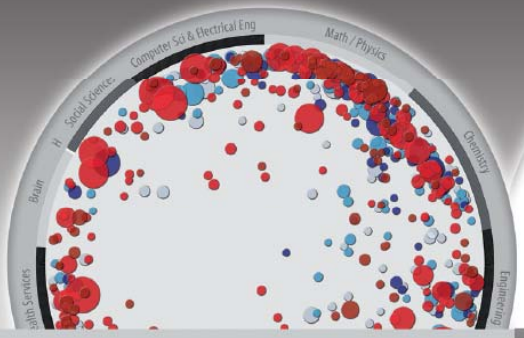
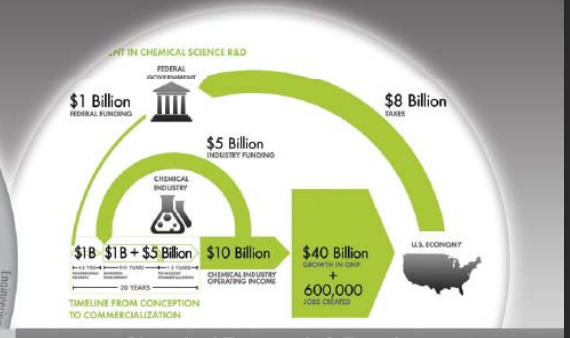
Mapping Innovation for Congress

CREATING AN Innovation Dashboard TO INFORM POLICY MAKERS

A Seminar and Interactive Session | Thursday, December 10, 2009 | Rayburn HOB 2103 | 3:00 p.m. - 4:30 p.m.





U.S. VULNERABILITIES IN SCIENCE

National Strengths are more accurately assessed using a reference-based classification system.

Chemical Research & Development Powers the U.S. Innovation Engine

Macroeconomic Implications of Public and Private R&D Investments in Chemical Sciences

Have you ever wondered what an "Innovation Dashboard" of your state or congressional district would reveal? Where would the "Pockets of Innovation" lie and what pathways do those innovations take to impact education, health, or profit? Where are the jobs or the innovative education programs? How would you use such a dashboard in your daily work?

This seminar series brings together R&D researchers with a strong background in data analysis and visualization and selected Members of Congress and Congressional Staff. The main goal is to collectively identify features and functionality of an "Innovation Dashboard" for Congress.

AGENDA

3:00 p.m.	Welcome & Introductions
3:10 p.m.	Overview of R&D Analyses and Maps
3:45 p.m.	Open Discussion Forum
4:30 p.m.	Adjourn

Take ASTRA's Mapping Innovation for Congress Survey — please visit https://www.surveymonkey.com/s/C9XTPLB

The first session in this series features Dr. Katy Börner of Indiana University. Dr. Börner will describe different approaches to R&D data analysis and visualization, discuss sample maps from the international Mapping Science exhibit (http://scimaps.org) and insights derived from them, as well as near-term developments in the mapping of R&D data. This presentation is followed by a structured but open discussion on desirable features and functionality for "State-Oriented R&D Fact Sheets" and "Innovation Dashboards" and how they would be used to understand, improve, and communicate State and Congressional District innovation metrics.

Please RSVP to the rboege@comcast.net by December 7, 2009 and confirm your attendance as seating is limited.

Acknowledgements: This work is supported in part by ASTRA, the Cyberinfrastructure for Network Science Center and the School of Library and Information Science at Indiana University, the National Science Foundation under Grant No. SBE-0738111 and IIS-0715303, and the James S. McDonnell Foundation.

ASTRA | U.S. Innovation | INDIANA UNIVERSITY SCHOOL OF LIBRARY AND INFORMATION SCIENCE | James S. McDonnell Foundation

ASTRA's Mapping Innovation for Congress Baseline Survey 121009

Would it be useful to have innovation information that compares different States?

	Response Percent
Yes	**89.5%**
No	5.3%
Not Sure	5.3%

ASTRA's Mapping Innovation for Congress Baseline Survey 121009

Do you (and Congress generally) have adequate data to make decisions on innovation policy?

	Response Percent
Most of the Time	5.0%
Some of the Time	25.0%
Usually Not	**55.0%**
Not Sure	15.0%

ASTRA's Mapping Innovation for Congress Baseline Survey 121009

What types of data would you like to have more readily available to you? (Please choose all that apply)

	Response Percent
R&D Funding	**76.2%**
Agency Budget Data	52.4%
Academic Degree Production Data	42.9%
STEM Education Data	52.4%
General Economic Statistics that Affe	
State and Congressio	
International	
Comparisons betwee	
Cybersecurity	14.3%
Migration, Visas, Foreign Talent in U.S.	23.8%
Internet & Broadband	23.8%
Venture Capital	38.1%
Income and Unemployment Information	52.4%
New Business Start-ups	52.4%
Job Creation	47.6%

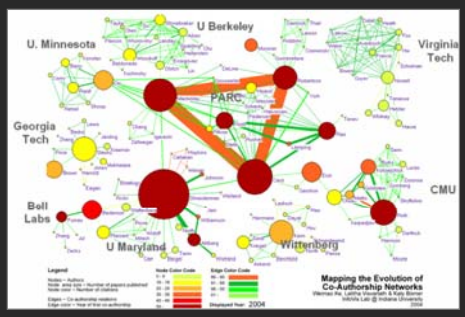
Science and Technology (S&T) Studies

Can be conducted at different levels:

- local (individual),
- meso (local, e.g., one institute, one funding agency), or
- global level (all of science or world wide).

