Envisioning and Accelerating Science and Technology

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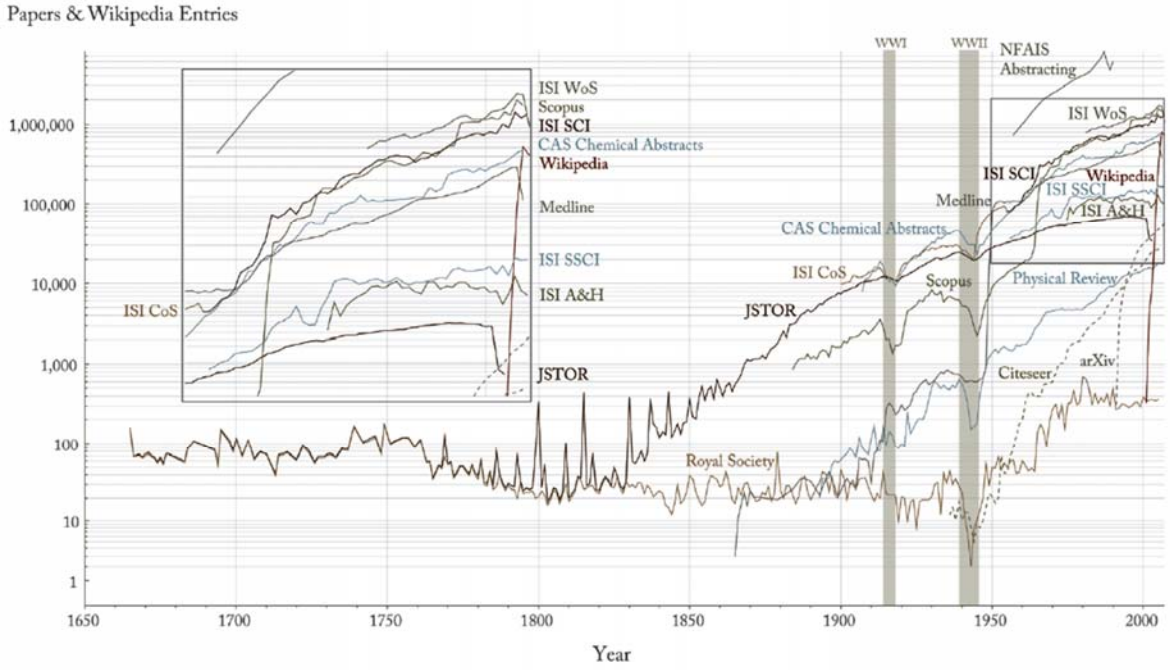
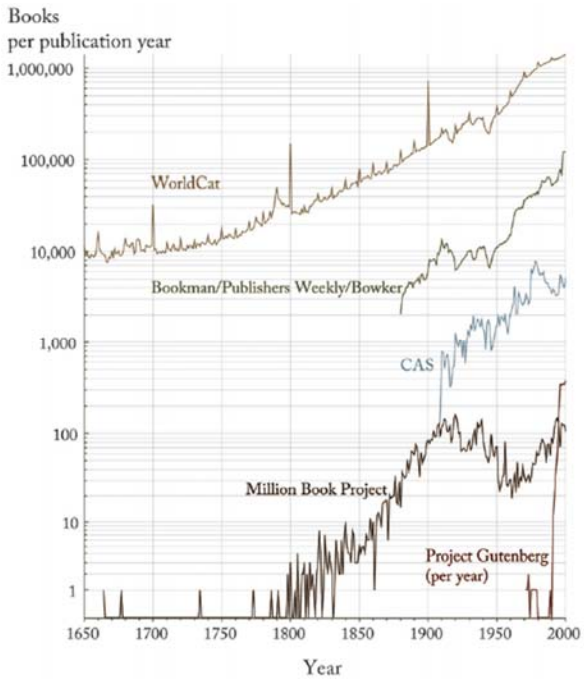
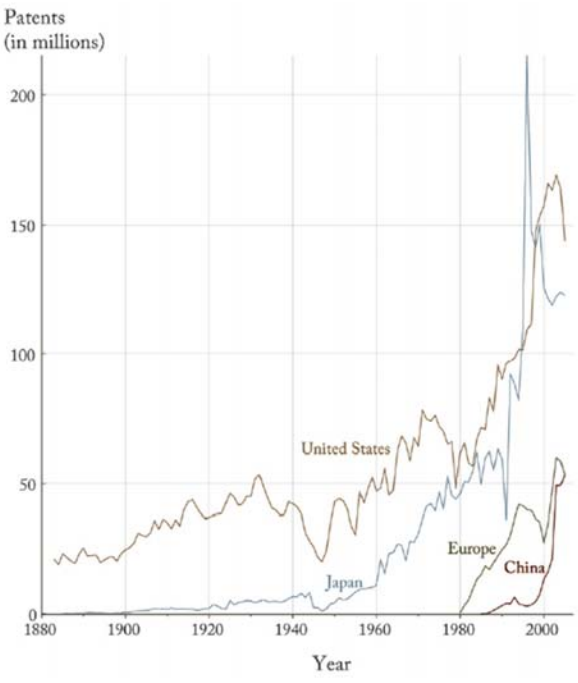
Médialab Sciences Po, 27 rue Saint Guillame
7eme arrondissement, Room Eugene D'EICHTAL - A35
Wednesday, April 11, 2012

The Rise of Science and Technology



Börner, Katy (2010) Atlas of Science. MIT Press.





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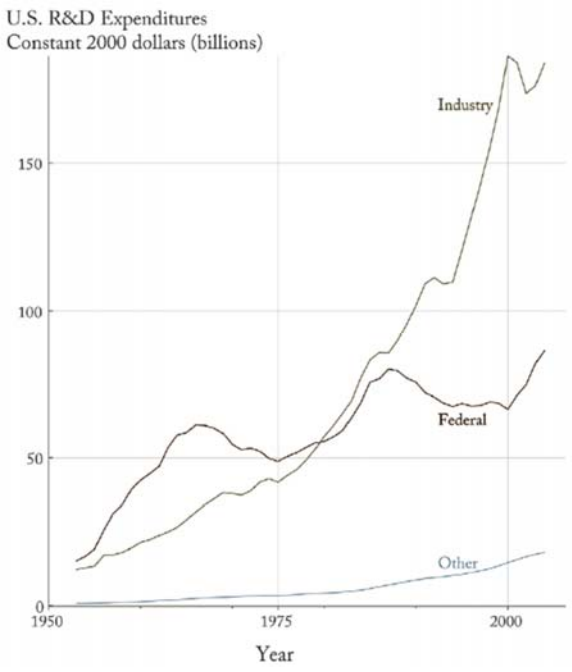

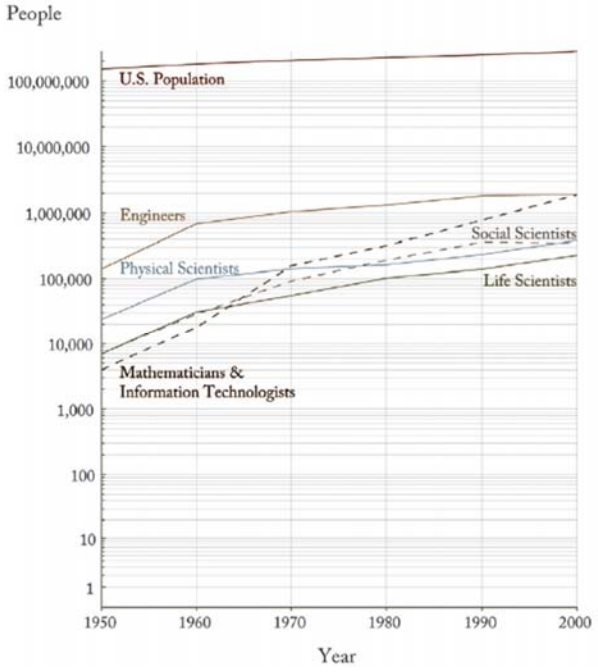

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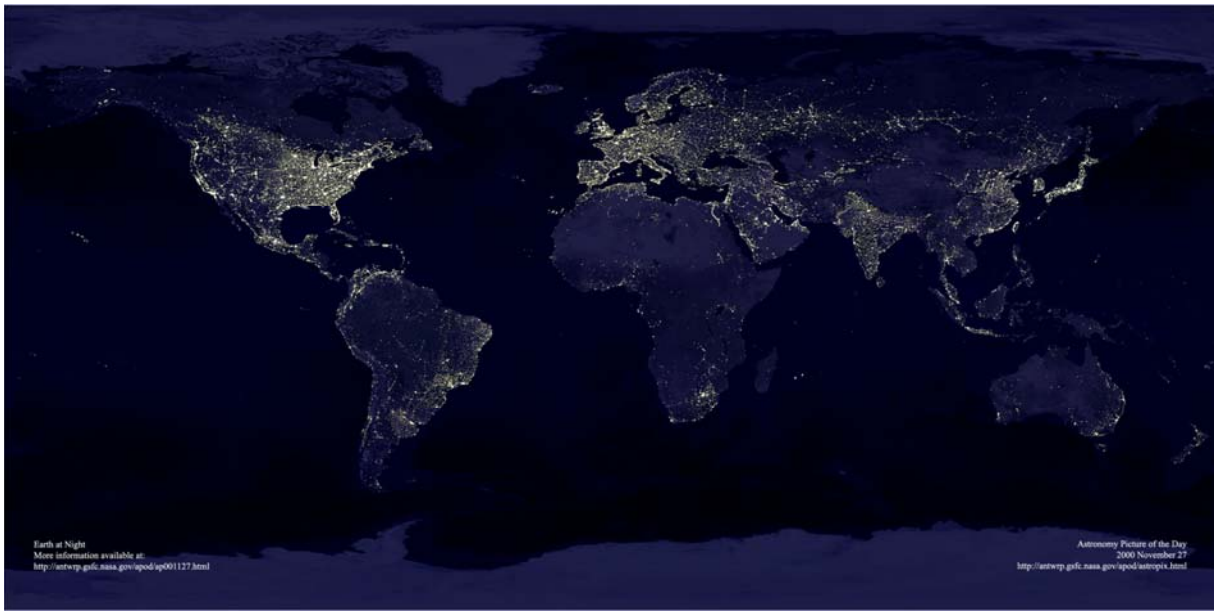
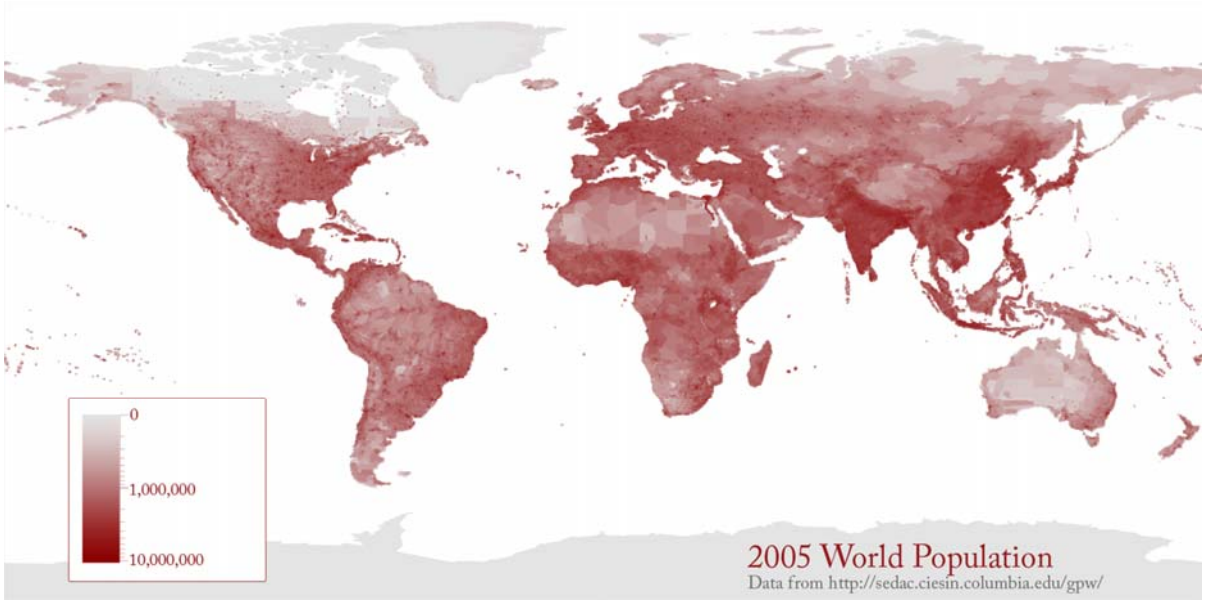
2000 Night on Earth

This image shows city lights at night. It was composed from hundreds of pictures made by orbiting satellites. The seaboards of Europe, the eastern United States, and Japan are particularly well lit. Many cities exist near rivers or oceans so that goods can be exchanged cheaply by boat. The central parts of South America, Africa, Asia, and Australia are rather dark despite their high population density, see map to the left.



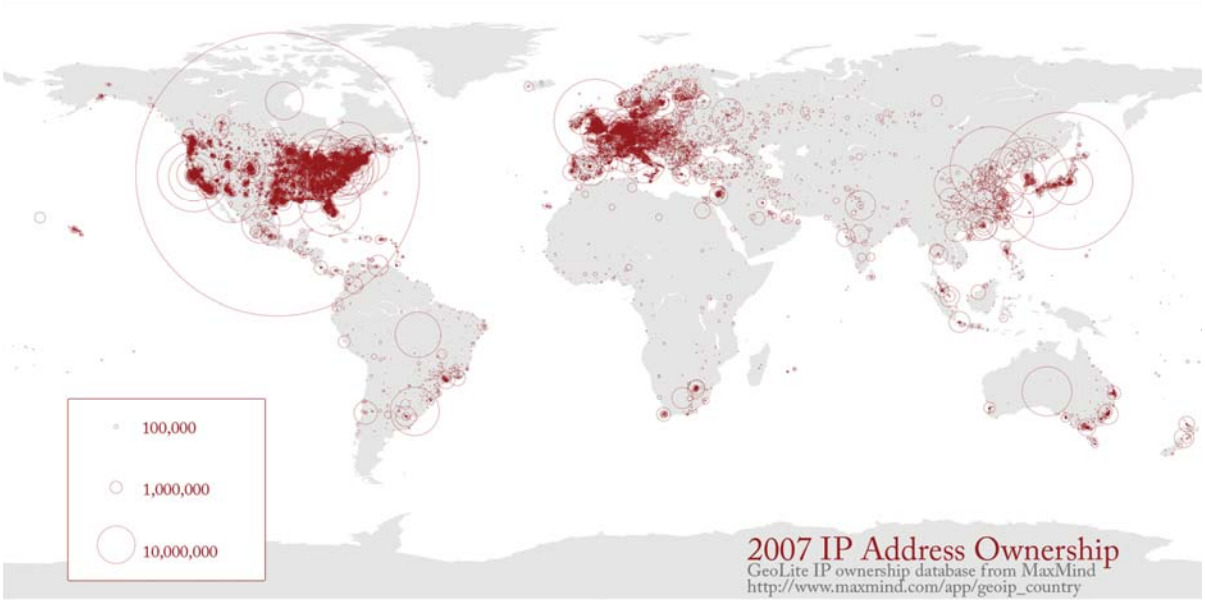
2005 World Population

The population map uses a quarter degree box resolution. Boxes with zero people are given in white. Darker shades of red indicate higher population counts per box using a logarithmic interpolation. The highest density boxes appear in Mumbai, with 11,687,850 people in the quarter degree block, Calcutta (10,816,010), and Shanghai (8,628,088).



