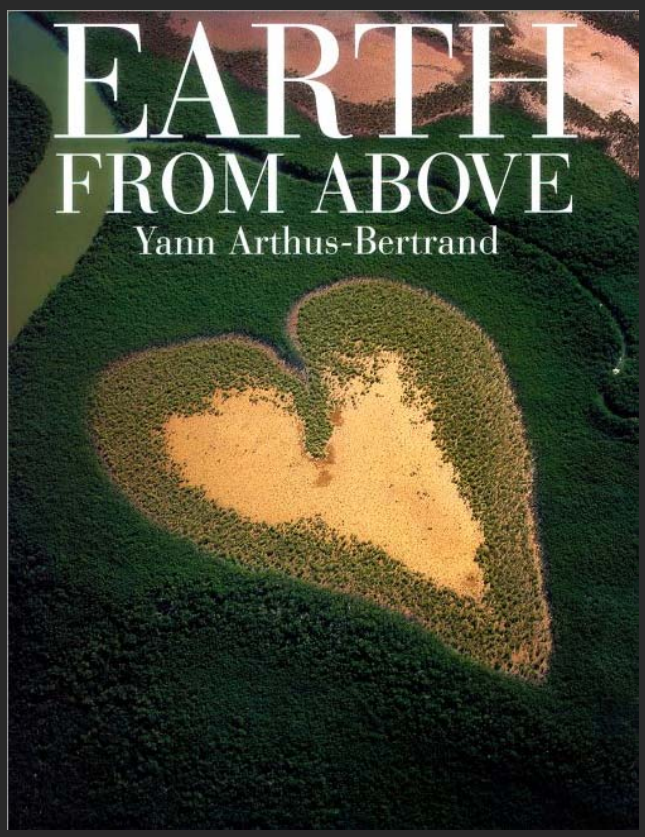
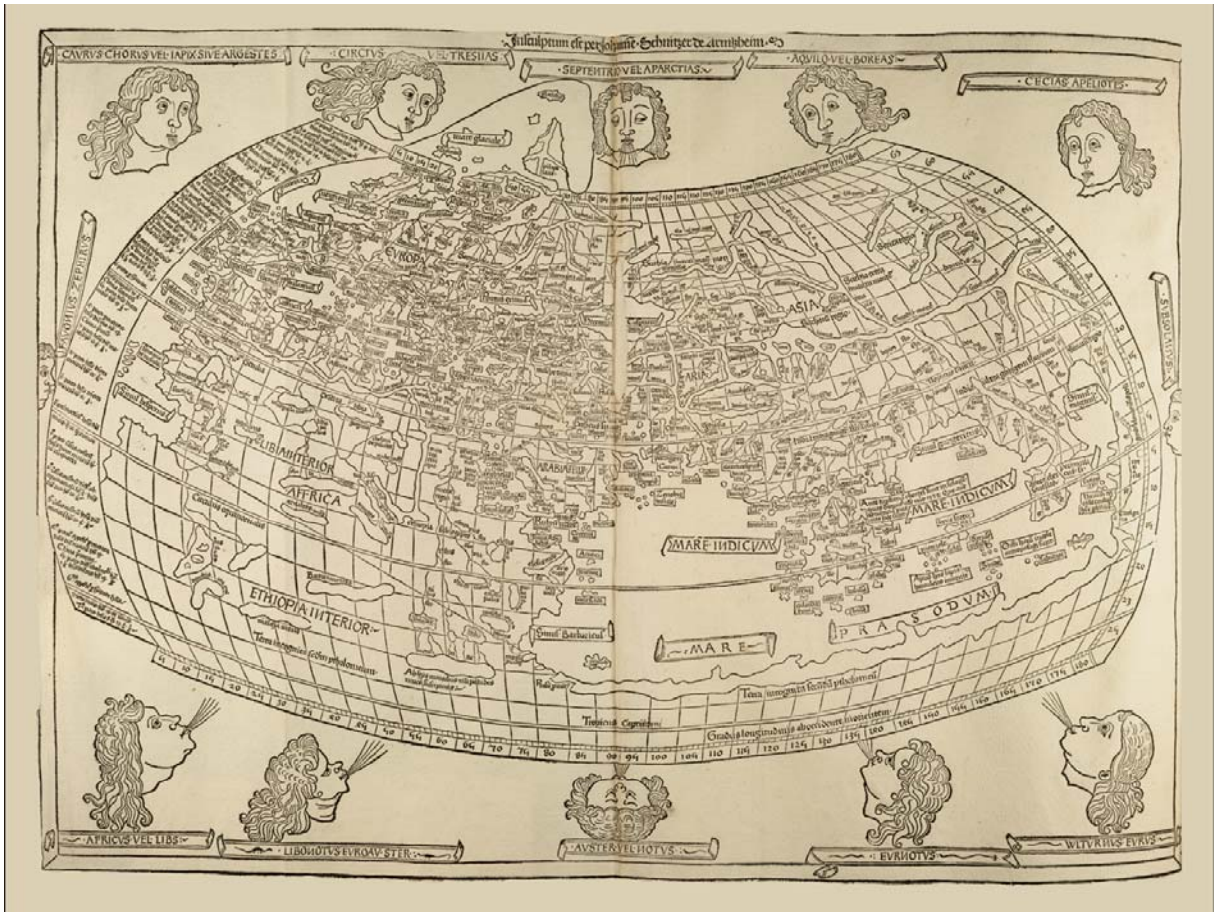
The 2009 North American Conference on Computing and Philosophy
NA-CAP@IU 2009: Networks and Their Philosophical Implications
Indiana University, Bloomington
June 15th, 2009



Cartographic maps of physical places have guided mankind's explorations for centuries.

They enabled the discovery of new worlds while also marking territories inhabited by the unknown.

Without maps, we would be lost.



Domain maps of abstract semantic spaces aim to serve today's explorers navigating the world of science.

These maps are generated through a scientific analysis of large-scale scholarly datasets in an effort to connect and make sense of the bits and pieces of knowledge they contain.

They can be used to identify objectively major research areas, experts, institutions, collections, grants, papers, journals, and ideas in a domain of interest. Science maps can provide overviews of "all-of-science" or of a specific area.

They can show homogeneity vs. heterogeneity, cause and effect, and relative speed. They allow us to track the emergence, evolution, and disappearance of topics and help to identify the most promising areas of research.

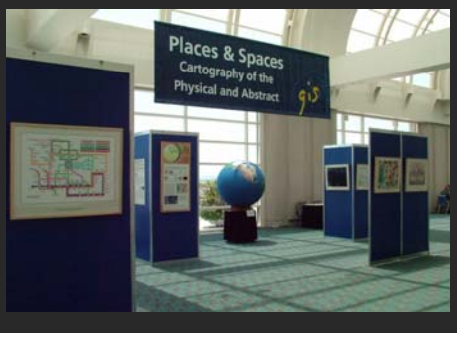
Places & Spaces: Mapping Science

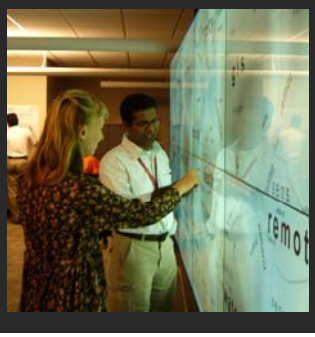
a science exhibit that introduces people to maps of sciences, their makers and users.