Using

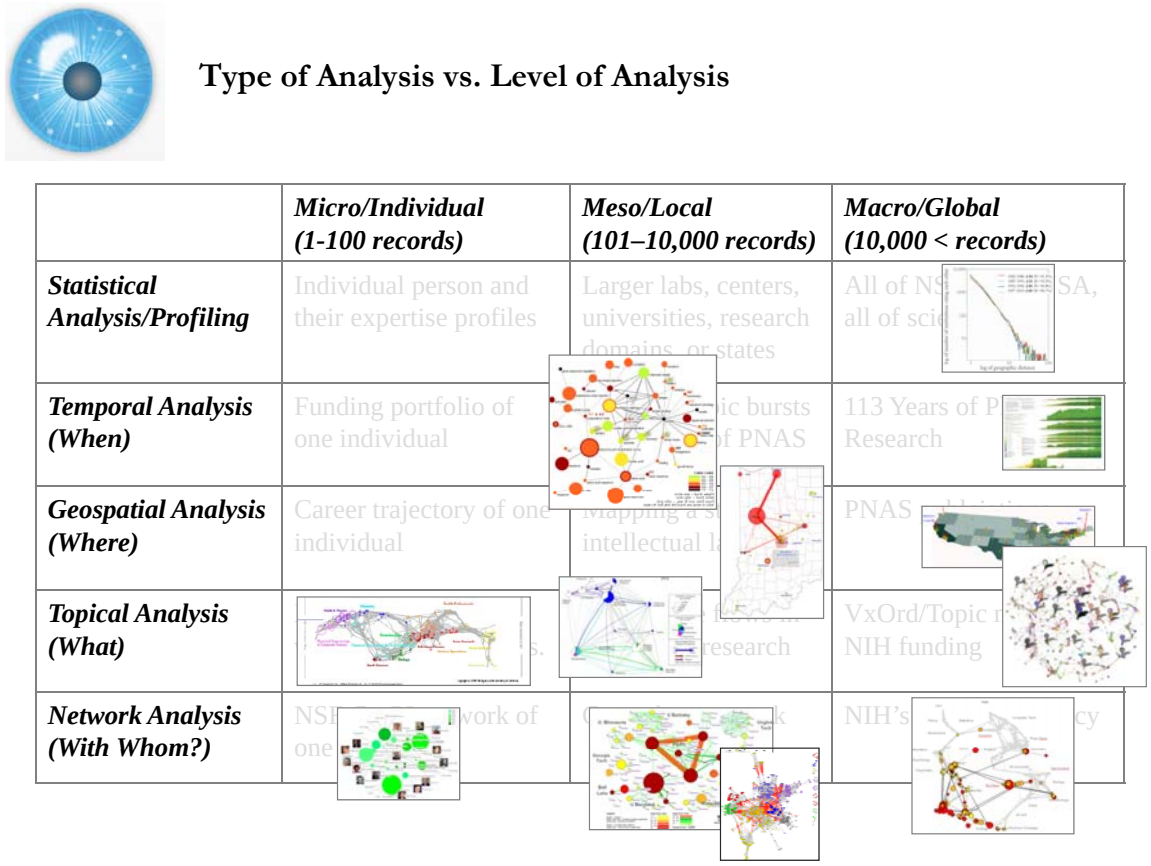
- Statistical Analysis/Profiling
- Temporal Analysis (When)
- Geospatial Analysis (Where)
- Topical Analysis (What)
- Network Analysis (With Whom?)
- Modeling (Why)

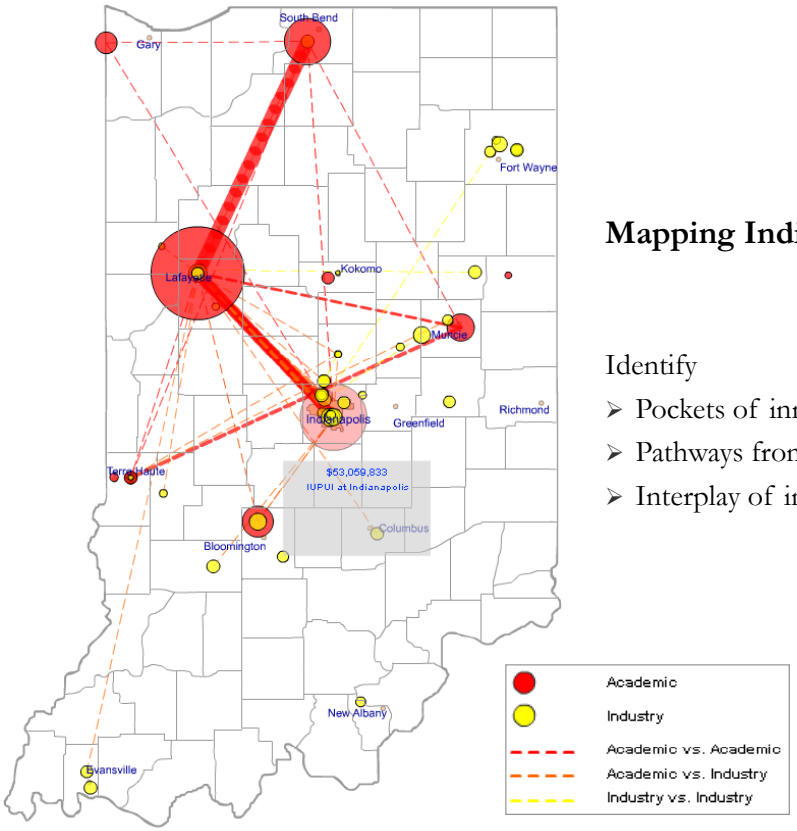


Type of Analysis vs. Level of Analysis

	Micro/Individual (1-100 records)	***Meso/Local (101–10,000 records)***	***Macro/Global (10,000 < records)***
Statistical Analysis/Profiling	Individual person and their expertise profiles	Larger labs, centers, universities, research domains, or states	All of NSF, all of USA, all of science.
Temporal Analysis (When)	Funding portfolio of one individual	Mapping topic bursts in 20-years of PNAS	113 Years of Physics Research
Geospatial Analysis (Where)	Career trajectory of one individual	Mapping a states intellectual landscape	PNAS Publications
Topical Analysis (What)	Base knowledge from which one grant draws.	Knowledge flows in Chemistry research	VxOrd/Topic maps of NIH funding
Network Analysis (With Whom?)	NSF Co-PI network of one individual	Co-author network	NSF's core competency

Type of Analysis vs. Level of Analysis





Mapping Indiana's Intellectual Space

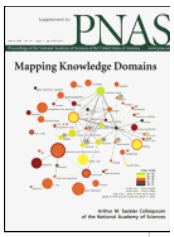
Identify

- Pockets of innovation
- Pathways from ideas to products
- Interplay of industry and academia

Mapping Topic Bursts

Co-word space of the top 50 highly frequent and bursty words used in the top 10% most highly cited PNAS publications in 1982-2001.