2007 IP Address Ownership

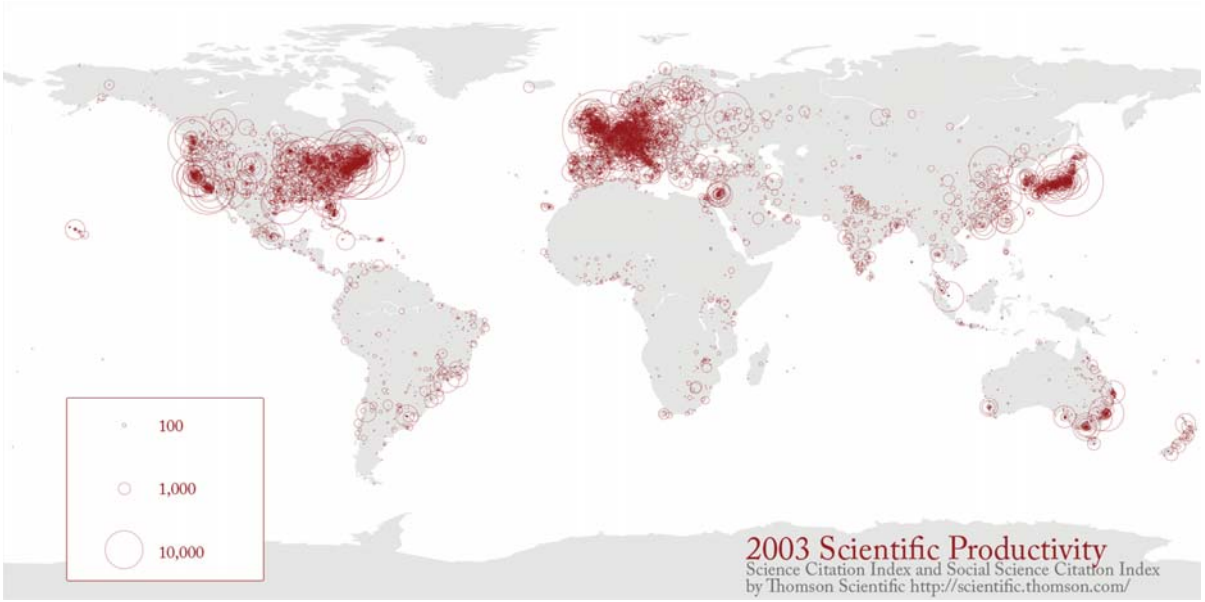
This map shows IP address ownership by location. Each owner is represented by a circle and the area size of the circle corresponds to the number of IP addresses owned. The larges circle denotes MIT's holdings of an entire class A subnet, which equates to 16,581,375 IP addresses. The countries that own the most IP addresses are US (560 million), Japan (130 million), Great Britain (47 million).



Börner, Katy (2010) Atlas of Science. MIT Press. 7

2003 Scientific Productivity

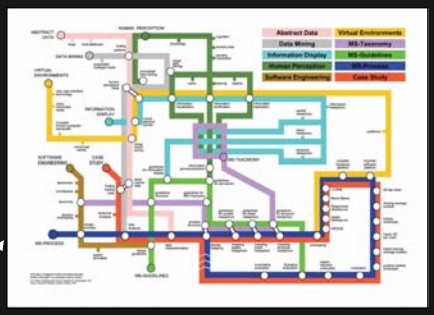
Shown is where science is performed today. Each circle indicates a geographic location at which scholarly papers are published. The larger the circle the more papers are produced. Boston, MA, London, England, and New York, NY are the top three paper production areas. Note the strong resemblance with the Night on Earth and the IP Ownership maps and the striking differences to the world population map.



Börner, Katy (2010) Atlas of Science. MIT Press. 8

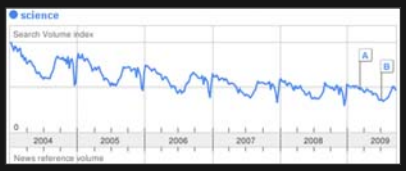
Take terra bytes of data

Descriptive & Predictive Models



Find your way

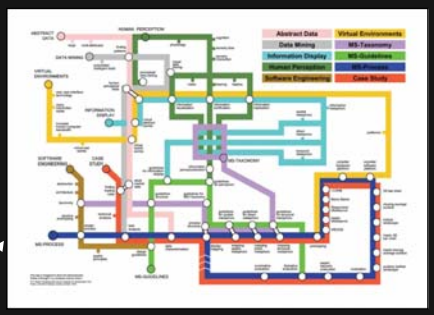
Find collaborators, friends



Identify trends

Take terra bytes of data

Plug-and-Play Macroscopes



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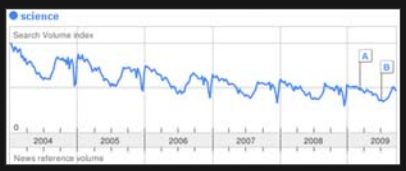
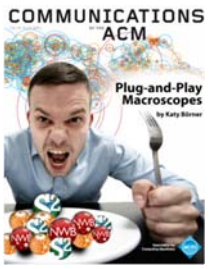
Find collaborators, friends



Identify trends

Overview

1. **Data mining and visualization research** that aims to increase our scientific understanding of the structure and dynamics of science and technology.
2. **Novel approaches and services** that improve information access, researcher networking, and research management.
3. **Data services and plug-and-play macroscope tools** that commoditize data mining and visualization.



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School of Library and Information Science | Indiana University Bloomington

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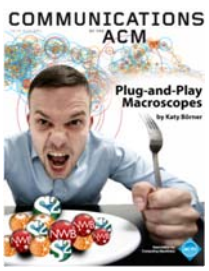

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Type of Analysis vs. Level of Analysis

	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	NIH's core competency

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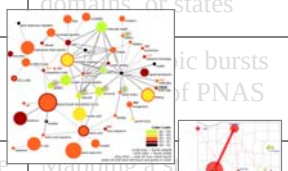

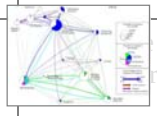
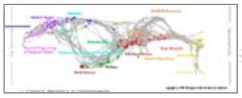

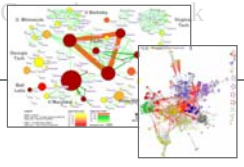
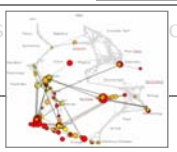
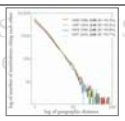


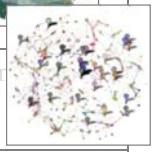

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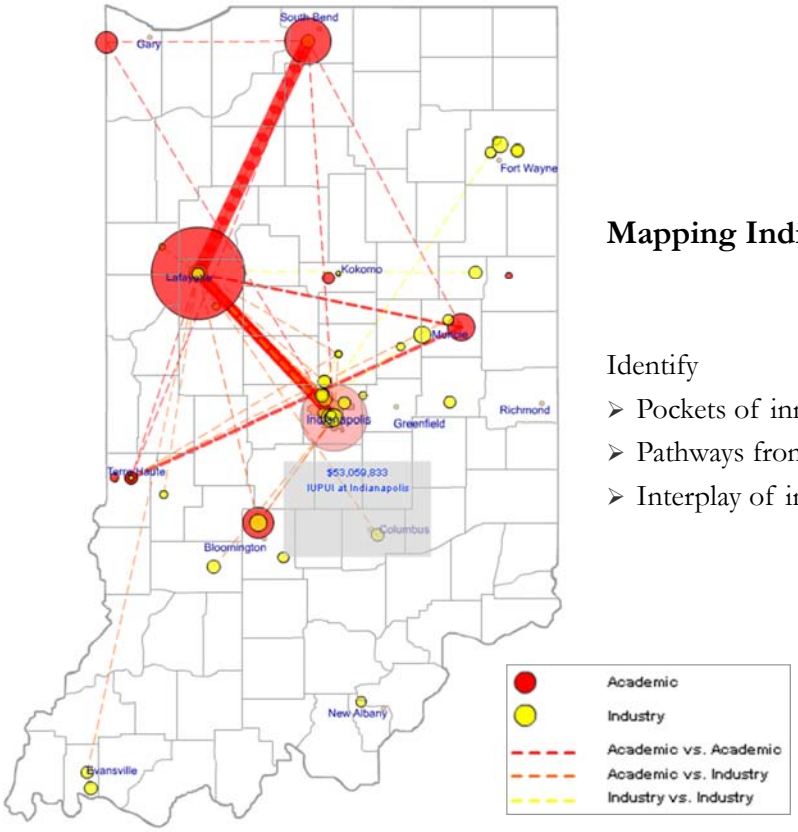


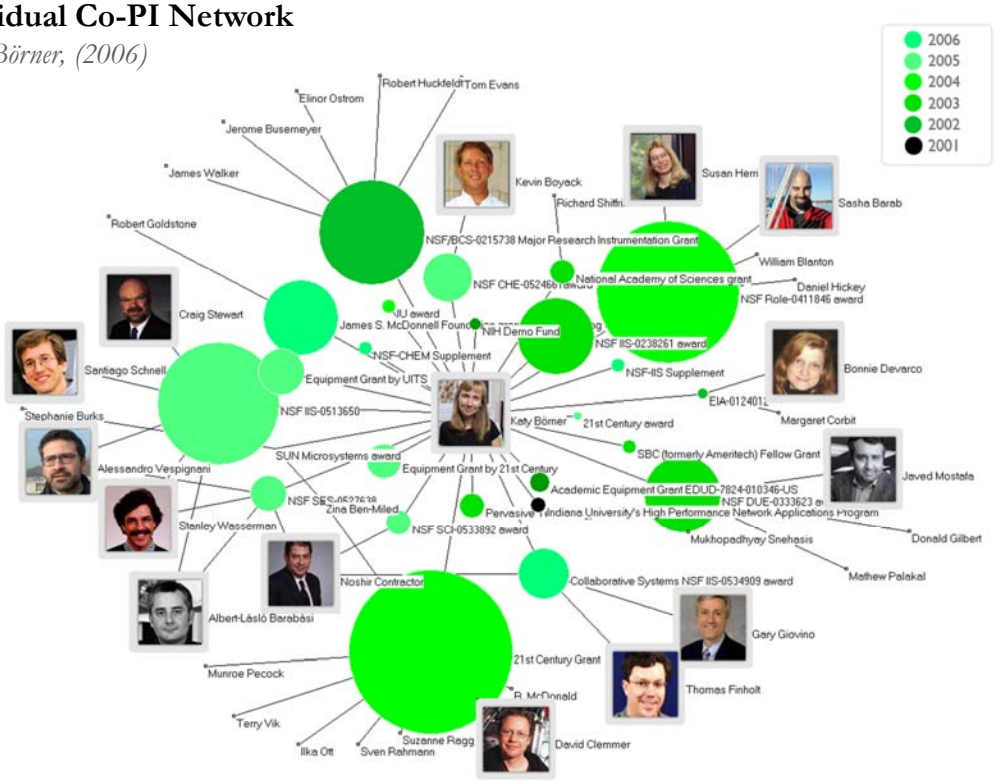
Mapping Indiana's Intellectual Space

Identify

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

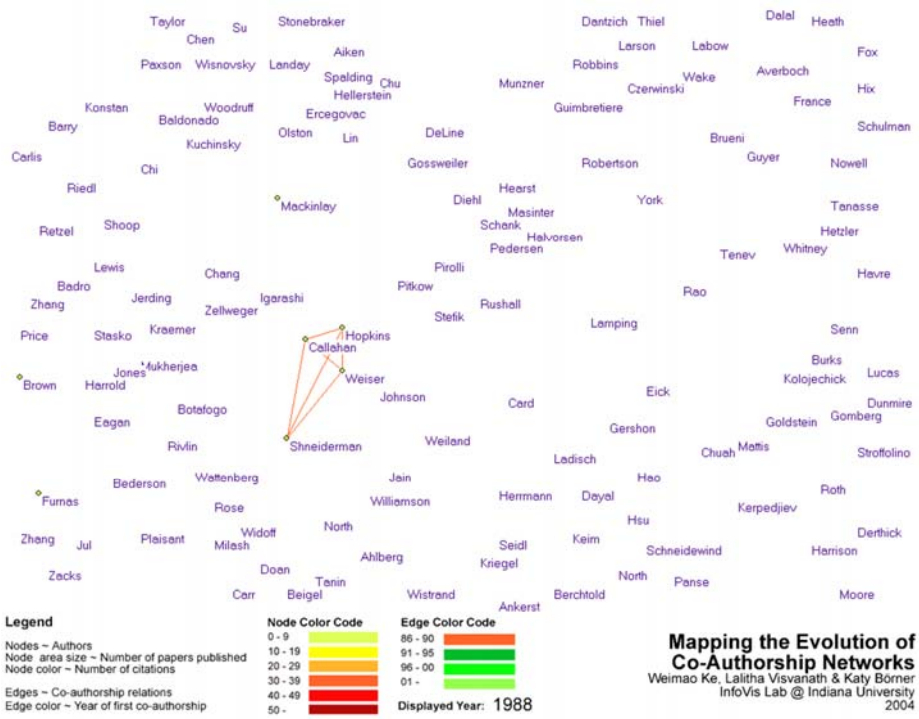
Individual Co-PI Network

Ke & Börner, (2006)