Exhibit Curators:

Dr. Katy Börner & Elisha Hardy

http://scimaps.org



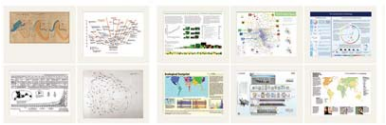


Mapping Science Exhibit – 10 Iterations in 10 years

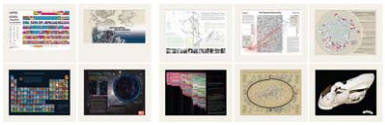
http://scimaps.org/

The Power of Maps (2005)

Science Maps for Economic Decision Makers (2008)



The Power of Reference Systems (2006)



Science Maps for Science Policy Makers (2009)

Science Maps for Scholars (2010)

Science Maps as Visual Interfaces to Digital Libraries (2011)

Science Maps for Kids (2012)

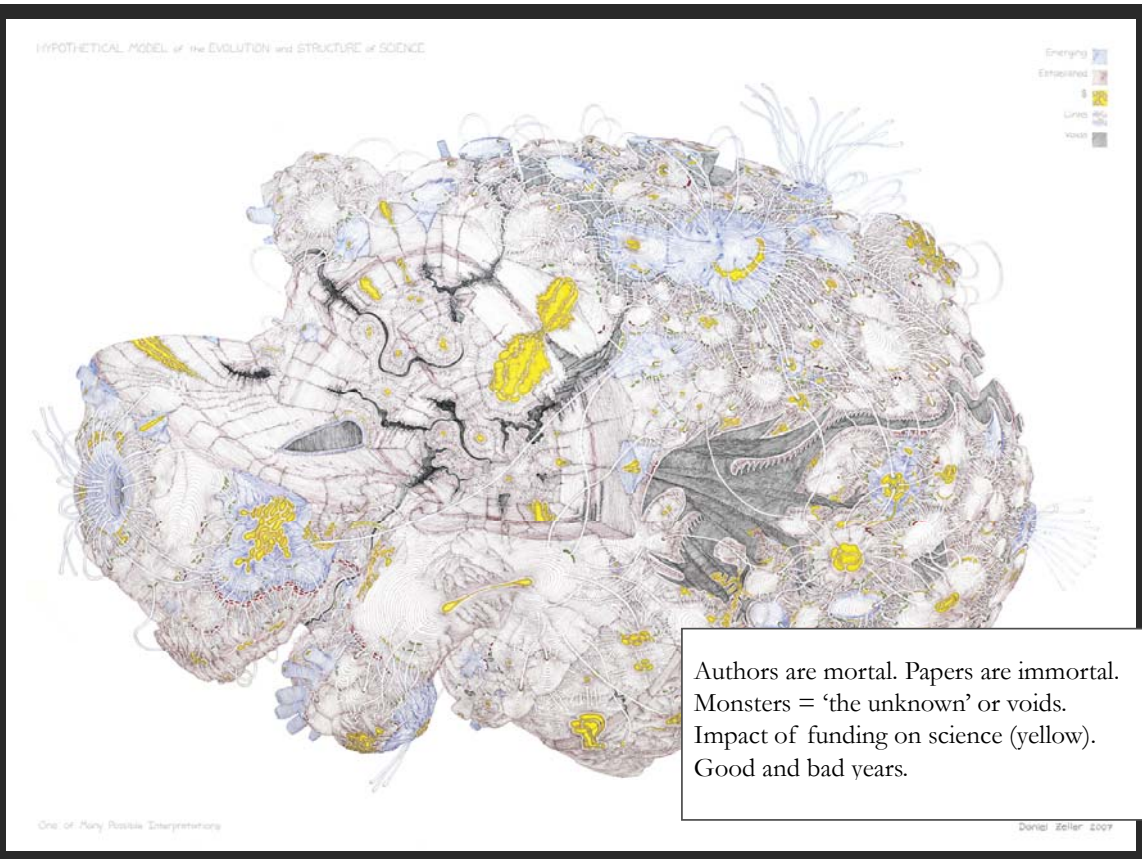
Science Forecasts (2013)

The Power of Forecasts (2007)

How to Lie with Science Maps (2014)

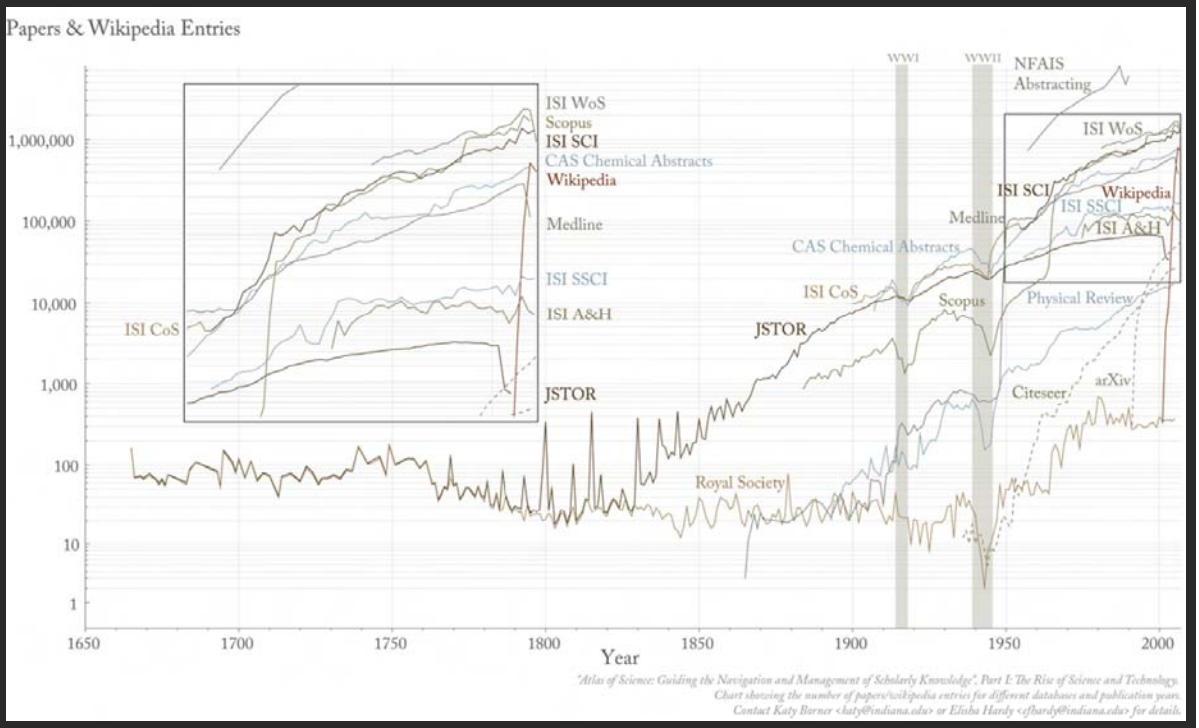
Exhibit has been shown in 52 venues on four continents. Also at
- NSF, 10th Floor, 4201 Wilson Boulevard, Arlington, VA.
- Chinese Academy of Sciences, China, May 17-Nov. 15, 2008.
- University of Alberta, Edmonton, Canada, Nov 10-Jan 31, 2009
- Center of Advanced European Studies and Research, Bonn, Germany, Dec. 11-19, 2008.