Mane & Börner. (2004) PNAS, 101(Suppl. 1): 5287-5290.

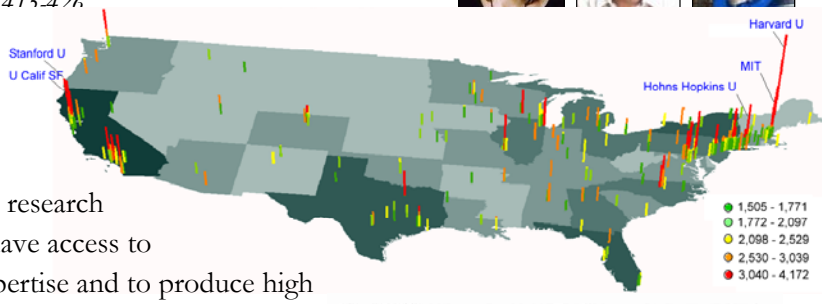


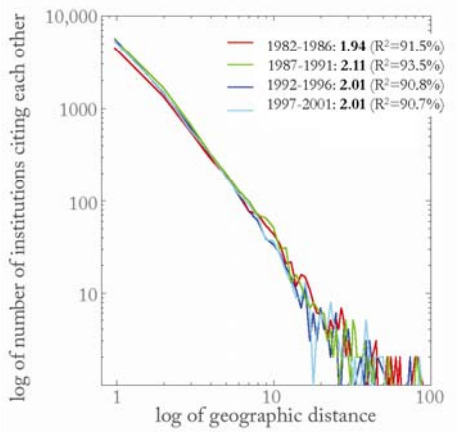
Spatio-Temporal Information Production and Consumption of Major U.S. Research Institutions

Börner, Katy, Penumarthy, Shashikant, Meiss, Mark and Ke, Weimao. (2006) Mapping the Diffusion of Scholarly Knowledge Among Major U.S. Research Institutions. Scientometrics. 68(3), pp. 415-426.

Research questions:

1. Does space still matter in the Internet age?
2. Does one still have to study and work at major research institutions in order to have access to high quality data and expertise and to produce high quality research?
3. Does the Internet lead to more global citation patterns, i.e., more citation links between papers produced at geographically distant research instructions?



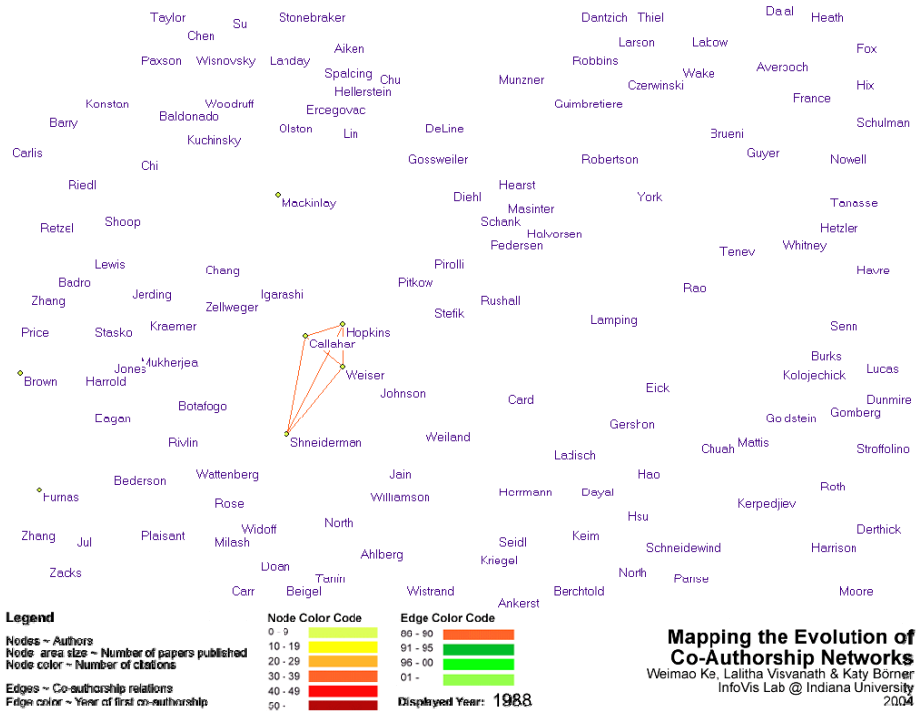


Contributions:

- Answer to Qs 1 + 2 is YES.
- Answer to Qs 3 is NO.
- Novel approach to analyzing the dual role of institutions as information producers and consumers and to study and visualize the diffusion of information among them.

Mapping the Evolution of Co-Authorship Networks

Ke, Visvanath & Börner, (2004) Won 1st price at the IEEE InfoVis Contest.