Mapping the Evolution of Co-Authorship Networks

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



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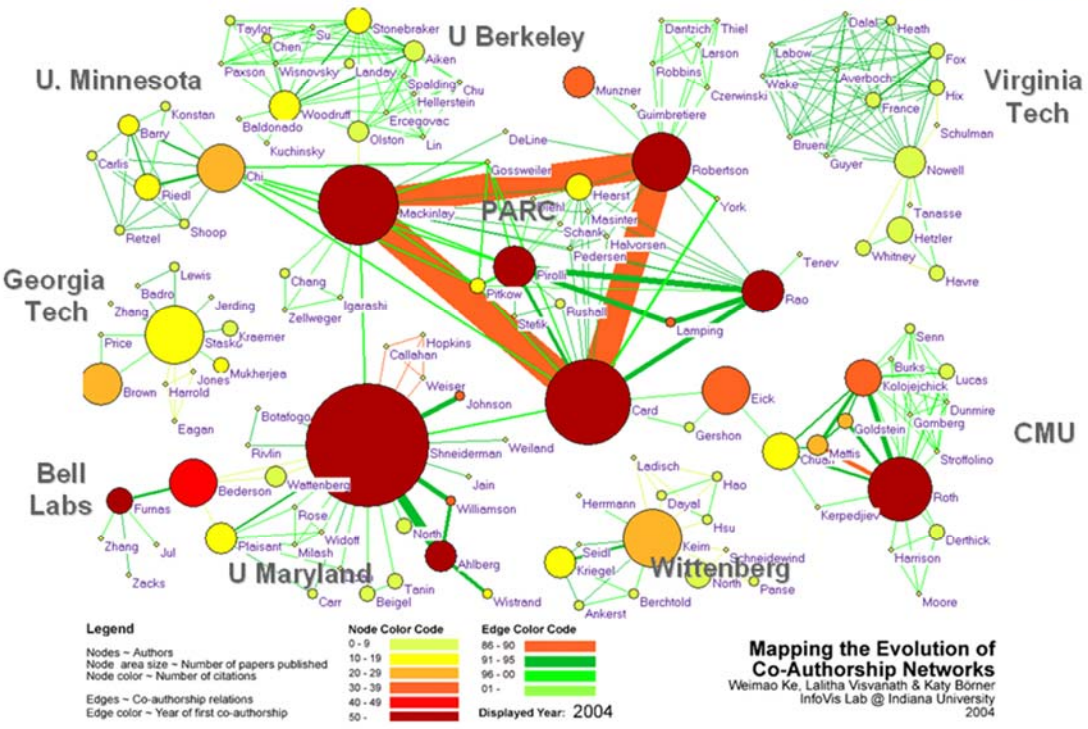
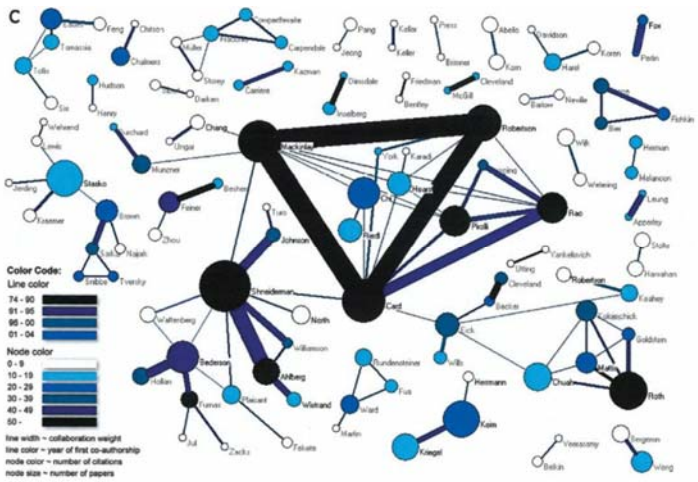


Studying the Emerging Global Brain: Analyzing and Visualizing the Impact of Co-Authorship Teams

Börner, Dall'Asta, Ke & Vespignani (2005) Complexity, 10(4):58-67.



Research question:

- Is science driven by prolific single experts or by high-impact co-authorship teams?

Contributions:

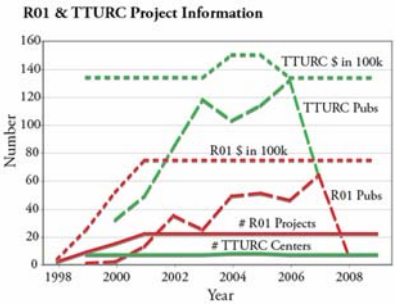
- New approach to allocate citational credit.
- Novel weighted graph representation.
- Visualization of the growth of weighted co-author network.
- Centrality measures to identify author impact.
- Global statistical analysis of paper production and citations in correlation with co-authorship team size over time.
- Local, author-centered entropy measure.

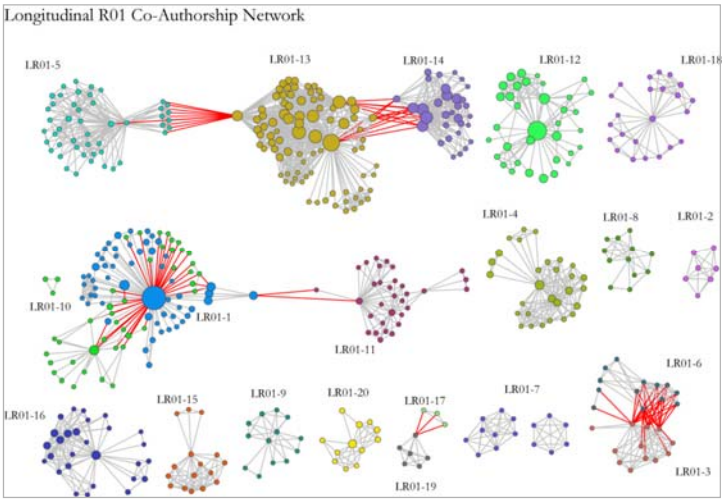
Mapping Transdisciplinary Tobacco Use Research Centers Publications

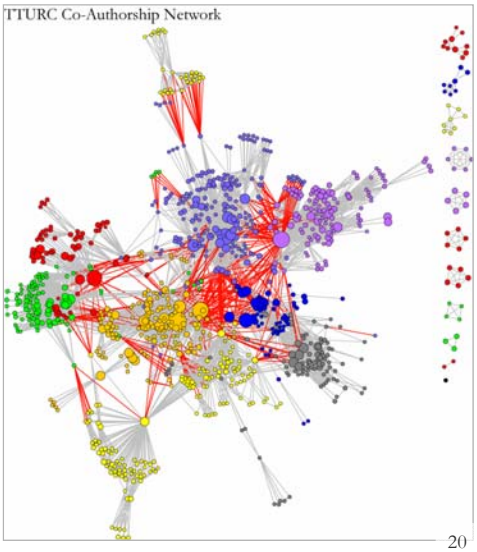
Compare R01 investigator based funding with TTURC Center awards in terms of number of publications and evolving co-author networks.

Zoss & Börner, forthcoming.

Supported by NIH/NCI Contract HHSN261200800812

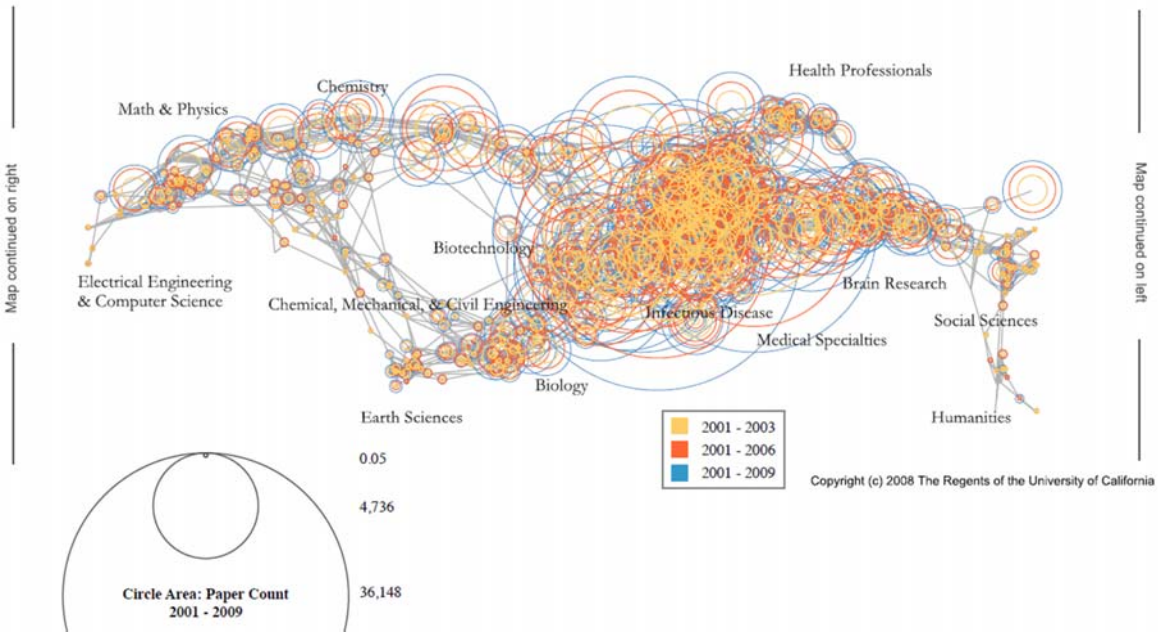






MEDLINE Publication Output by The National Institutes of Health (NIH) Using Nine Years of ExPORTER Data

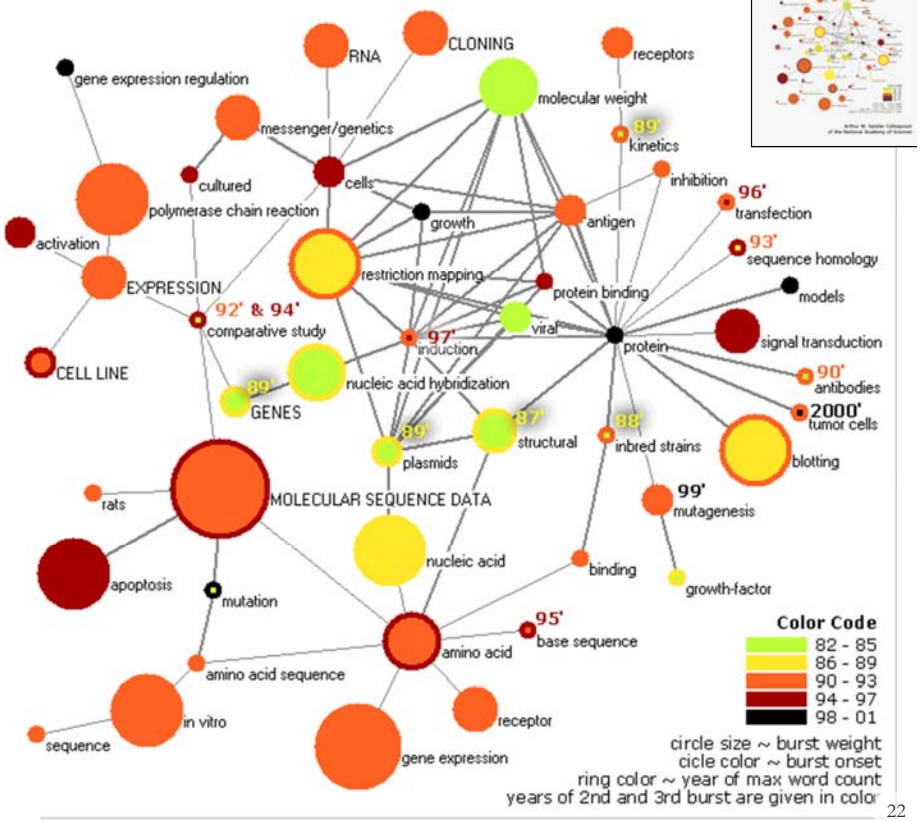
Katy Börner, Nianli Ma, Joseph R. Biberstine, Cyberinfrastructure for Network Science Center, SLIS, Indiana University, Robin M. Wagner, Rediet Berhane, Hong Jiang, Susan E. Ivey, Katrina Pearson and Carl McCabe, Reporting Branch, Division of Information Services, Office of Research Information Systems, Office of Extramural Research, Office of the Director, National Institutes of Health (NIH), Bethesda, MD.



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.



References

Börner, Katy, Chen, Chaomei, and Boyack, Kevin. (2003). **Visualizing Knowledge Domains.** In Blaise Cronin (Ed.), *ARIST*, Medford, NJ: Information Today, 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.), *ARIST*, Information Today, Inc., Volume 41, Chapter 12, pp. 537-607.
http://ivl.slis.indiana.edu/km/pub/2007-borner-arist.pdf

Börner, Katy (2010) **Atlas of Science**. MIT Press.
http://scimaps.org/atlas

Scharnhorst, Andrea, Börner, Katy, van den Besselaar, Peter (2011) **Models of Science Dynamics**. Springer Verlag.

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*

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

Information on how to host the exhibit or acquire a subset of the maps is at http://scimaps.org

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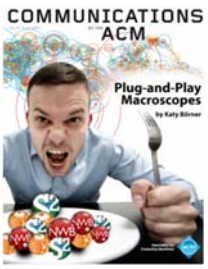

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Different Stakeholder Groups and Their Needs

Funding Agencies

- Need to monitor (long-term) money flow and research developments, identify areas for future development, stimulate new research areas, evaluate funding strategies for different programs, decide on project durations, funding patterns.

Scholars

- Want easy access to research results, relevant funding programs and their success rates, potential collaborators, competitors, related projects/publications *(research push)*.

Industry

- Is interested in fast and easy access to major results, experts, etc. Influences the direction of research by entering information on needed technologies *(industry-pull)*.

Advantages for Publishers

- Need easy to use interfaces to massive amounts of interlinked data. Need to communicate data provenance, quality, and context.

Society

- Needs easy access to scientific knowledge and expertise.

Scholars Have Different Roles/Needs

Researchers and Authors—need to select promising research topics, students, collaborators, and publication venues to increase their reputation. They benefit from a global view of competencies, reputation and connectivity of scholars; hot and cold research topics and bursts of activity, and funding available per research area.