Debut of 5th Iteration of Mapping Science Exhibit at MEDIA X was on May 18, 2009 at Wallenberg Hall, Stanford University, *http://mediax.stanford.edu*, *http://scaleindependentthought.typepad.com/photos/scimaps*

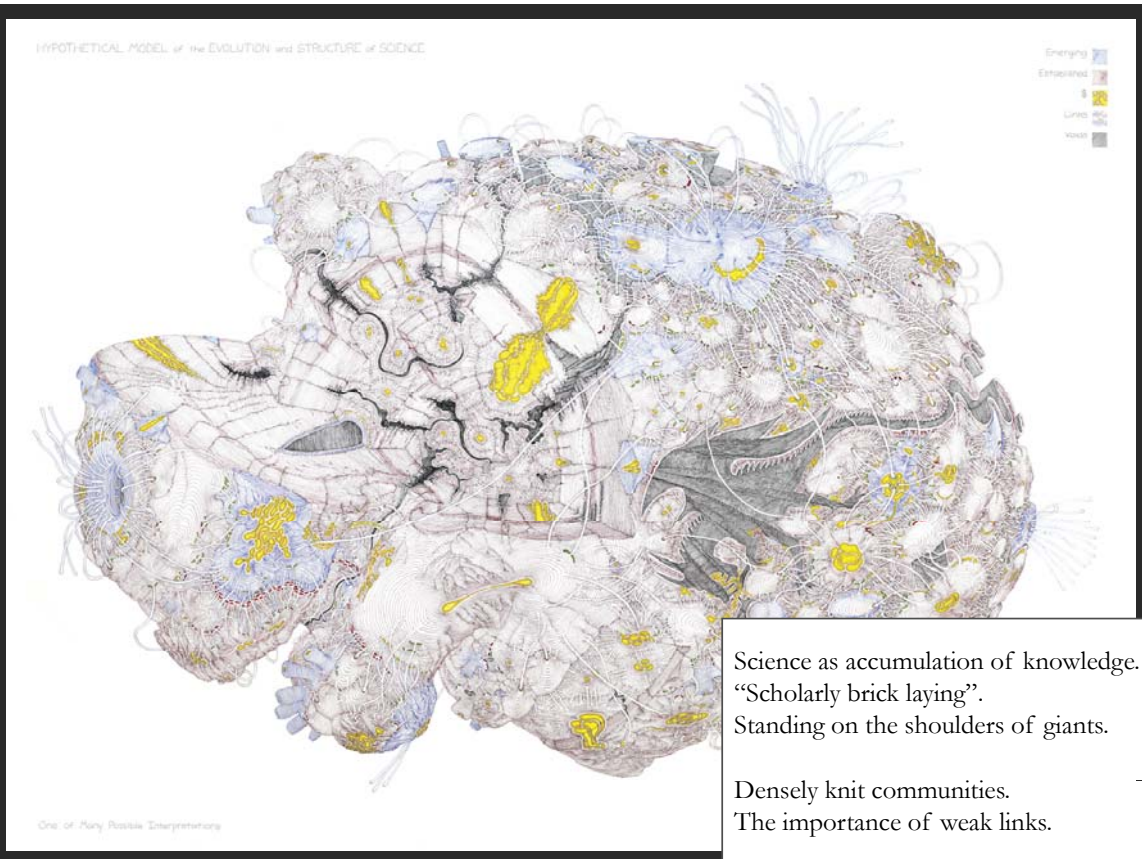


Authors are mortal. Papers are immortal.
Monsters = 'the unknown' or voids.
Impact of funding on science (yellow).
Good and bad years.