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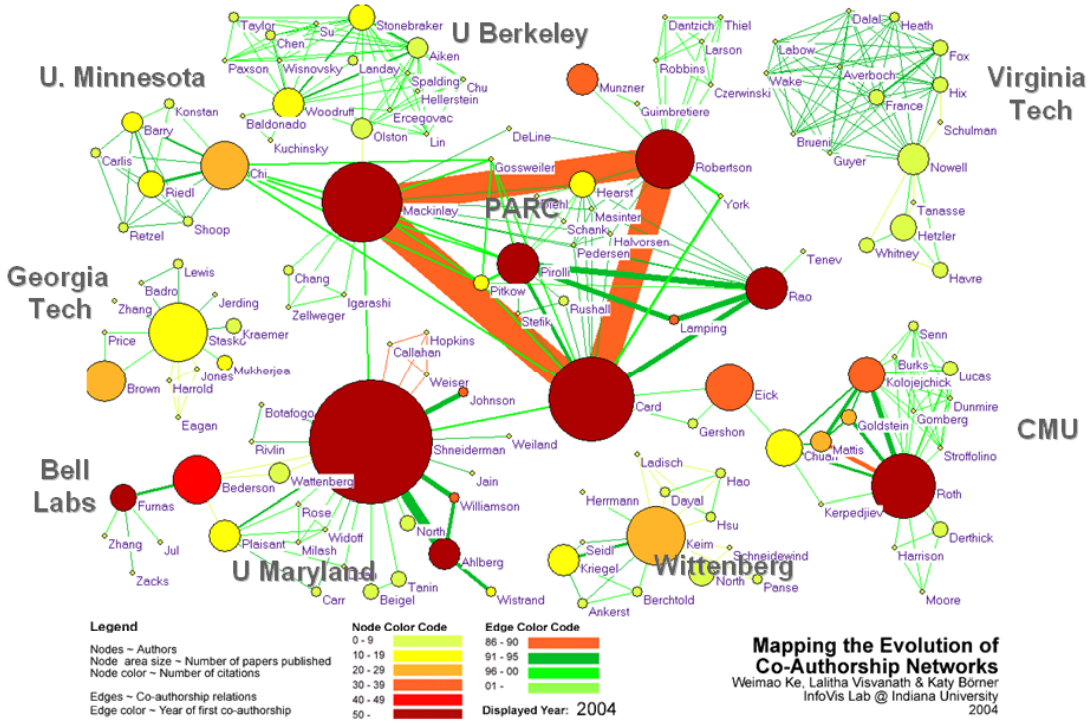
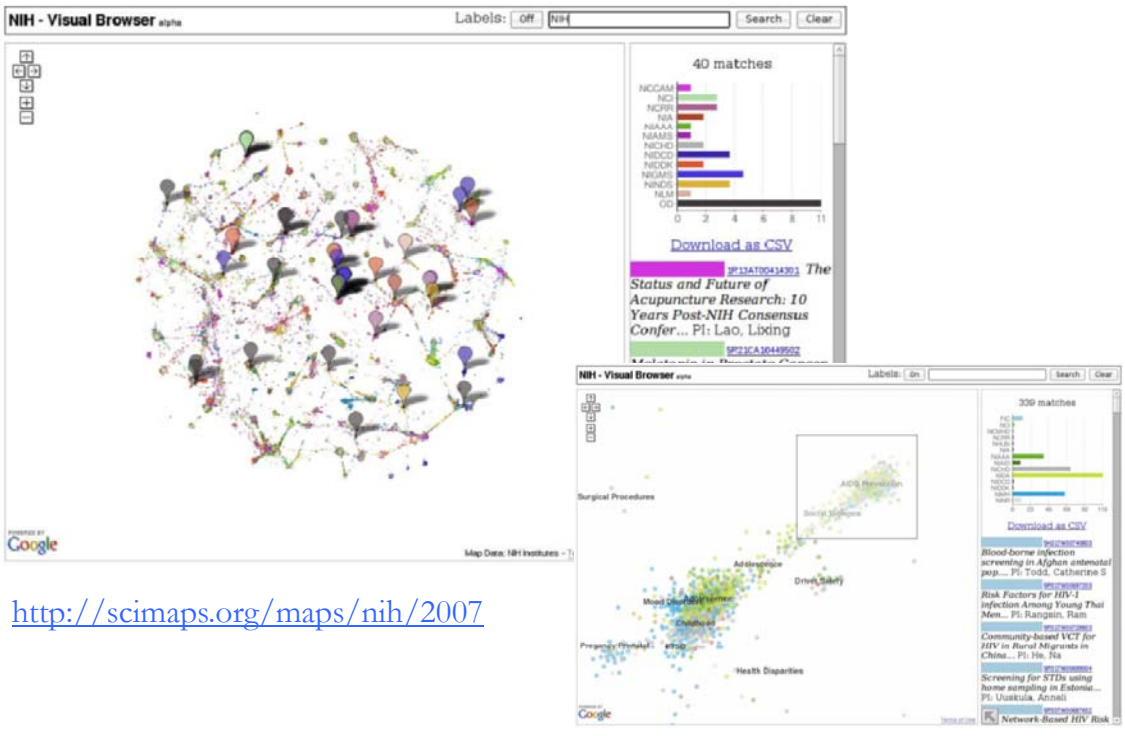


Interactive Science Map of NIH Funding

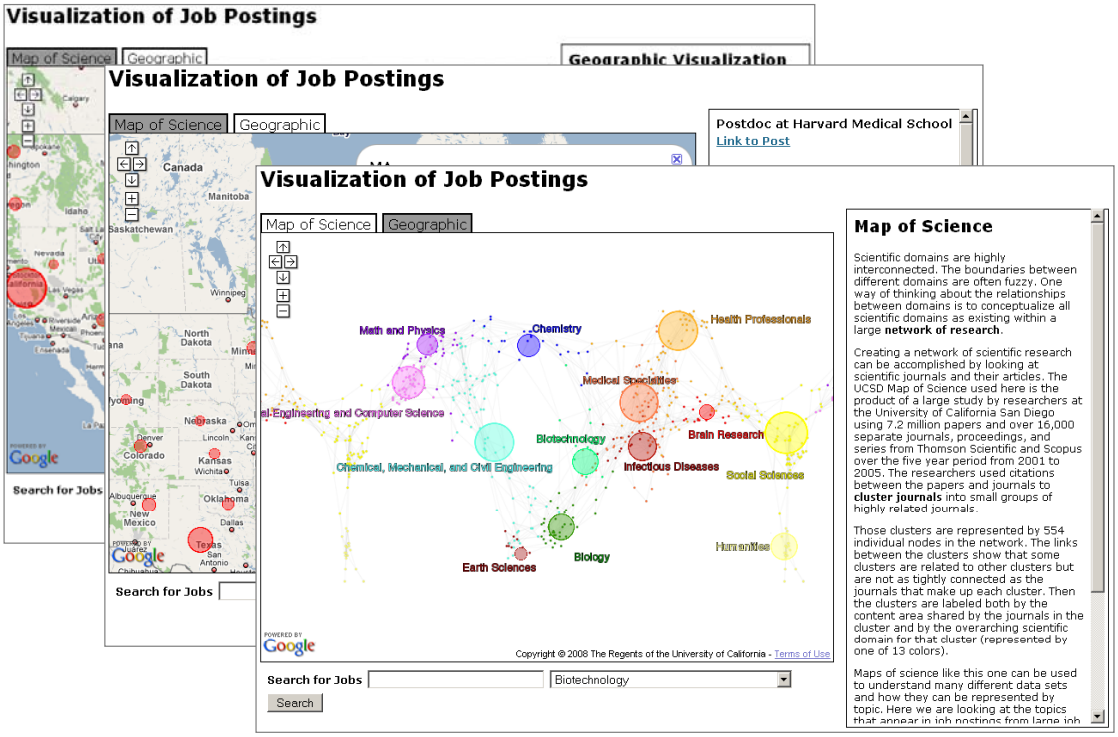
Herr II, Bruce W., Talley, Edmund M, Burns, Gully APC, Newman, David & La Rowe, Gavin. (2009).