Editors—have to determine editorial board members, assign papers to reviewers, and ultimately accept or reject papers. Editors need to know the position of their journals in the evolving world of science. They need to advertise their journals appropriately and attract high-quality submissions, which will in turn increase the journal's reputation.

Reviewers—read, critique, and suggest changes to help improve the quality of papers and funding proposals. They need to identify related works that should be cited or complementary skills that authors might consider when selecting project collaborators.

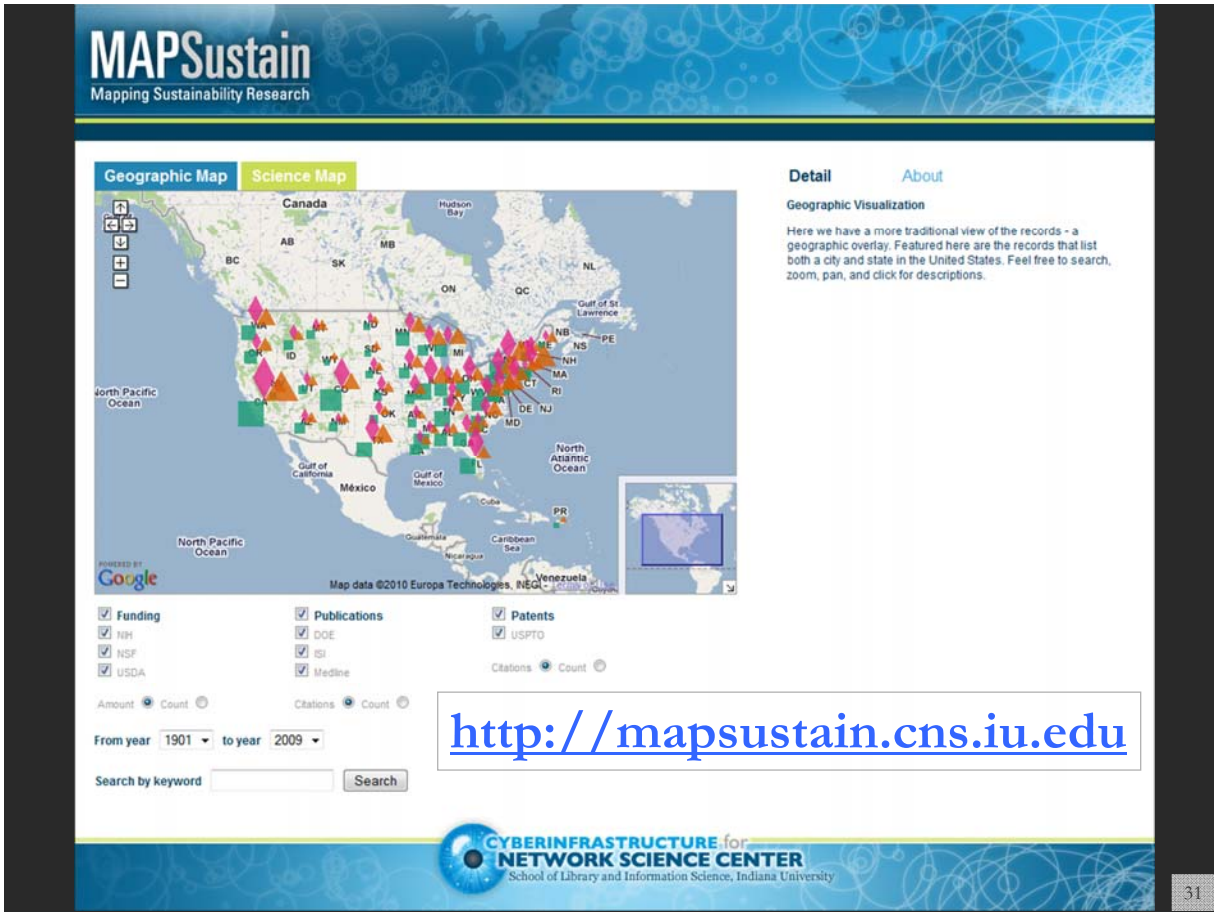
Teachers/Mentors—teach classes, train doctoral students, and supervise postdoctoral researchers. They need to identify key works, experts, and examples relevant to a topic area and teach them in the context of global science.

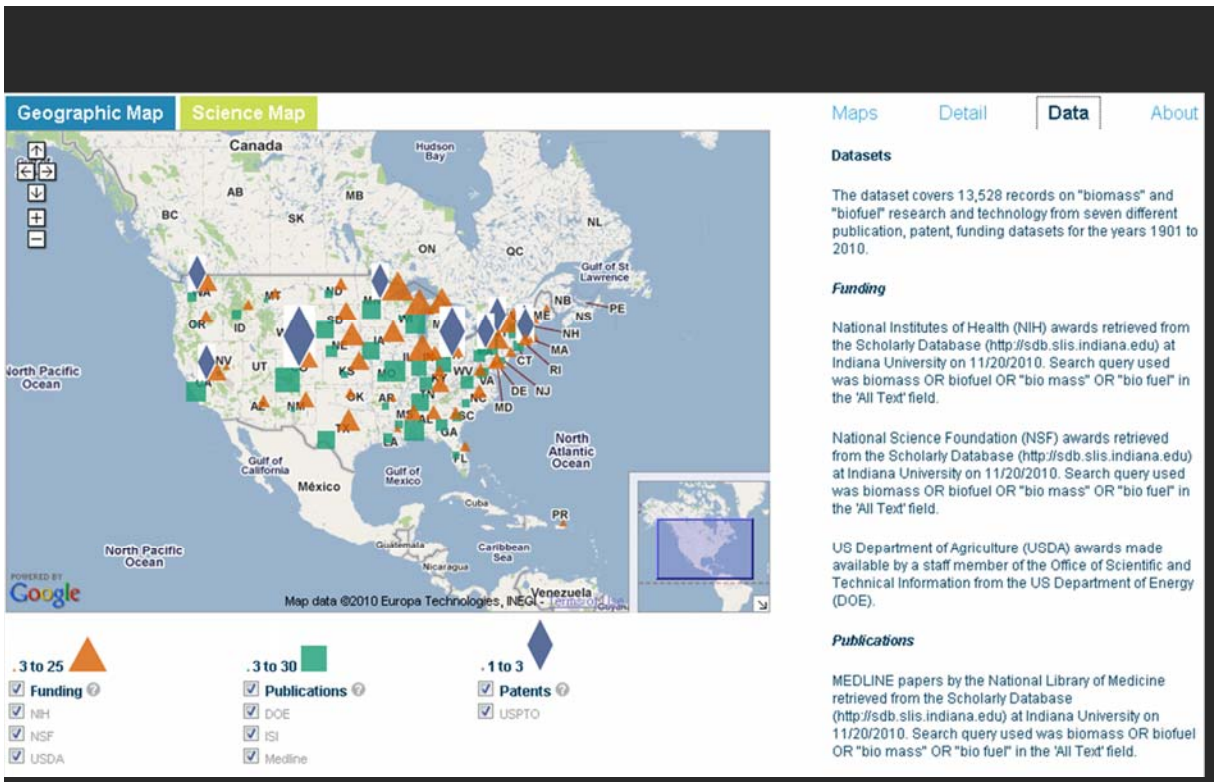
Inventors—create intellectual property and obtain patents, thus needing to navigate and make sense of research spaces as well as intellectual property spaces.

Investigators—scholars need funding to support students, hire staff, purchase equipment, or attend conferences. Here, research interests and proposals have to be matched with existing federal and commercial funding opportunities, possible industry collaborators and sponsors.

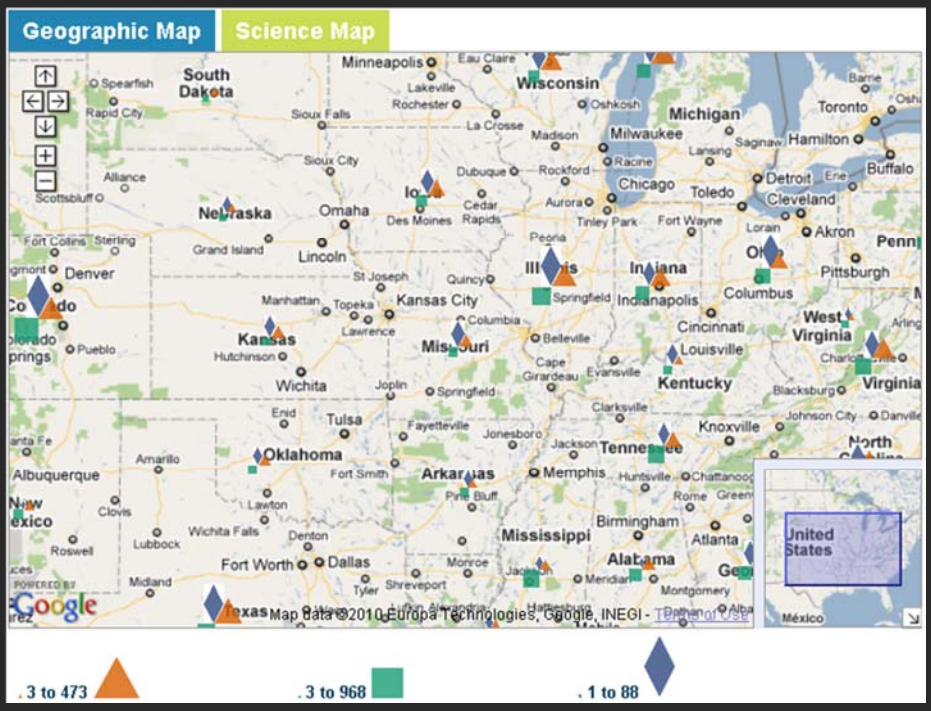
Team Leads and Science Administrators—many scholars direct multiple research projects simultaneously. Some have full-time staff, research scientists, and technicians in their laboratories and centers. Leaders need to evaluate performance and provide references for current or previous members; report the progress of different projects to funding agencies.