Hypothetical Model of the Evolution of Science - Daniel Zeller - 2007



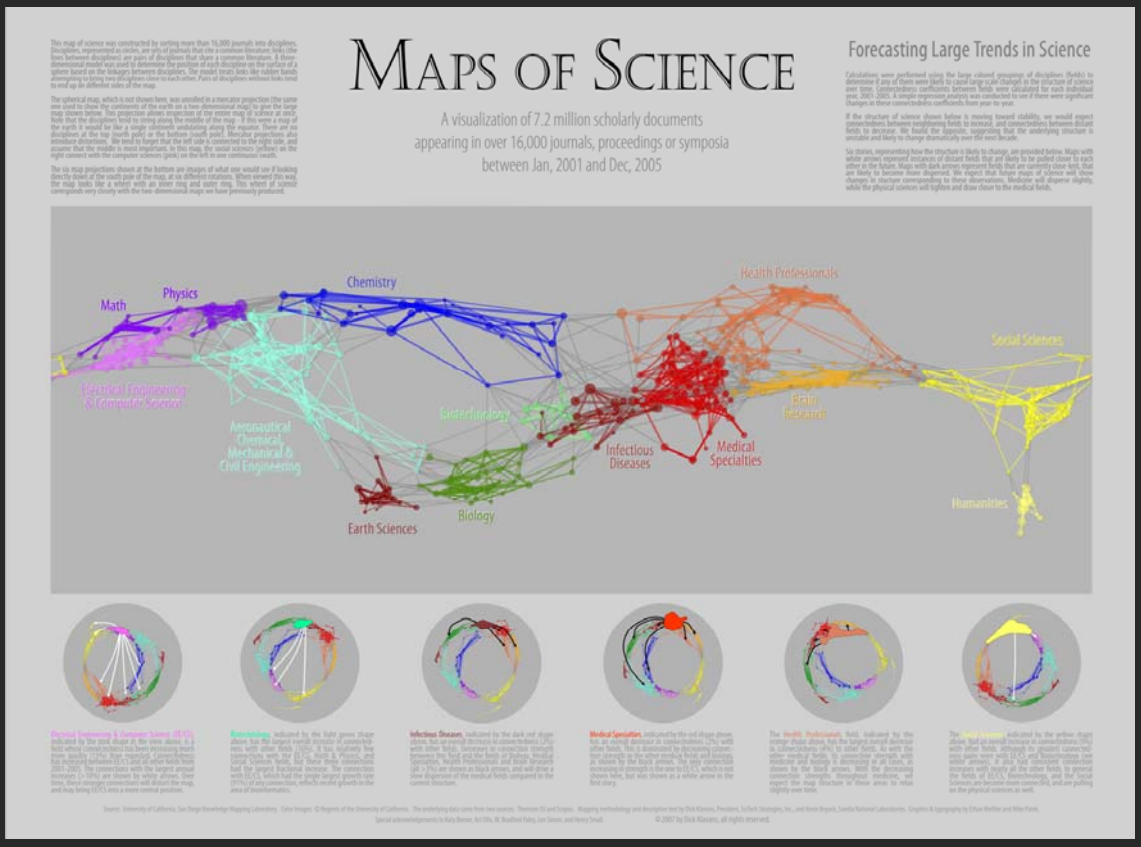
Atlas of Science - Katy Borner - 2010



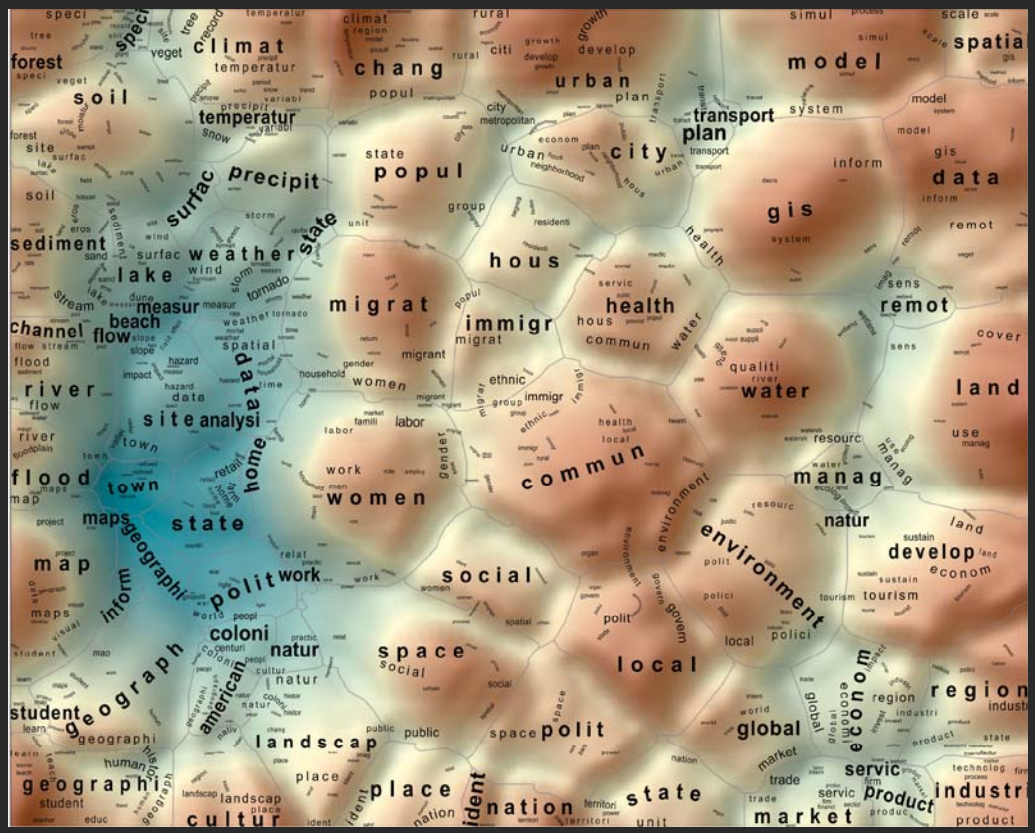
Science as accumulation of knowledge.
"Scholarly brick laying".
Standing on the shoulders of giants.

Densely knit communities.
The importance of weak links.

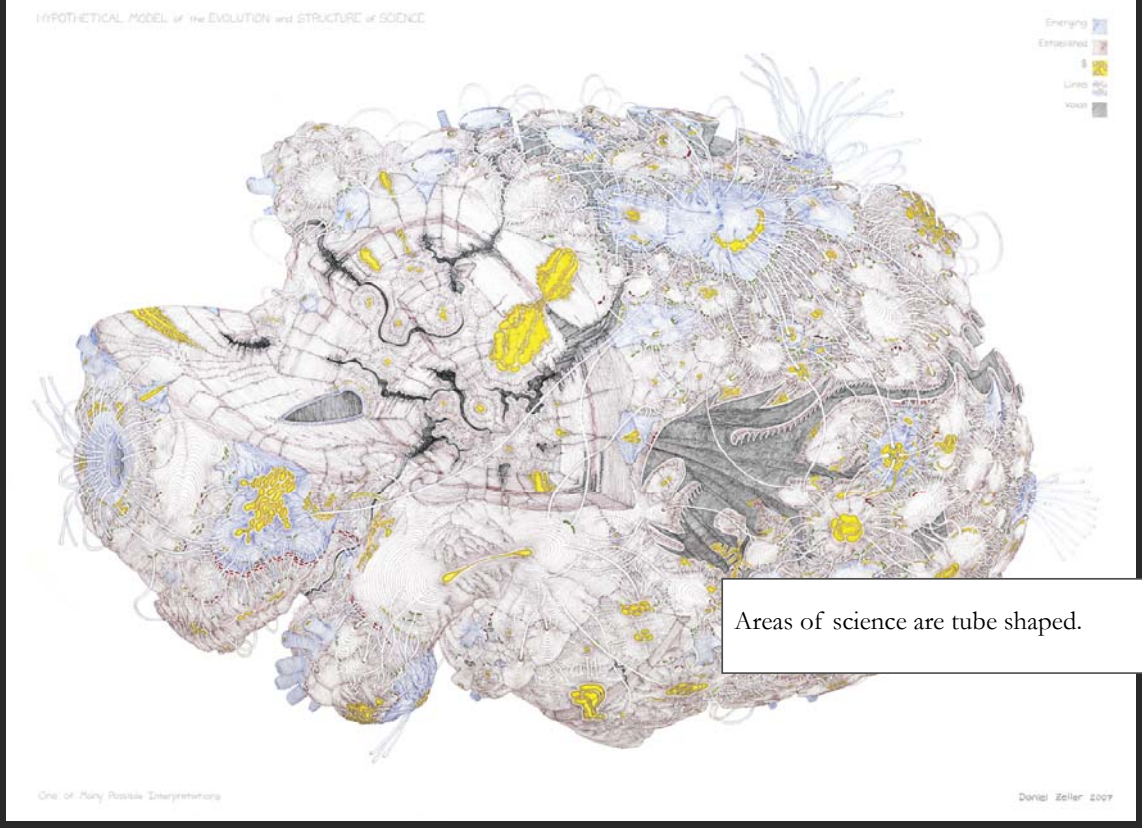
Hypothetical Model of the Evolution of Science - Daniel Zeller - 2007



Maps of Science: Forecasting Large Trends in Science - Richard Klavans, Kevin Boyack - 2007