http://scimaps.org/maps/nih/2007

Interactive World and Science Map of S&T Jobs

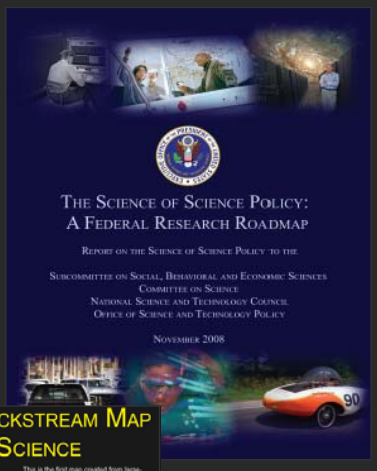
Angela Zoss, Michael Connover, Katy Börner (in preparation).

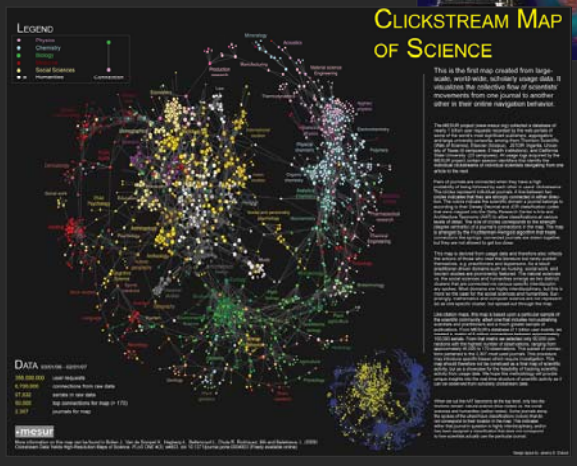


Science and Technology (S&T) Studies

Results are communicated using

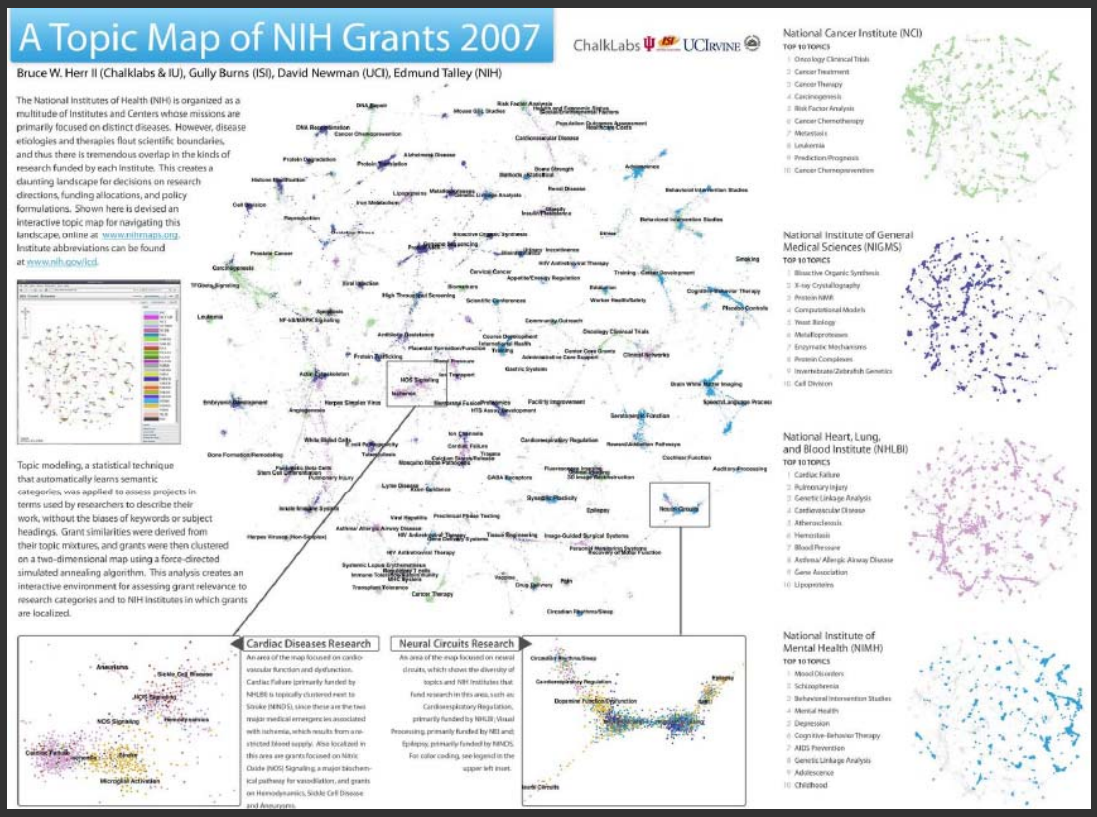
- Top-N lists
- Profiles
- Graphs and charts
- Geographic map overlays
- Science maps