Mapping Sustainability Research

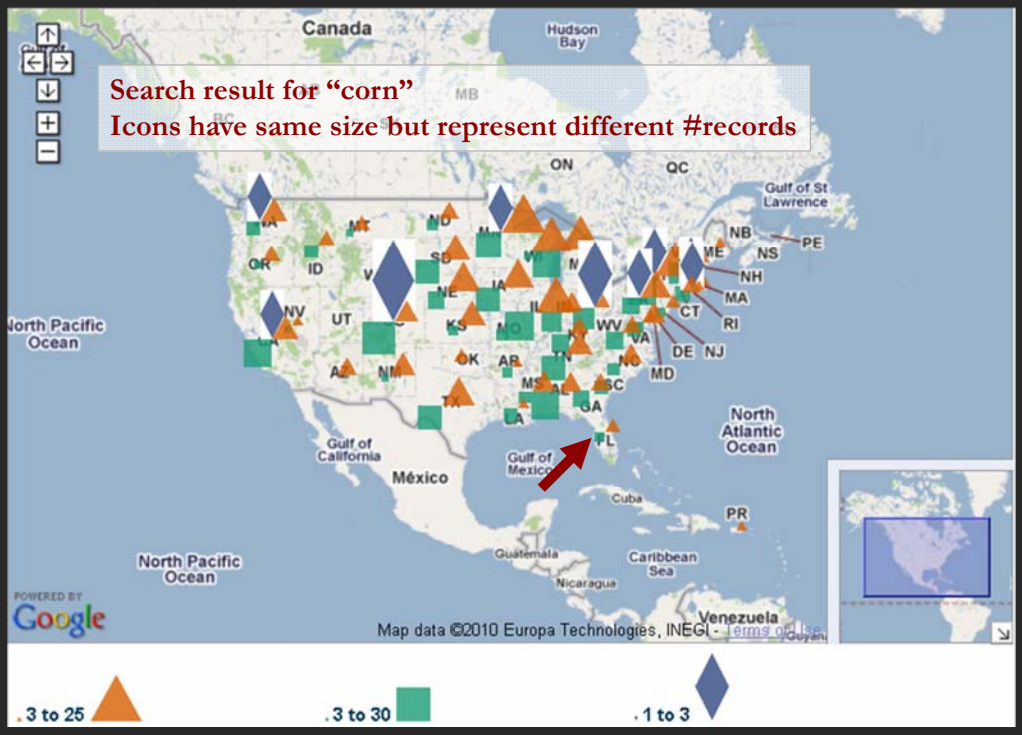


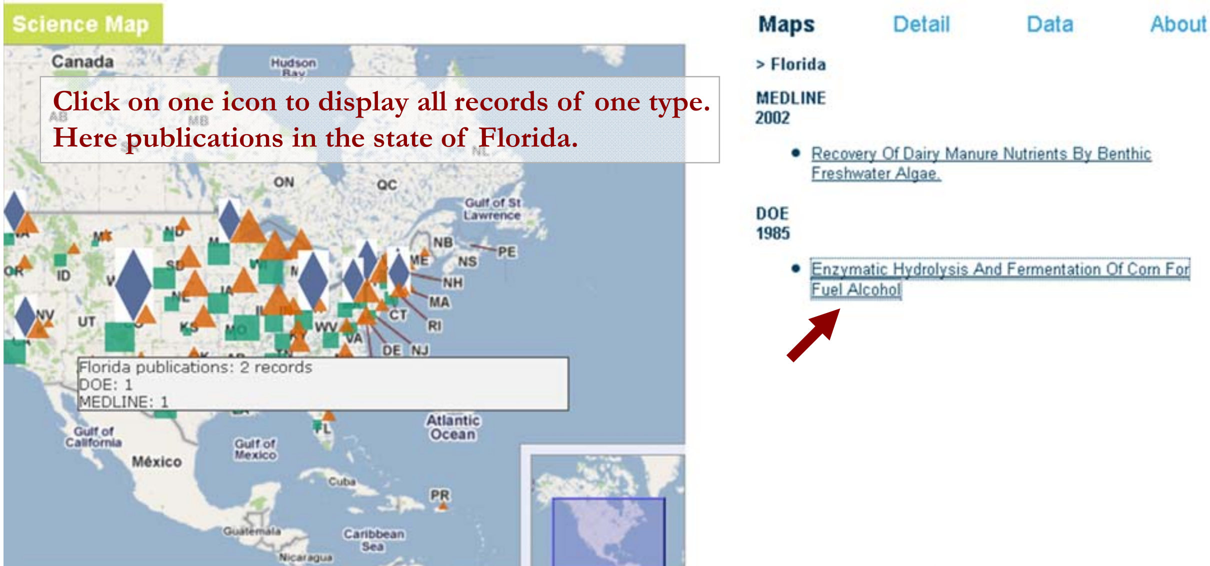


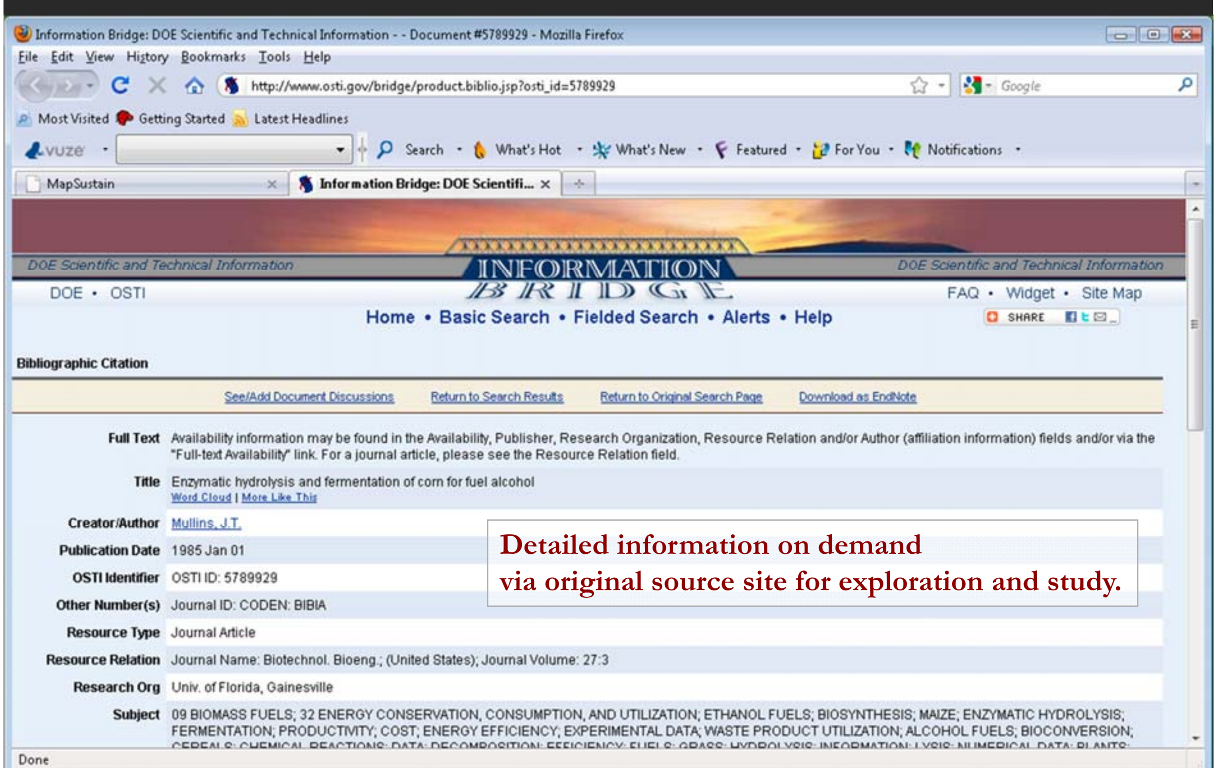
The geographic map at **state level**.



The geographic map at **city level**.




Science Map
Canada
Click on one icon to display all records of one type.
Here publications in the state of Florida.
Florida publications: 2 records
DOE: 1
MEDLINE: 1
Atlantic Ocean
Gulf of Mexico
México
Maps
Detail
Data
About
> Florida
MEDLINE
2002
Recovery Of Dairy Manure Nutrients By Benthic Freshwater Algae.
DOE
1985
Enzymatic Hydrolysis And Fermentation Of Corn For Fuel Alcohol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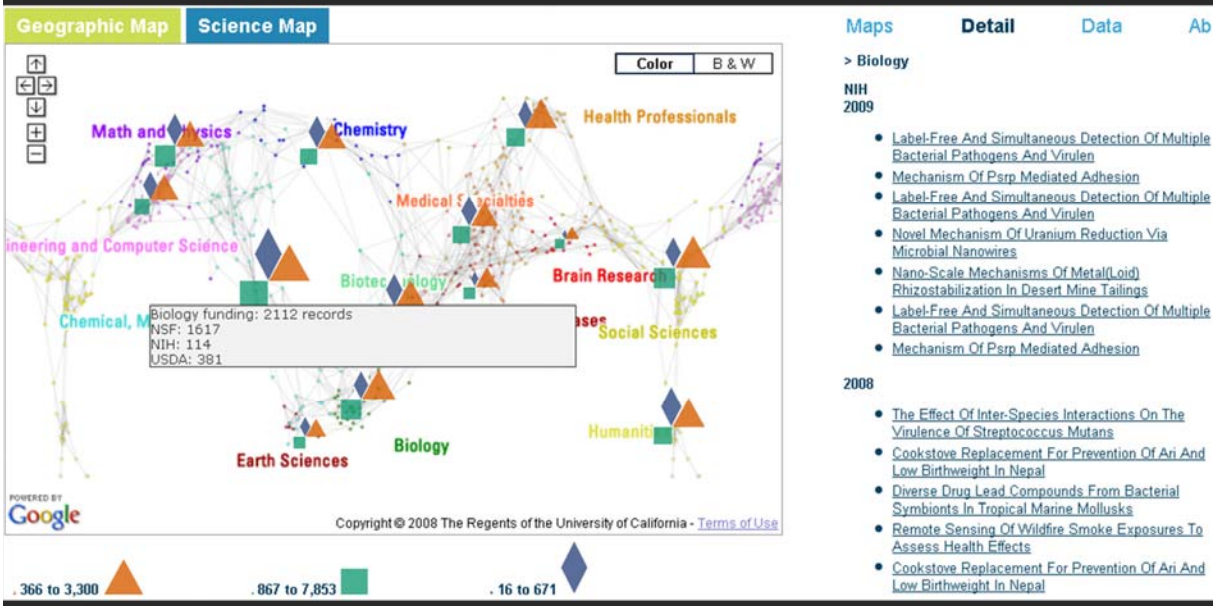
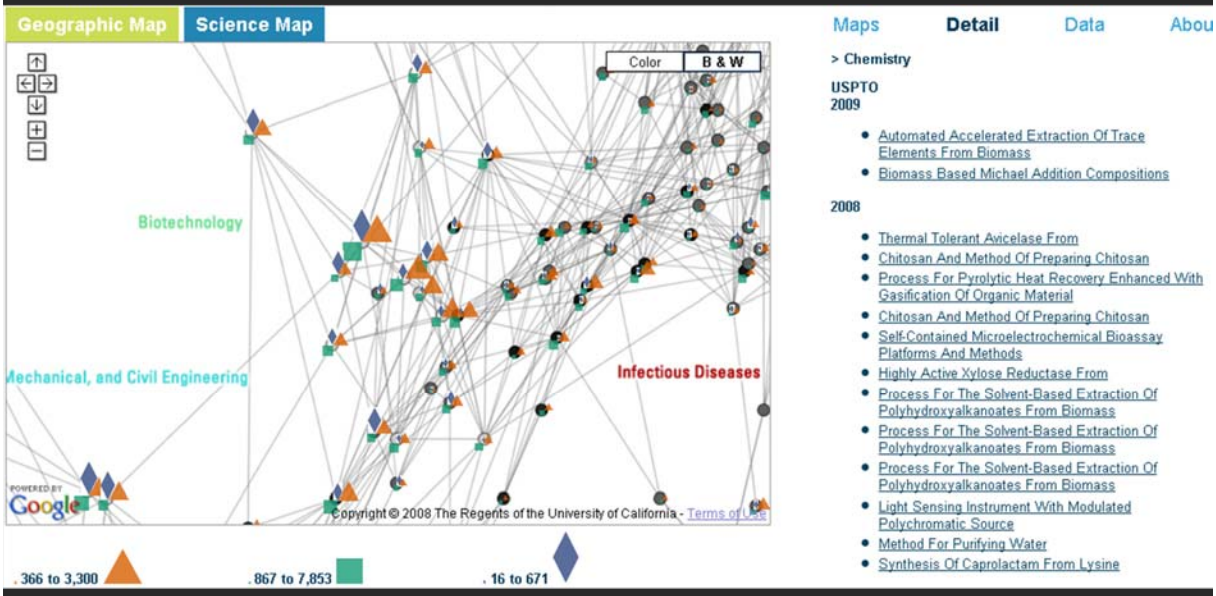
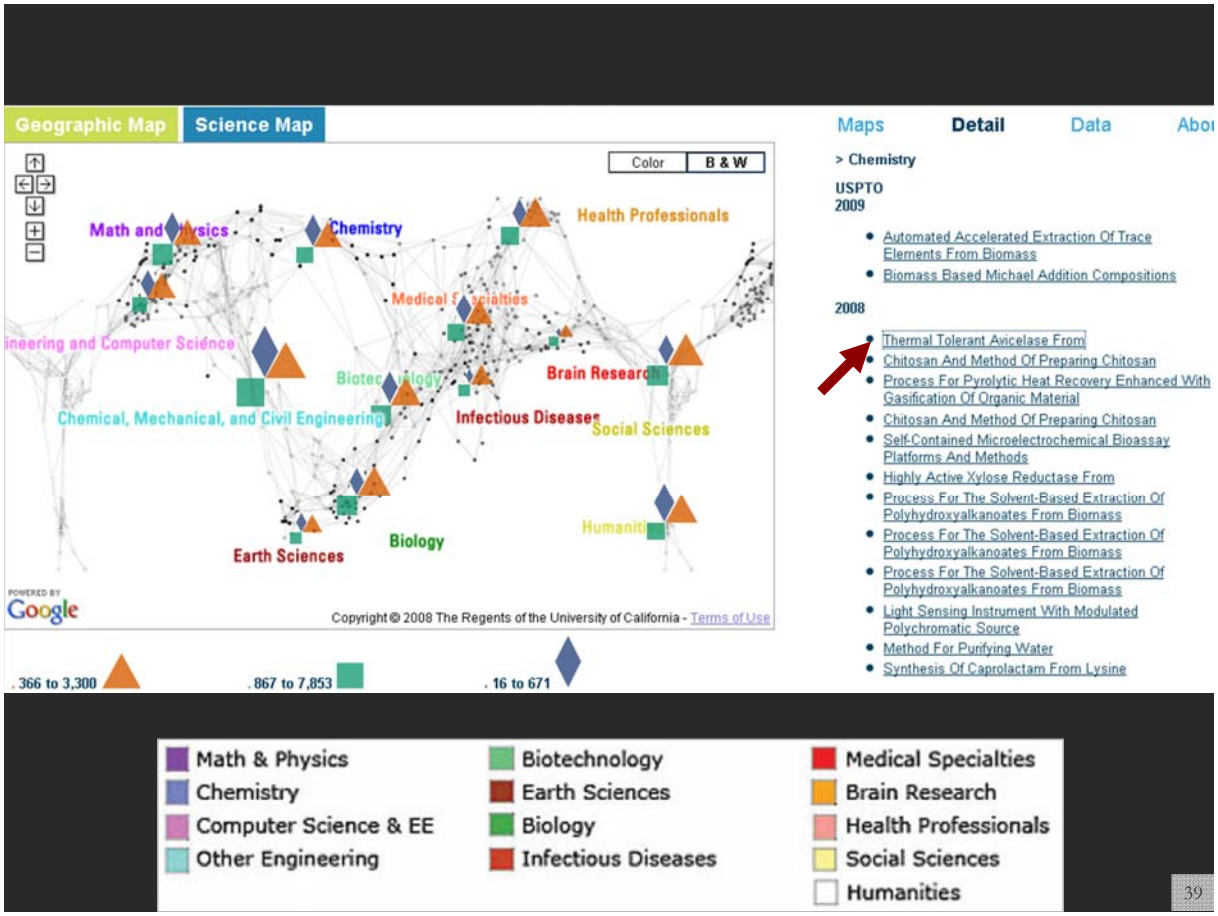
Title Enzymatic hydrolysis and fermentation of corn for fuel alcohol
Creator/Author Mullins, J.T.
Publication Date 1985 Jan 01
OSTI Identifier OSTI ID: 5789929
Other Number(s) Journal ID: CODEN: BIBIA
Resource Type Journal Article
Resource Relation Journal Name: Biotechnol. Bioeng.; (United States); Journal Volume: 27:3
Research Org Univ. of Florida, Gainesville
Subject 09 BIOMASS FUELS; 32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION; ETHANOL FUELS; BIOSYNTHESIS; MAIZE; ENZYMATIC HYDROLYSIS; FERMENTATION; PRODUCTIVITY; COST; ENERGY EFFICIENCY; EXPERIMENTAL DATA; WASTE PRODUCT UTILIZATION; ALCOHOL FUELS; BIOCONVERSION;
Detailed information on demand
via original source site for exploration and study.
Done

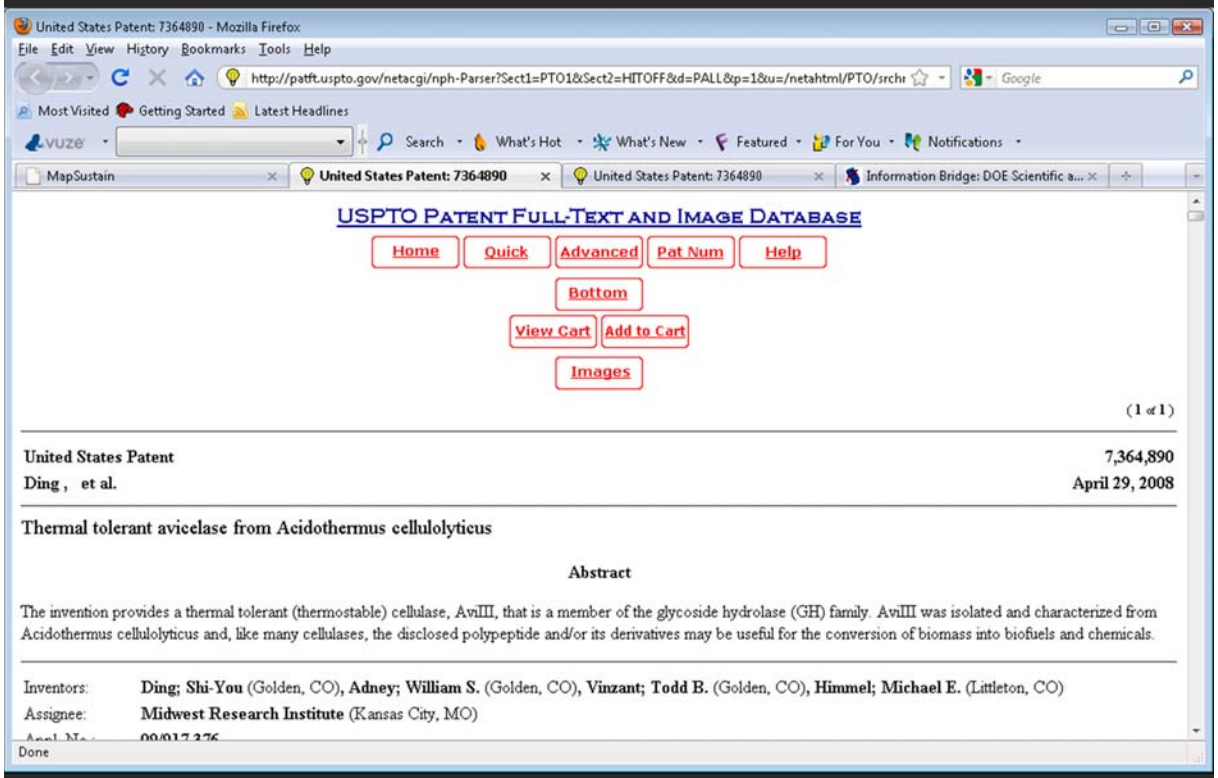


The science map at 13 top-level scientific **disciplines level**.