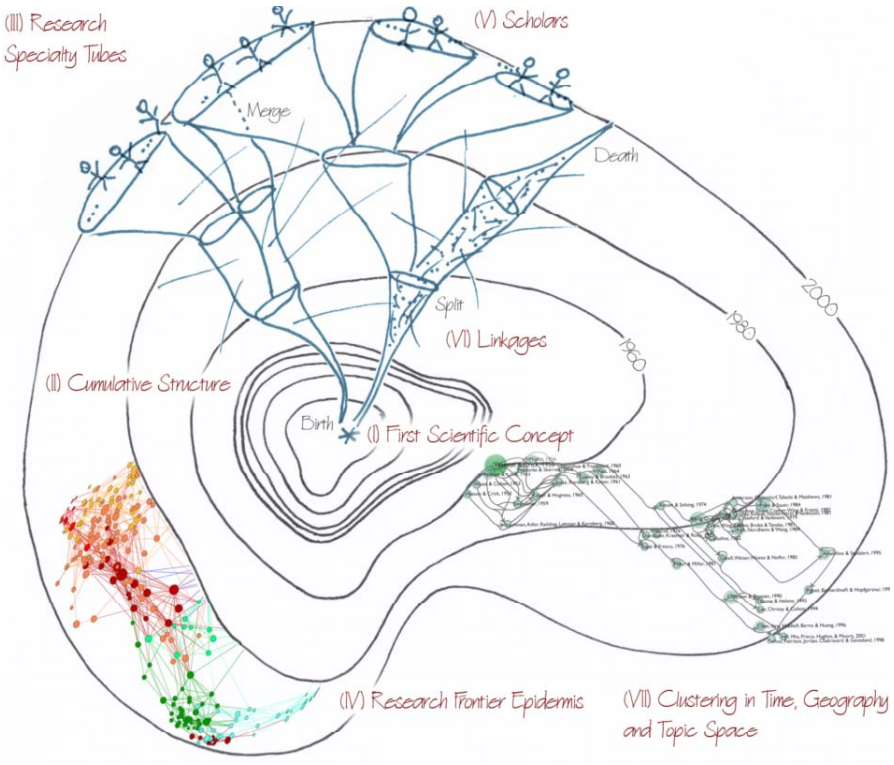


In Terms of Geography - Andre Skupin - 2005

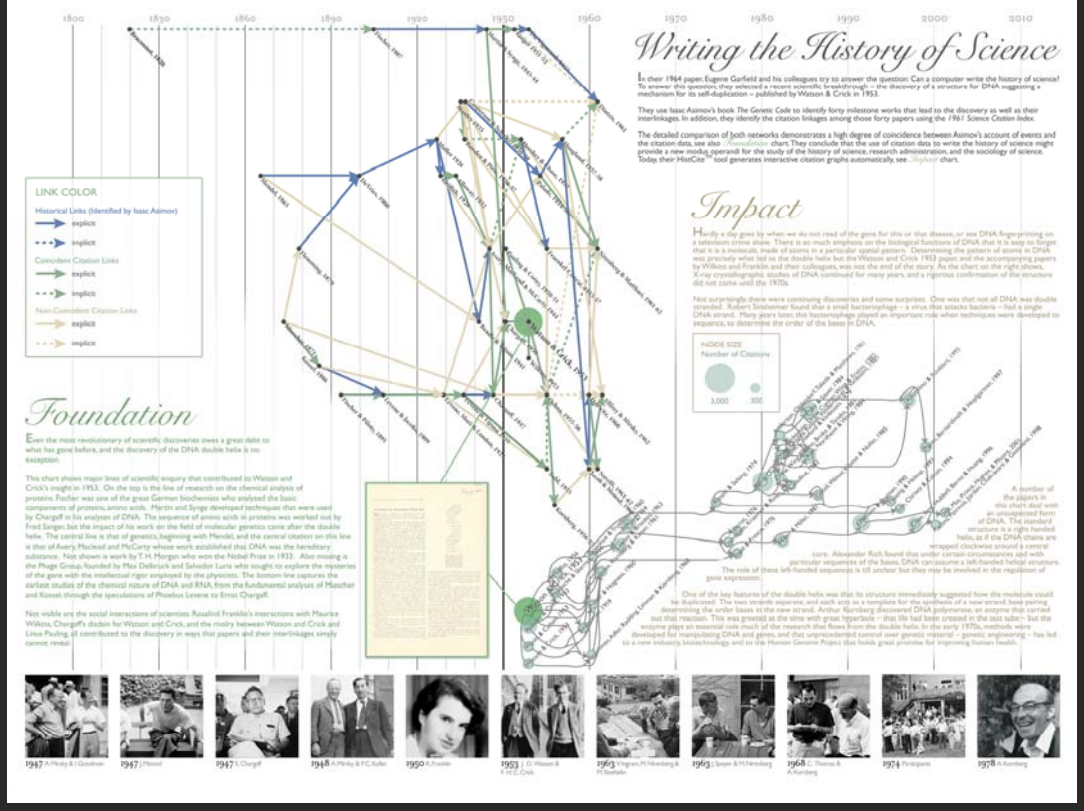


Areas of science are tube shaped.

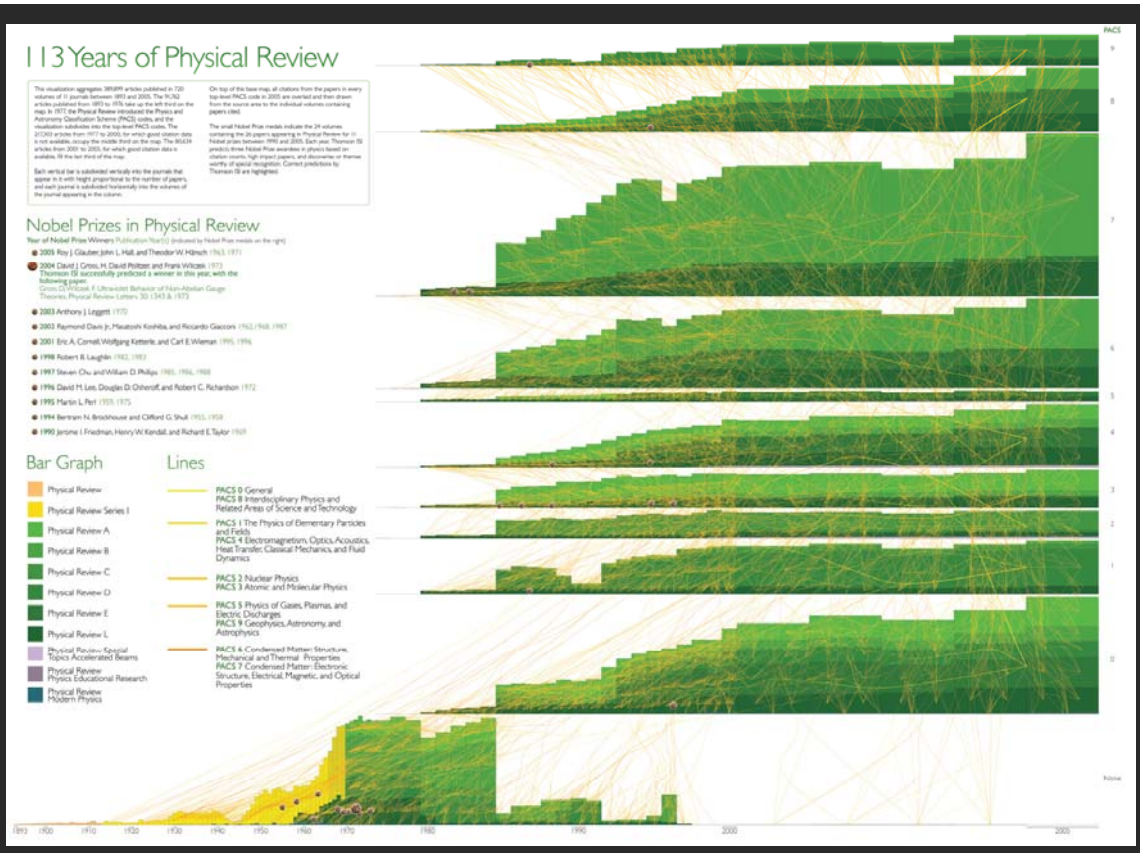
Hypothetical Model of the Evolution of Science - Daniel Zeller - 2007