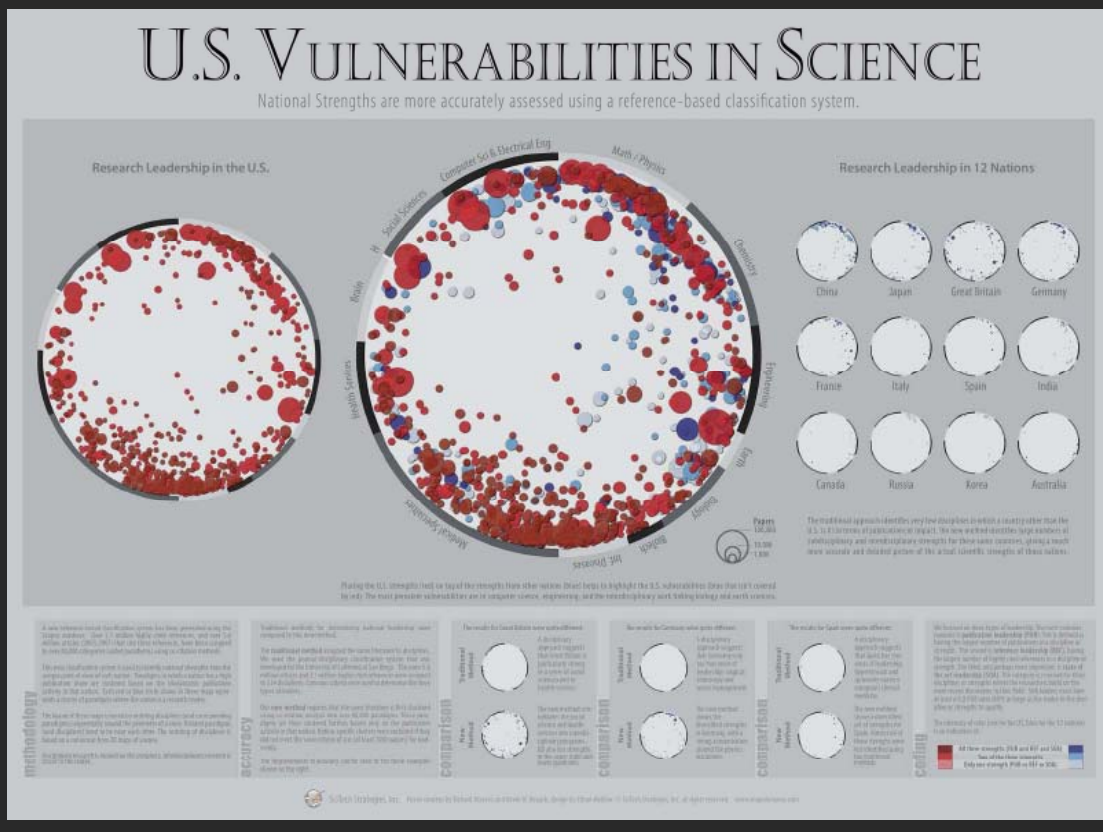


By means of

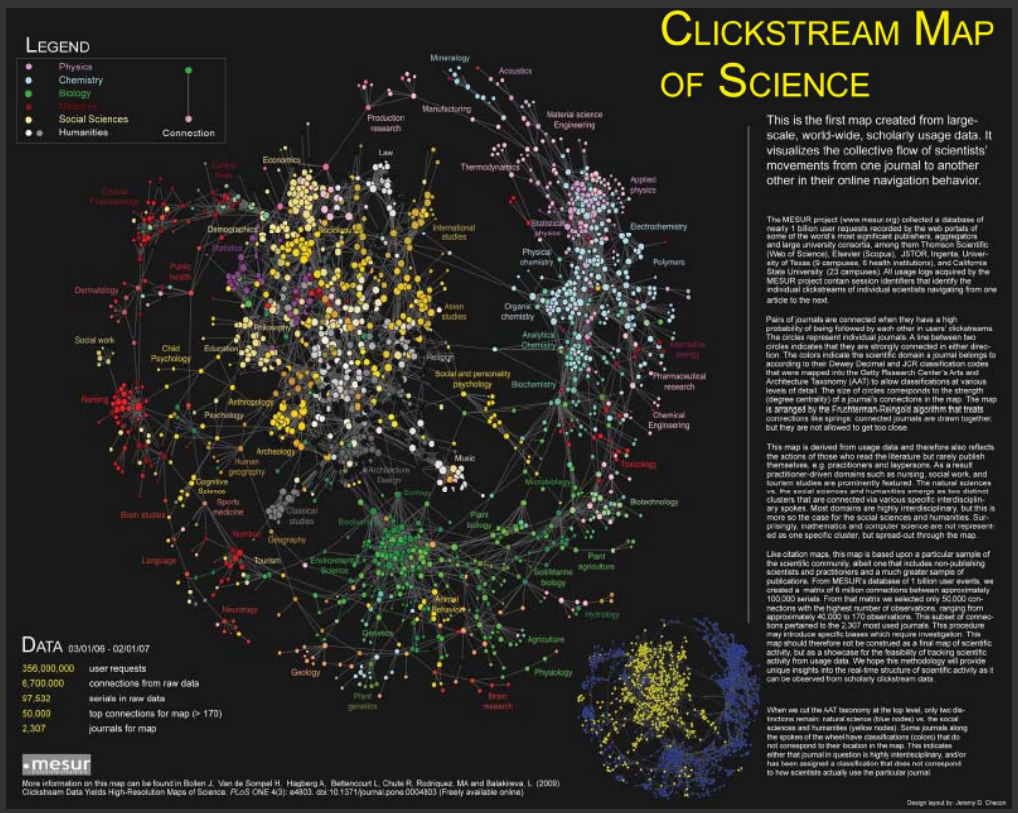
- Alerts
- White papers
- Reports
- Science forecasts