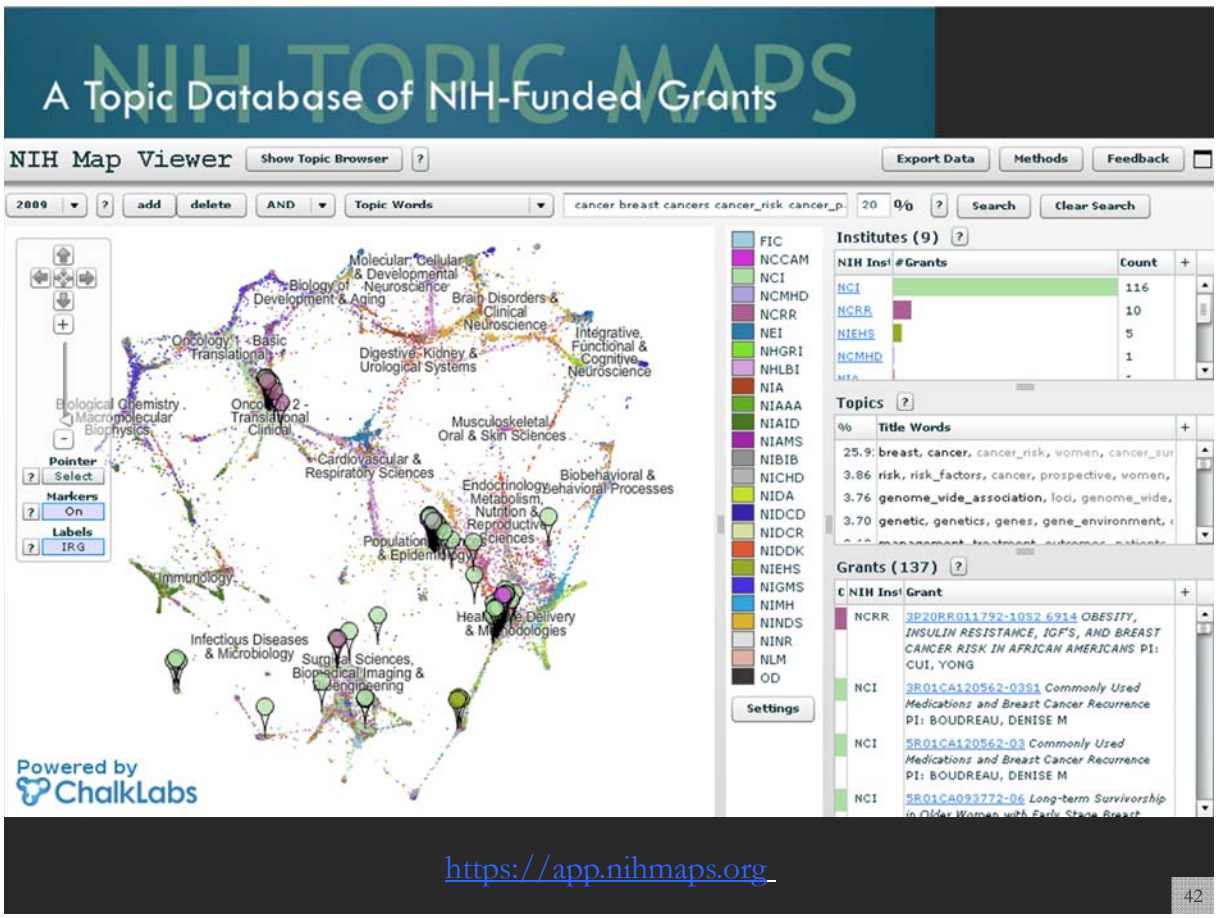


The science map at 554 **sub-disciplines level**.


Geographic Map
Science Map
Color
B & W
Math and Physics
Chemistry
Health Professionals
Medical Specialties
Engineering and Computer Science
Biotechnology
Brain Research
Chemical, Mechanical, and Civil Engineering
Infectious Diseases
Social Sciences
Earth Sciences
Biology
Humanities
Google
Copyright © 2008 The Regents of the University of California - Terms of Use
.366 to 3,300
.867 to 7,853
.16 to 671
Maps
Detail
Data
> Chemistry
USPTO
2009
Automated Accelerated Extraction Of Trace Elements From Biomass
Biomass Based Michael Addition Compositions
2008
Thermal Tolerant Avicelase From
Chitosan And Method Of Preparing Chitosan
Process For Pyrolytic Heat Recovery Enhanced With Gasification Of Organic Material
Chitosan And Method Of Preparing Chitosan
Self-Contained Microelectrochemical Bioassay Platforms And Methods
Highly Active Xylose Reductase From
Process For The Solvent-Based Extraction Of Polyhydroxyalkanoates From Biomass
Process For The Solvent-Based Extraction Of Polyhydroxyalkanoates From Biomass
Process For The Solvent-Based Extraction Of Polyhydroxyalkanoates From Biomass
Light Sensing Instrument With Modulated Polychromatic Source
Method For Purifying Water
Synthesis Of Caprolactam From Lysine
Math & Physics
Chemistry
Computer Science & EE
Other Engineering
Biotechnology
Earth Sciences
Biology
Infectious Diseases
Medical Specialties
Brain Research
Health Professionals
Social Sciences
Humanities

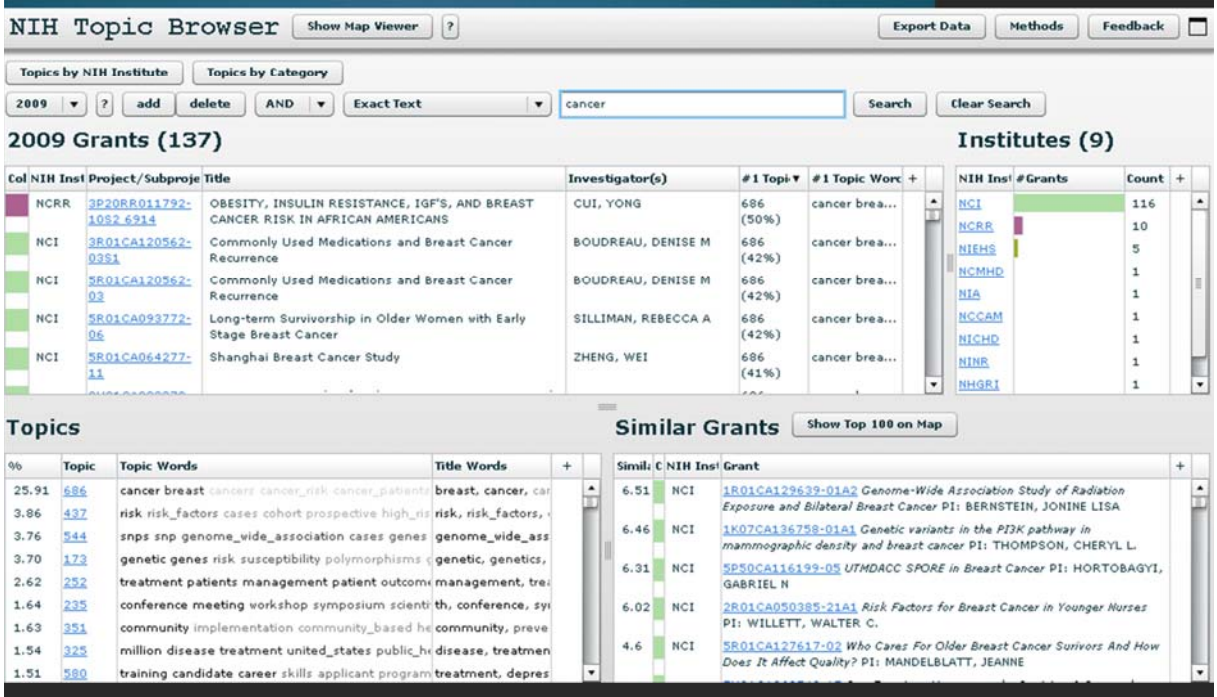

United States Patent: 7364890 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=/netahtml/PTO/srchr
Most Visited Getting Started Latest Headlines
Search What's Hot What's New Featured For You Notifications
MapSustain
United States Patent: 7364890
United States Patent: 7364890
Information Bridge: DOE Scientific a...
USPTO PATENT FULL-TEXT AND IMAGE DATABASE
Home Quick Advanced Pat Num Help
Bottom
View Cart Add to Cart
Images
(1 of 1)
United States Patent
Ding , et al.
7,364,890
April 29, 2008
Thermal tolerant avicelase from Acidothermus cellulolyticus
Abstract
The invention provides a thermal tolerant (thermostable) cellulase, AviIII, that is a member of the glycoside hydrolase (GH) family. AviIII was isolated and characterized from Acidothermus cellulolyticus and, like many cellulases, the disclosed polypeptide and/or its derivatives may be useful for the conversion of biomass into biofuels and chemicals.
Inventors: Ding; Shi-You (Golden, CO), Adney; William S. (Golden, CO), Vinzant; Todd B. (Golden, CO), Himmel; Michael E. (Littleton, CO)
Assignee: Midwest Research Institute (Kansas City, MO)
Done

NIH Topic Maps



https://app.nihmaps.org

A Topic Database of NIH-Funded Grants

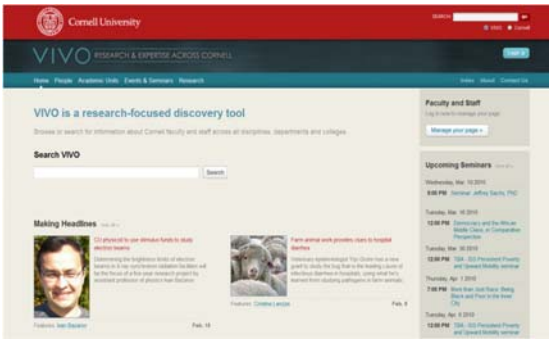


https://app.nihmaps.org

VIVO International Researcher Network

VIVO: A Semantic Approach to Creating a National Network of Researchers (http://vivoweb.org)

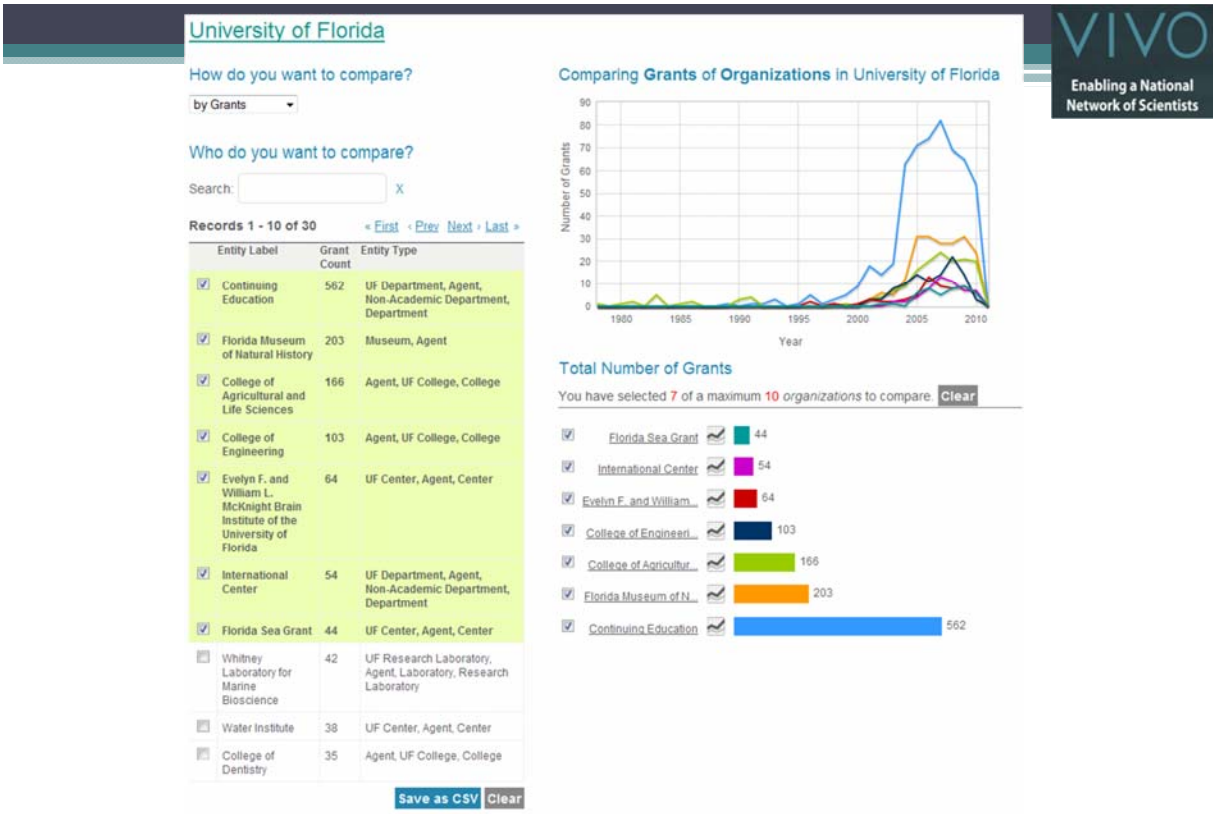
- Semantic web application and ontology editor originally developed at Cornell U.
- Integrates research and scholarship info from systems of record across institution(s).
- Facilitates research discovery and cross-disciplinary collaboration.
- Simplify reporting tasks, e.g., generate biosketch, department report.