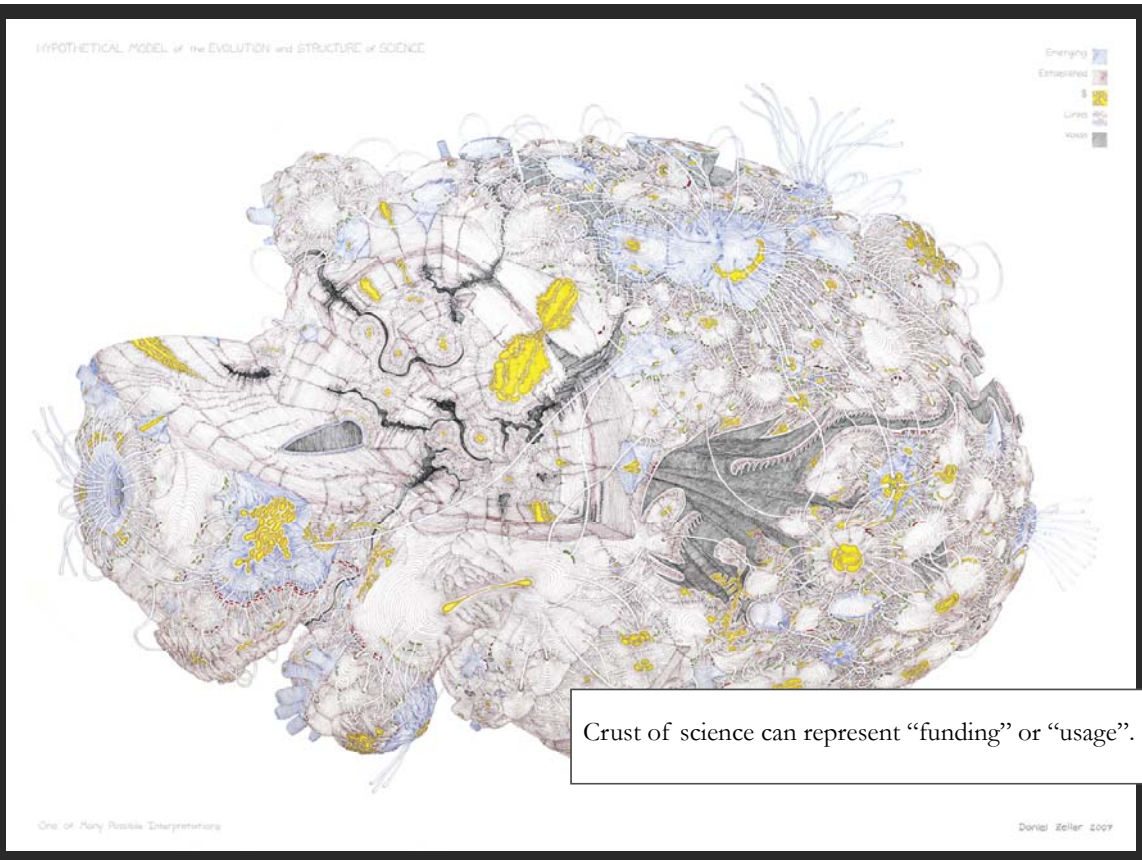
Atlas of Science - Katy Borner - 2010



HistCite™ Visualization of DNA Development - Eugene Garfield, Elisha Hardy, Katy Borner, Ludmila Pollock, Jan Witkowski- 2006