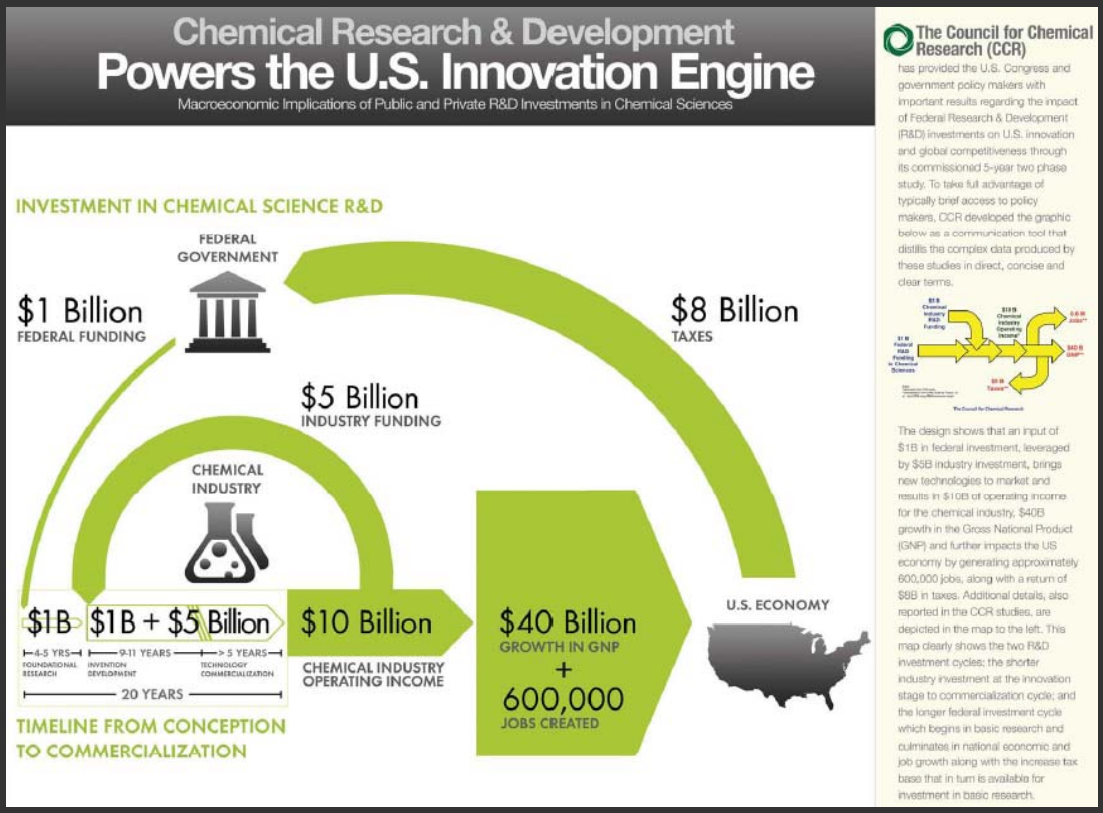
Herr II, Bruce W., Gully Burns, David Newman, Edmund Talley. 2007. A Topic Map of NIH Grants 2007. Bloomington, IN.



U.S. Vulnerabilities in Science - Kevin W. Boyack, Richard Klavans - 2009



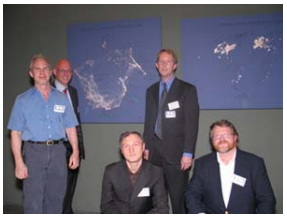
Bollen, Johan, Herbert Van de Sompel, Aric Hagberg, Luis M.A. Bettencourt, Ryan Chute, Marko A. Rodriquez, Lyudmila Balakireva. 2008. A Clickstream Map of Science.



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

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.

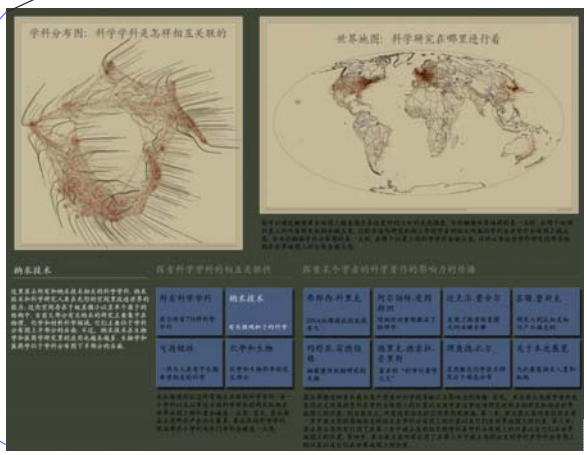
Questions:

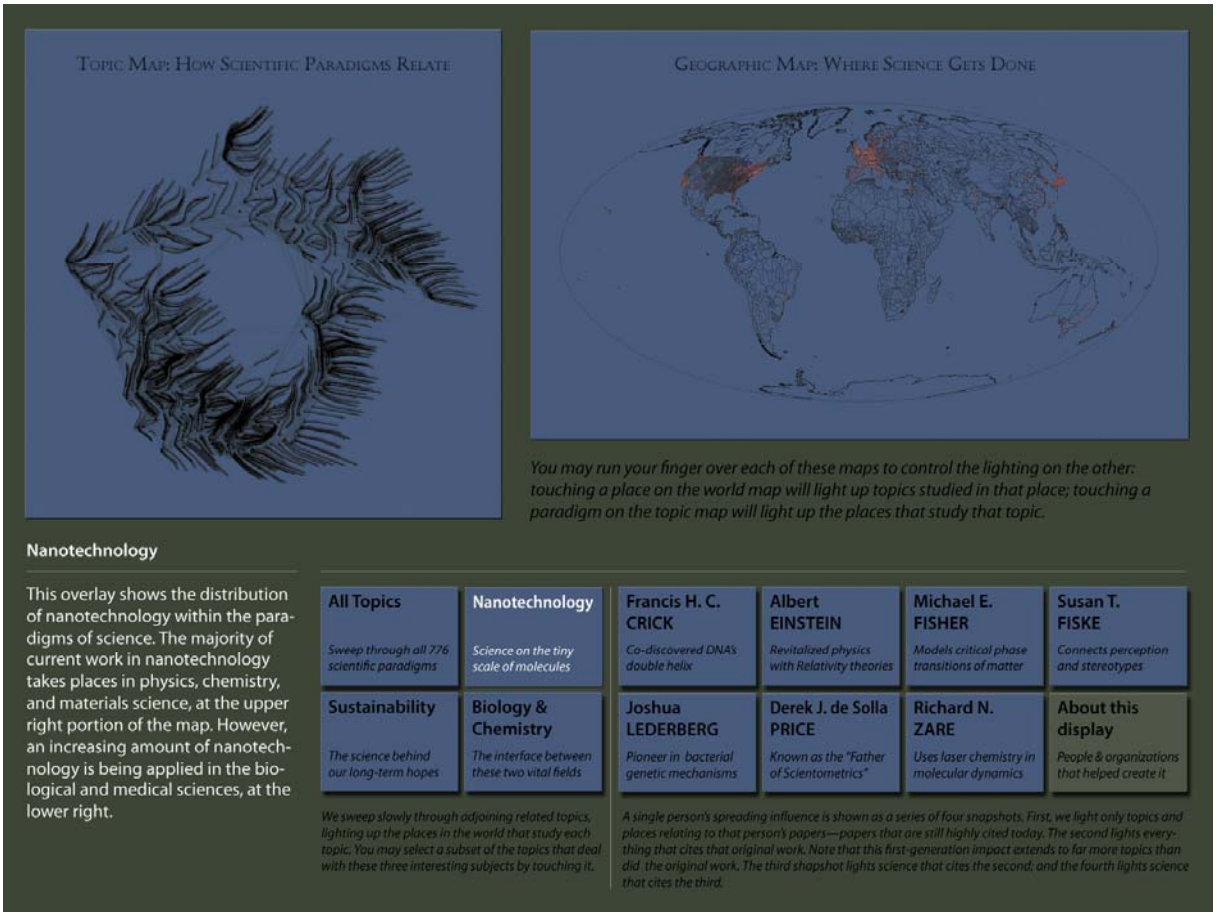
- Who is doing research on what topic and where?
- What is the 'footprint' of interdisciplinary research fields?
- What impact have scientists?