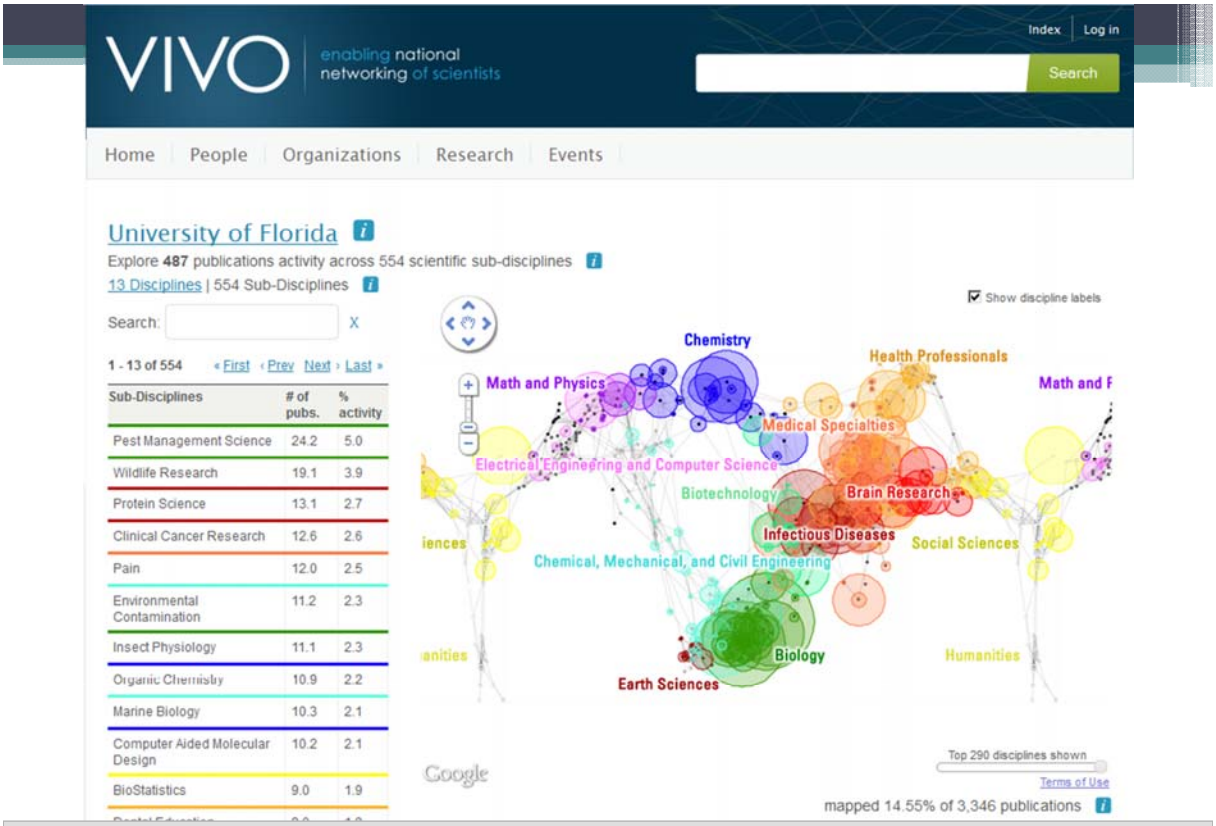
Funded by $12 million NIH award.

Cornell University: Dean Krafft (Cornell PI), Manolo Bevia, Jim Blake, Nick Cappadona, Brian Caruso, Jon Corson-Rikert, Elly Cramer, Medha Devare, John Fereira, Brian Lowe, Stella Mitchell, Holly Mistlebauer, Anup Sawant, Christopher Westling, Rebecca Younes. **University of Florida:** Mike Conlon (VIVO and UF PI), Cecilia Botero, Kerry Britt, Erin Brooks, Amy Buhler, Ellie Bushhousen, Chris Case, Valrie Davis, Nita Ferree, Chris Haines, Rae Jesano, Margeaux Johnson, Sara Kreinest, Yang Li, Paula Markes, Sara Russell Gonzalez, Alexander Rockwell, Nancy Schaefer, Michele R. Tennant, George Hack, Chris Barnes, Narayan Raum, Brenda Stevens, Alicia Turner, Stephen Williams. **Indiana University**: Katy Borner (IU PI), William Barnett, Shanshan Chen, Ying Ding, Russell Duhon, Jon Dunn, Micah Linnemeier, Nianli Ma, Robert McDonald, Barbara Ann O'Leary, Mark Price, Yuyin Sun, Alan Walsh, Brian Wheeler, Angela Zoss. **Ponce School of Medicine:** Richard Noel (Ponce PI), Ricardo Espada, Damaris Torres. **The Scripps Research Institute:** Gerald Joyce (Scripps PI), Greg Dunlap, Catherine Dunn, Brant Kelley, Paula King, Angela Murrell, Barbara Noble, Cary Thomas, Michaeleen Trimarchi. **Washington University, St. Louis**: Rakesh Nagarajan (WUSTL PI), Kristi L. Holmes, Sunita B. Koul, Leslie D. McIntosh. **Weill Cornell Medical College:** Curtis Cole (Weill PI), Paul Albert, Victor Brodsky, Adam Cheriff, Oscar Cruz, Dan Dickinson, Chris Huang, Itay Klaz, Peter Michelini, Grace Migliorisi, John Ruffing, Jason Specland, Tru Tran, Jesse Turner, Vinay Varughese.

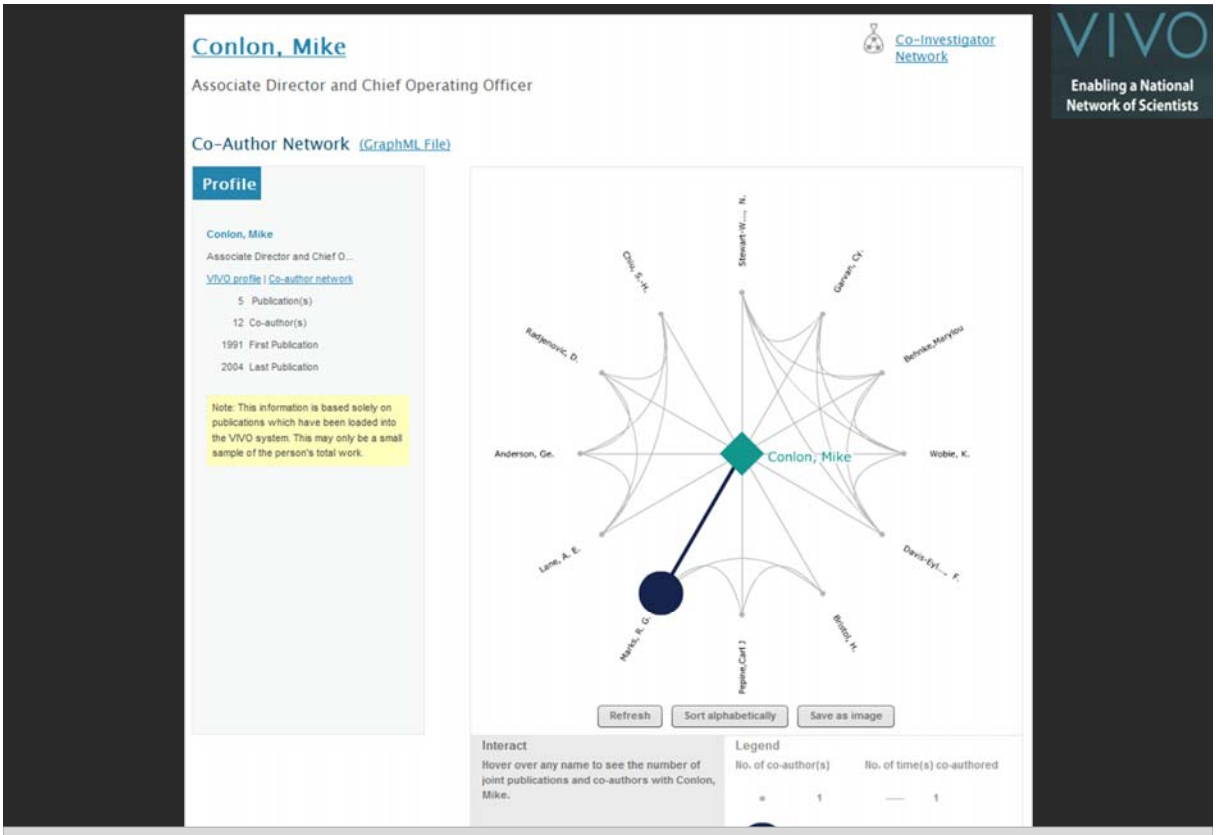
UF Clinical and Translational Science Institute
UNIVERSITY of FLORIDA



Temporal Analysis (When) Temporal visualizations of the number of papers/funding award at the institution, school, department, and people level



Topical Analysis (What) Science map overlays will show where a person, department, or university publishes most in the world of science. (in work)



Network Analysis (With Whom?) Who is co-authoring, co-investigating, co-inventing with whom? What teams are most productive in what projects?

http://nrn.cns.iu.edu

Geospatial Analysis (Where) Where is what science performed by whom? Science is global and needs to be studied globally.

VIVO On-The-Go

Overview, Interactivity, Details on Demand come to commonly used devices and environments

Develop VIVO Visualizations

See also Visualization in VIVO Workshop on Aug 24, 2011
http://wiki.cns.iu.edu/display/PRES/VIVO+Presentation

VIVO Presentation

4 Added by Chin Hua Kong, last edited by Chintan Tank on Aug 24, 2011 (view change)

August, 2011 Workshop

Material

- Java 1.5 or higher - A programming language and computing platform for developing cross OS softwares.
- Science of Science tool (Sci2) - An desktop application for information analysis and visualization.
- Gephi - An interactive visualization tool for networks and complex systems, dynamic and hierarchical graphs.
- VIVO August 2011 workshop data.zip - Hands on workshop data package

Slides

- Tutorial Slides presented at the VIVO Conference 2011
- Pre-Questionnaire and Post-Questionnaire

Demo Links

- Map of Science Visualization (dev link)
- Temporal Graph Visualization (dev link)
- National Researcher Networking Visualization
- Word Cloud Visualization dev link

VIVO enabling national networking of scientists

Call for Papers

2012 VIVO Conference

August 22-24, 2012
InterContinental ~ Miami, FL

In the past 3 years, a growing international movement of developers, researchers, administrators, funders, librarians and informaticians has converged around the vision of openly representing research and researchers via Linked Open Data. VIVO is helping to make this vision a reality through its community, through open software and the VIVO ontology, and a growing number of adopters and collaborators worldwide, across multiple knowledge domains.

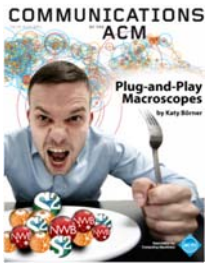
The 2012 VIVO conference will explore how to participate in and best take advantage of the emerging Linked Open Data world encompassing and expanding our understanding of research. How can we contribute? How will newly available data and the applications built around it change the future of research networking? How will the vision evolve into practice?

Overview

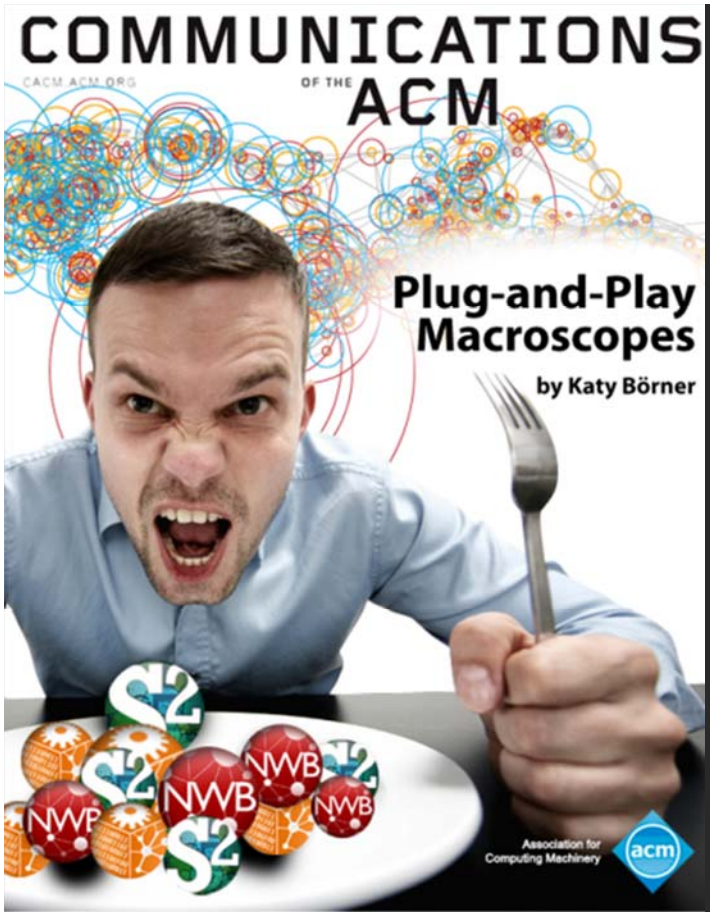
1. **Data mining and visualization research** that aims to increase our scientific understanding of the structure and dynamics of science and technology.

2. **Novel approaches and services** that improve information access, researcher networking, and research management.

3. **Data services and plug-and-play macroscope tools** that commoditize data mining and visualization.