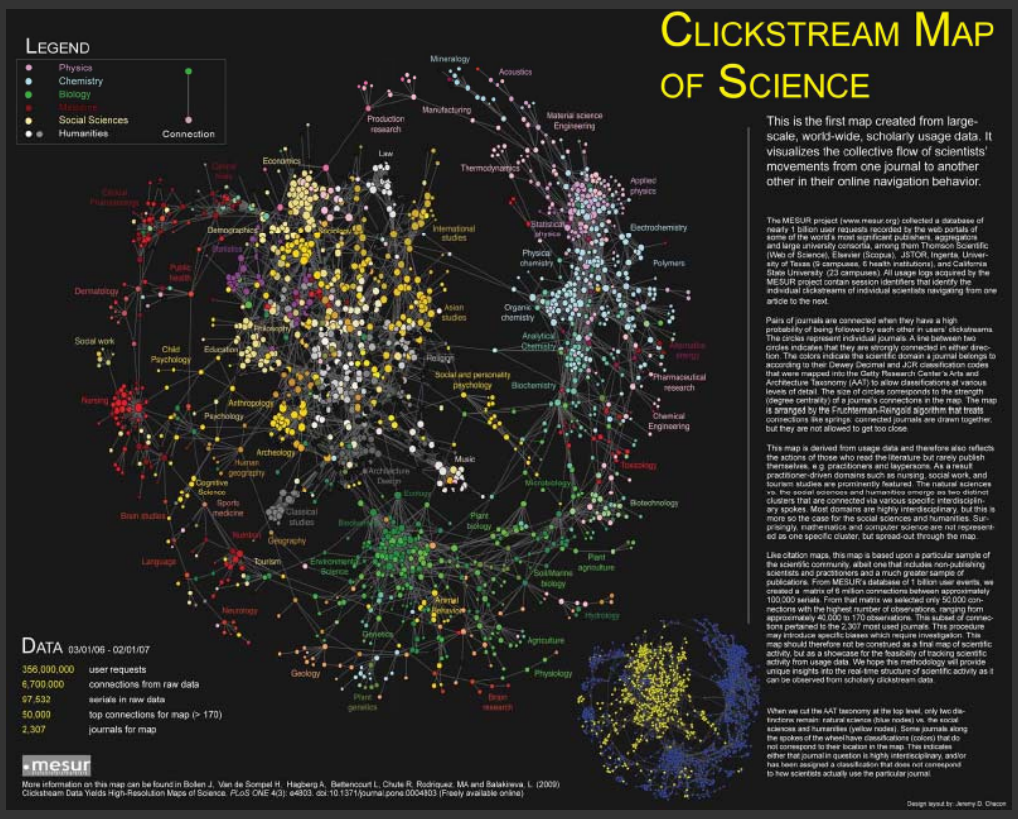


114 Years of Physical Review - Bruce W. Herr II, Russell Duhon, Katy Borner, Elisha Hardy, Shashikant Penumarthy - 2007

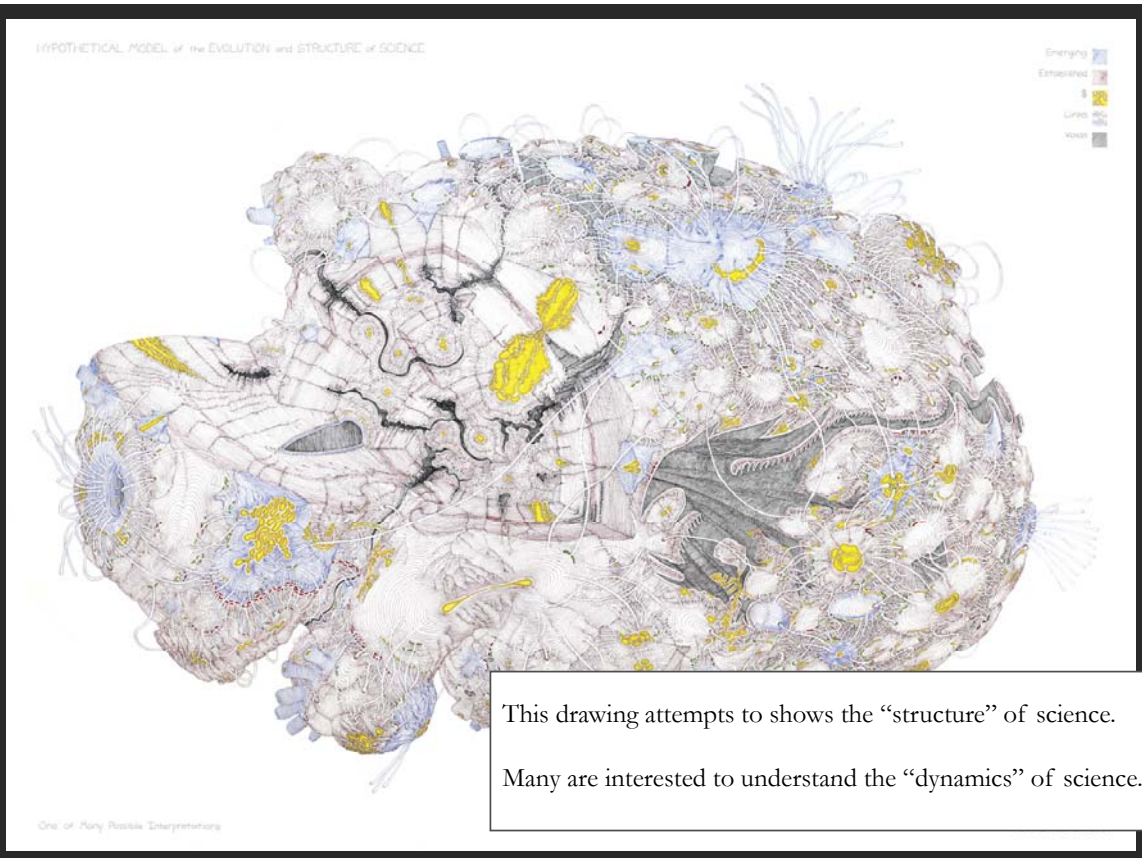


Crust of science can represent "funding" or "usage".

Hypothetical Model of the Evolution of Science - Daniel Zeller - 2007



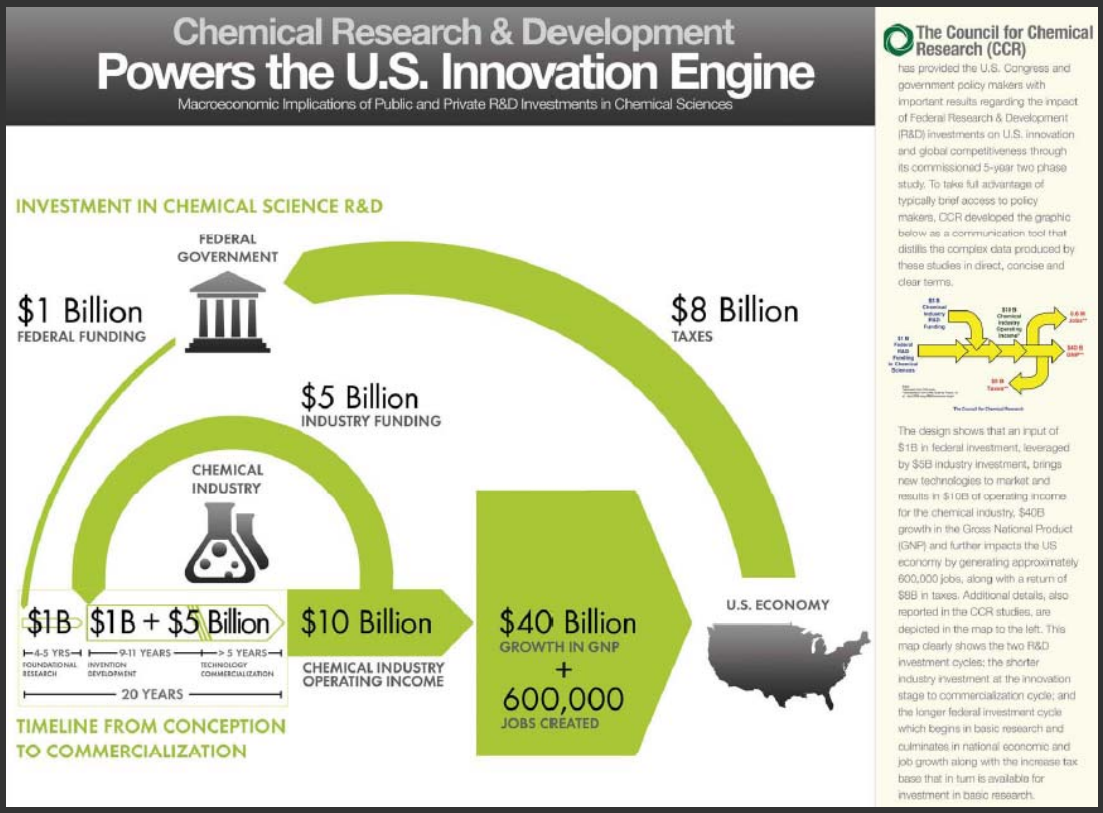
A Clickstream Map of Science – Bollen, Johan, Herbert Van de Sompel, Aric Hagberg, Luis M.A. Bettencourt, Ryan Chute, Marko A. Rodriquez, Lyudmila Balakireva - 2008



This drawing attempts to shows the "structure" of science.

Many are interested to understand the "dynamics" of science.

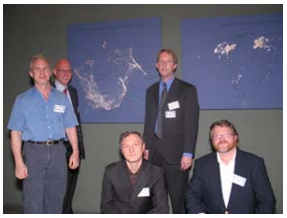
Hypothetical Model of the Evolution of Science - Daniel Zeller - 2007



Council for Chemical Research - Chemical R&D Powers the U.S. Innovation Engine. Washington, DC. Courtesy of the Council for Chemical Research - 2009

Illuminated Diagram Display

W. Bradford Paley, Kevin W. Boyack, Richard Kalvans, and Katy Börner (2007) Mapping, Illuminating, and Interacting with Science. SIGGRAPH 2007.



Large-scale, high resolution prints illuminated via projector or screen.

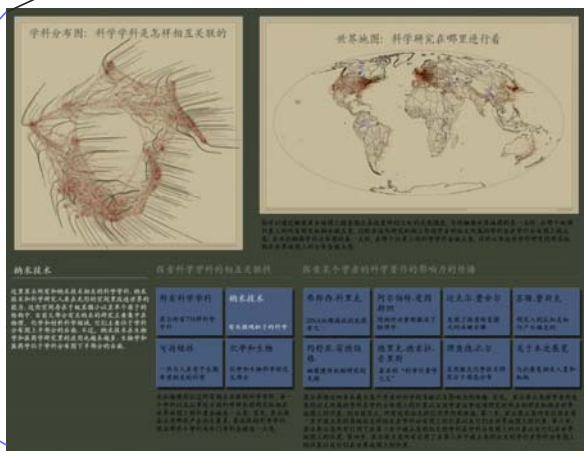
Questions:

- Who is doing research on what topic and where?
- What is the 'footprint' of interdisciplinary research fields?
- What impact have scientists?

Interactive touch panel.

Contributions:

- Interactive, high resolution interface to access and make sense of data about scholarly activity.

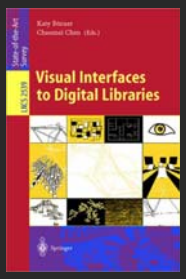


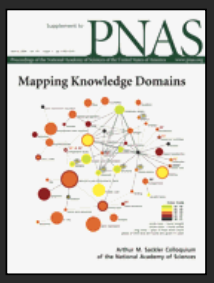
Science Maps in "Expedition Zukunft" science train visiting 62 cities in 7 months
12 coaches, 300 m long
Opening was on April 23rd, 2009 by German Chancellor Merkel
http://www.expedition-zukunft.de


This is the only mockup in this slide show.
Everything else is available today.