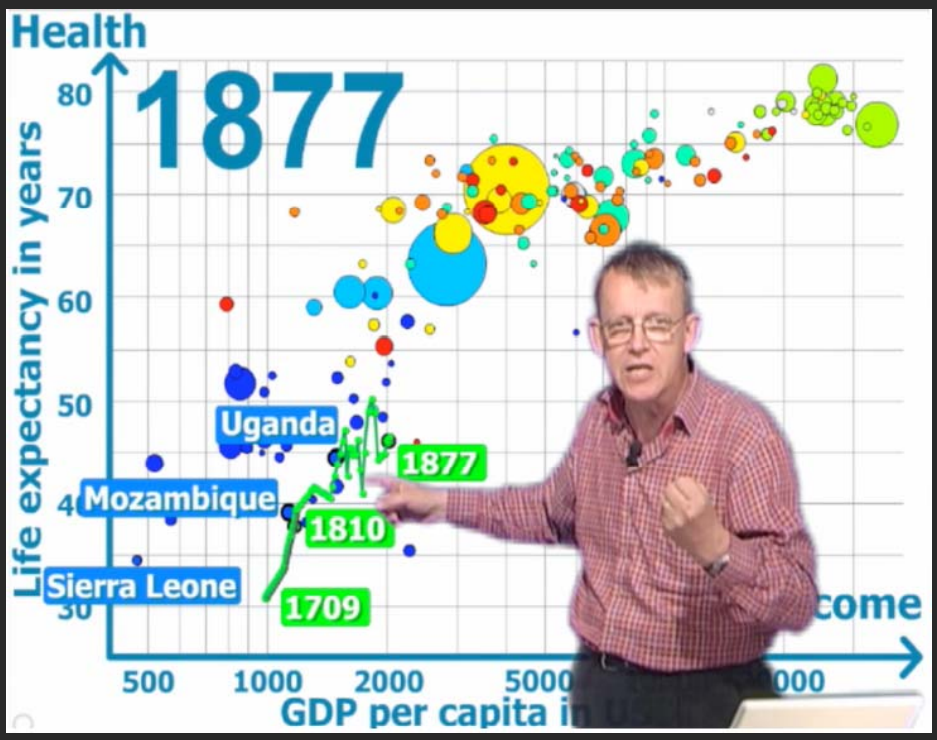
Interactive touch panel.

Contributions:

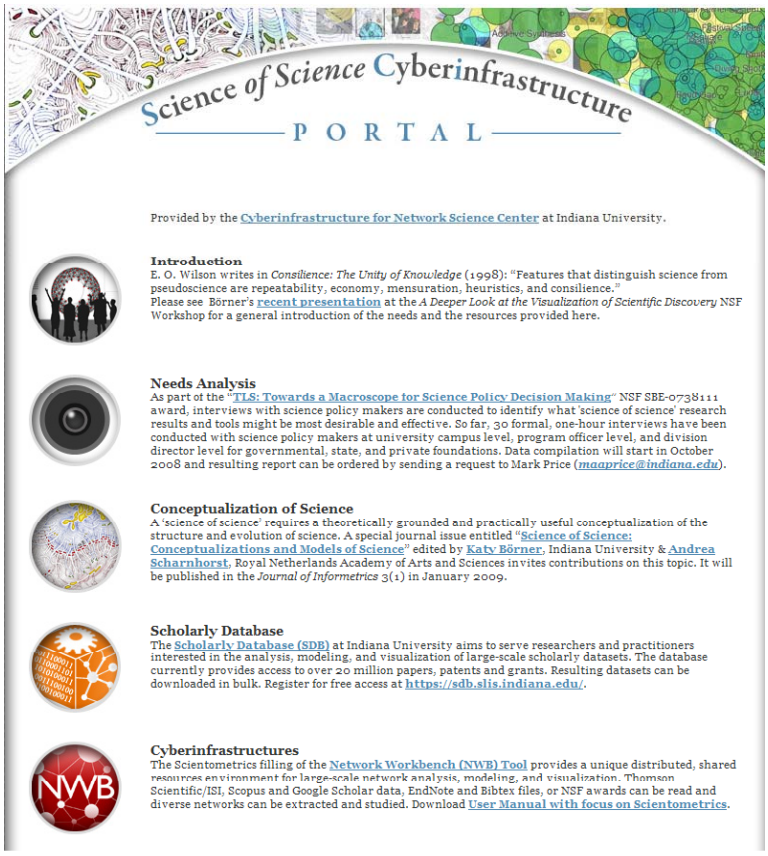
- Interactive, high resolution interface to access and make sense of data about scholarly activity.







http://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html



http://sci.slis.indiana.edu