Contact the map makers via the exhibit curators:
Katy Börner (katy@indiana.edu) and Elisha Hardy (elhardy@indiana.edu)

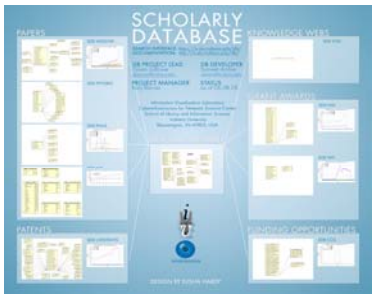
Computational Scientometrics: Studying Science by Scientific Means





- *Börner, Katy, Chen, Chaomei, and Boyack, Kevin. (2003).* ***Visualizing Knowledge Domains.*** *In Blaise Cronin (Ed.), Annual Review of Information Science & Technology, Medford, NJ: Information Today, Inc./American Society for Information Science and Technology, Volume 37, Chapter 5, pp. 179-255.* http://ivl.slis.indiana.edu/km/pub/2003-borner-arist.pdf
- *Shiffrin, Richard M. and Börner, Katy (Eds.) (2004).* ***Mapping Knowledge Domains.*** *Proceedings of the National Academy of Sciences of the United States of America, 101(Suppl_1).* http://www.pnas.org/content/vol101/suppl_1/
- *Börner, Katy, Sanyal, Soma and Vespignani, Alessandro (2007).* ***Network Science.*** *In Blaise Cronin (Ed.), Annual Review of Information Science & Technology, Information Today, Inc./American Society for Information Science and Technology, Medford, NJ, Volume 41, Chapter 12, pp. 537-607.* http://ivl.slis.indiana.edu/km/pub/2007-borner-arist.pdf
- *Börner, Katy & Scharnhorst, Andrea. (2009).* ***Visual Conceptualizations and Models of Science****. Journal of Informetrics. Vol. 3(3), Elsevier.* http://ivl.slis.indiana.edu/km/pub/2009-borner-scharnhorst-joi-sos-intro.pdf
- ***Places & Spaces: Mapping Science*** *exhibit, see also http://scimaps.org.*

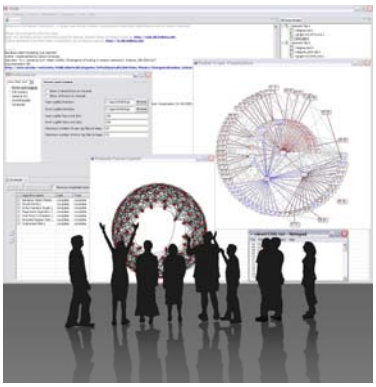
Cyberinfrastructures for a Science of Science



Scholarly Database of 23 million scholarly records
http://sdb.slis.indiana.edu

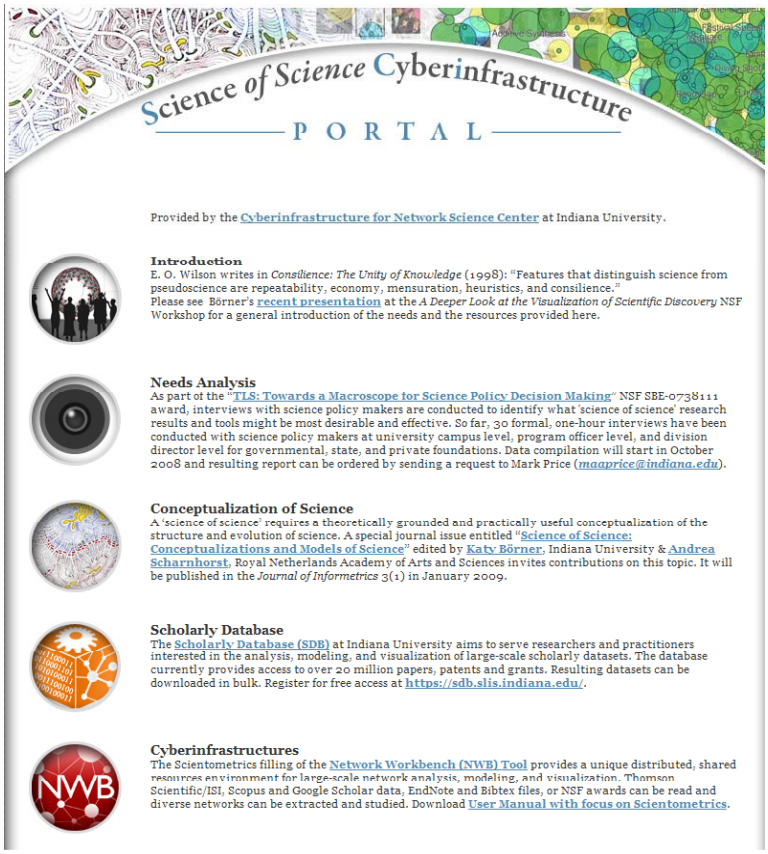
James S. McDonnell Foundation

Information Visualization Cyberinfrastructure
http://iv.slis.indiana.edu

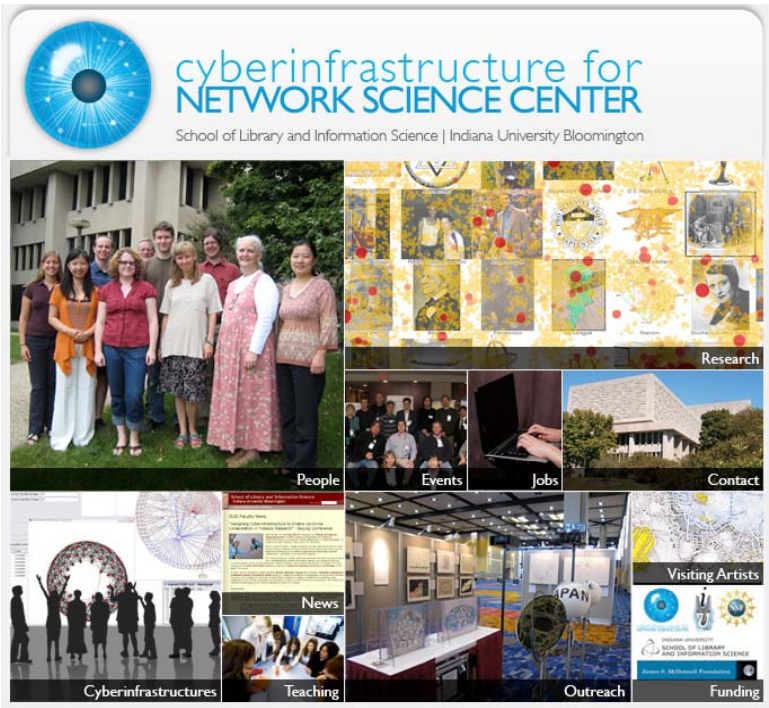


Network Workbench Tool and Community Wiki
NEW Scientometrics plugins
http://nwb.slis.indiana.edu

Epidemics Cyberinfrastructure
http://epic.slis.indiana.edu/



http://sci.slis.indiana.edu



Papers, maps, cyberinfrastructures, talks, press are linked from
http://cns.slis.indiana.edu

The End.