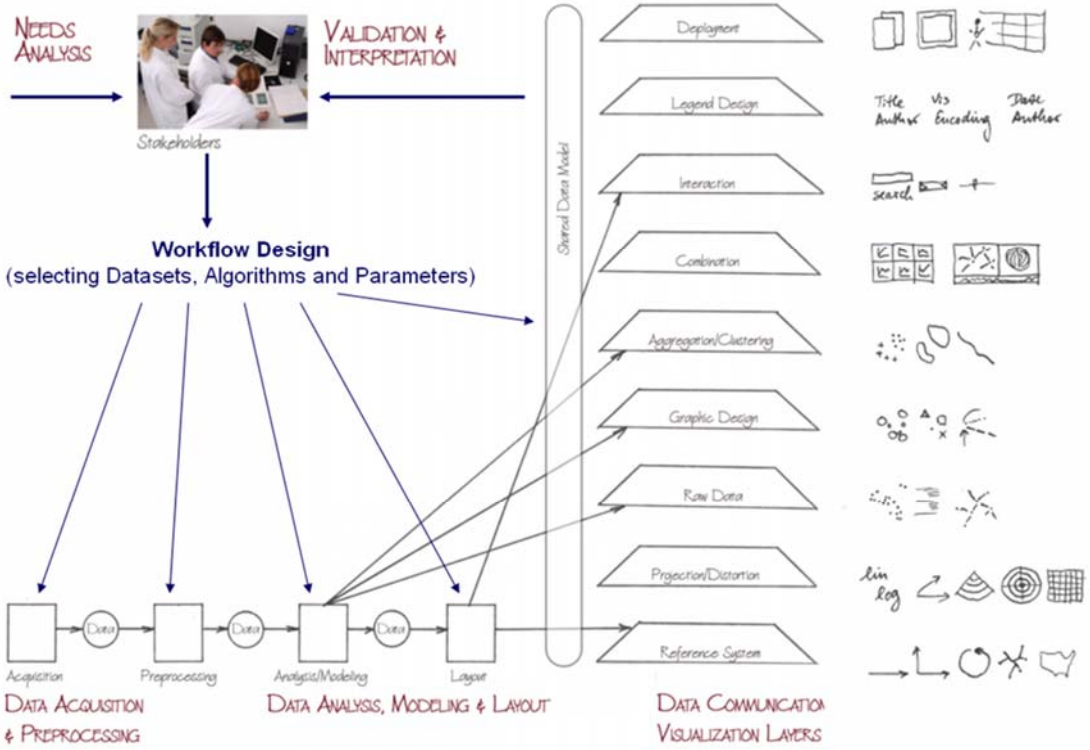
cyberinfrastructure for NETWORK SCIENCE CENTER
School of Library and Information Science | Indiana University Bloomington



Börner, Katy. (March 2011). Plug-and-Play Macroscopes. *Communications of the ACM, 54(3), 60-69.*

Video and paper are at
http://www.scivee.tv/node/27704

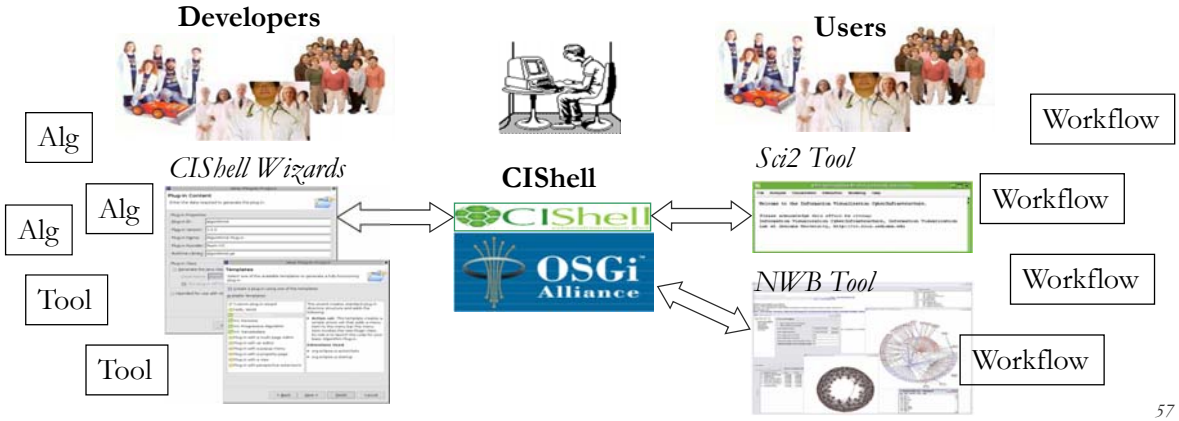
Needs-Driven Workflow Design using a modular data acquisition/analysis/ modeling/ visualization pipeline as well as modular visualization layers.



Börner, Katy (2010) Atlas of Science. MIT Press.

OSGi & CIShell

- CIShell (http://cishell.org) is an open source software specification for the integration and utilization of datasets, algorithms, and tools.
- It extends the Open Services Gateway Initiative (OSGi) (http://osgi.org), a standardized, component oriented, computing environment for networked services widely used in industry since more than 10 years.
- Specifically, CIShell provides "sockets" into which existing and new datasets, algorithms, and tools can be plugged using a wizard-driven process.



CIShell Developer Guide

(*http://cishell.wiki.cns.iu.edu*)

CIShell Home

Edit Add

1 Added by Micah Linnemeier, last edited by Micah Linnemeier on Mar 16, 2011 (view change)

About the Cyberinfrastructure Shell

The Cyberinfrastructure Shell (CIShell) is an open source, community-driven platform for the integration and utilization of datasets, algorithms, tools, and computing resources. Algorithm integration support is built in for Java and most other programming languages. Being Java based, it will run on almost all platforms. The software and specification is released under an Apache 2.0 License.

CIShell is the basis of Network Workbench, TexTrend, Sci² and the upcoming EpiC tool.

CIShell supports remote execution of algorithms. A standard web service definition is in development that will allow pools of algorithms to transparently be used in a peer-to-peer, client-server, or web front-end fashion.

CIShell Features

A framework for easy integration of new and existing algorithms written in any programming language

Using CIShell, an algorithm writer can fully concentrate on creating their own algorithm in whatever language they are comfortable with. Simple tools are provided to then take their algorithm and

Learn More...

- CIShell Papers
- CIShell Powered Tools
- Algorithms
- Plugins (coming soon)
- Misc. Tool Documentation
- CIShell Web Services (coming soon)
- Screenshots

Getting Started...

- Documentation & Developer Resources
- Download

Getting Involved...

- Contact Us

CIShell Portal (http://cishell.org)

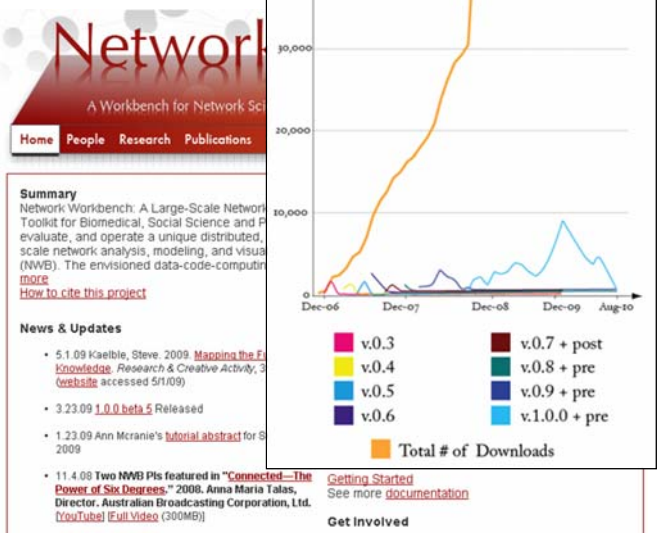
Network Workbench Tool
http://nwb.cns.edu

The Network Workbench (NWB) tool supports researchers, educators, and practitioners interested in the study of biomedical, social and behavioral science, physics, and other networks.

In February 2009, the tool provides more 169 plugins that support the preprocessing, analysis, modeling, and visualization of networks.

More than 50 of these plugins can be applied or were specifically designed for S&T studies.

It has been downloaded more than 65,000 times since December 2006.



Herr II, Bruce W., Huang, Weixia (Bonnie), Penumarthy, Shashikant & Börner, Katy. (2007). Designing Highly Flexible and Usable Cyberinfrastructures for Convergence. In Bainbridge, William S. & Roco, Mihail C. (Eds.), Progress in Convergence - Technologies for Human Wellbeing (Vol. 1093, pp. 161-179), Annals of the New York Academy of Sciences, Boston, MA.

Computational Proteomics

What relationships exist between protein targets of all drugs and all disease-gene products in the human protein–protein interaction network?

Yildrüm, Muhammed A., Kwan-II Goh, Michael E. Cusick, Albert-László Barabási, and Marc Vidal. (2007). Drug-target Network. Nature Biotechnology 25 no. 10: 1119-1126.

Figure 2 Drug–target network (DT network). The DT network is generated by using the known associations between FDA-approved drugs and their target proteins. Circles and rectangles correspond to drugs and target proteins, respectively. A link is placed between a drug node and a target node if the protein is a known target of that drug. The area of the drug (protein) node is proportional to the number of targets that the drug has (the number of drugs targeting the protein). Color codes are given in the legend. Drug nodes (circles) are colored according to their Anatomical Therapeutic Chemical Classification, and the target proteins (rectangular boxes) are colored according to their cellular component obtained from the Gene Ontology database.

Computational Economics

Does the type of product that a country exports matter for subsequent economic performance?

C. A. Hidalgo, B. Klinger, A.-L. Barabási, R. Hausmann (2007) The Product Space Conditions the Development of Nations. Science 317, 482 (2007).

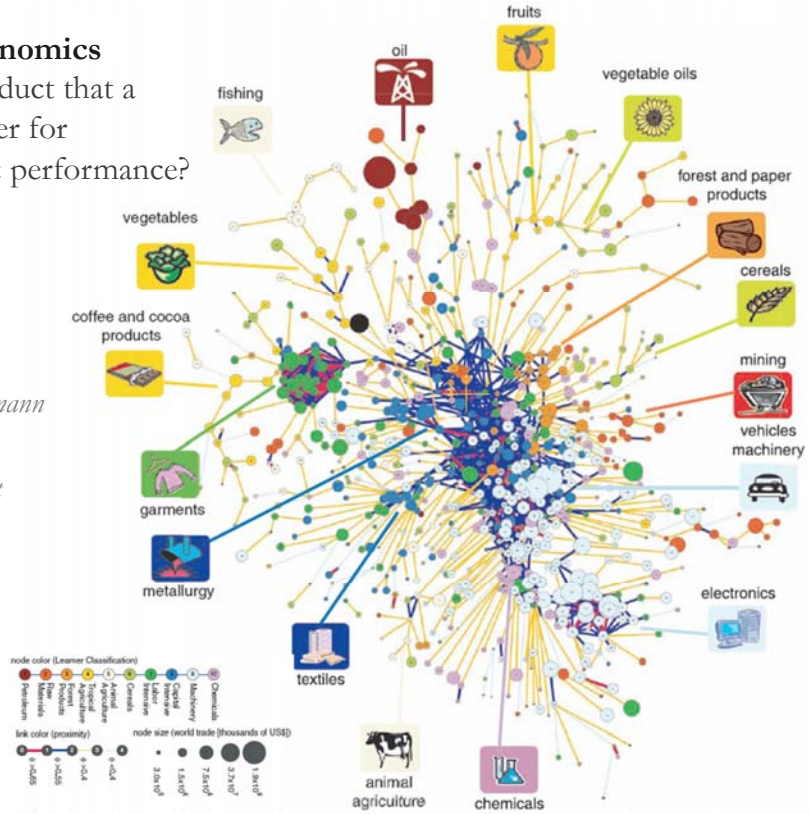


Fig. 1. The product space. **(A)** Hierarchically clustered proximity (φ) matrix representing the 775 SITC-4 product classes exported in the 1998–2000 period. **(B)** Network representation of the product space. Links are color coded with their proximity value. The sizes of the nodes are proportional to world trade, and their colors are chosen according to the classification introduced by Leamer.

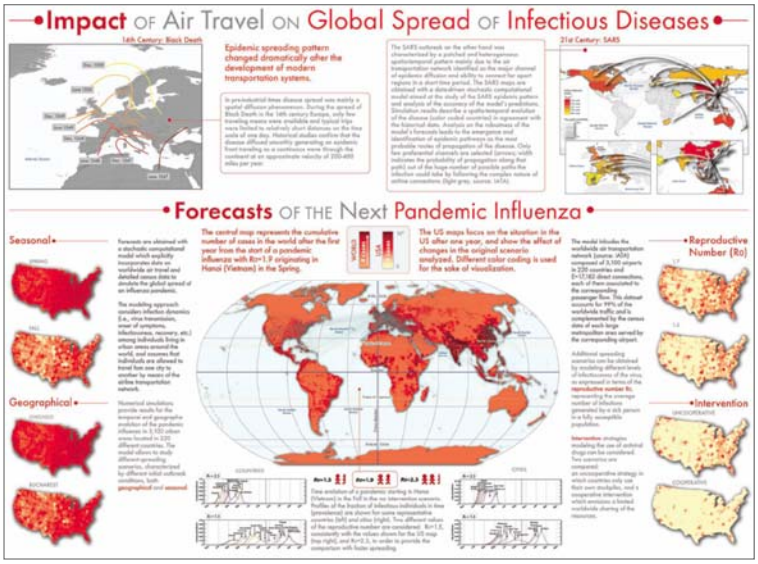
Computational Social Science
Studying large scale social networks such as Wikipedia

Second Sight: An Emergent Mosaic of Wikipedian Activity, The NewScientist, May 19, 2007

Computational Epidemics
Forecasting (and preventing the effects of) the next pandemic.

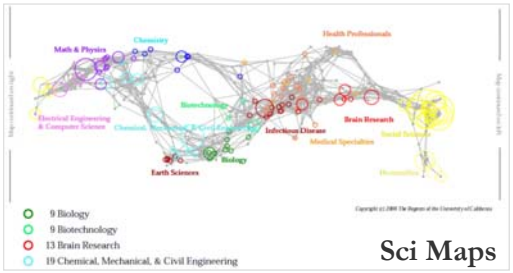
Epidemic Modeling in Complex realities, V. Colizza, A. Barrat, M. Barthelemy, A.Vespignani, Comptes Rendus Biologie, 330, 364-374 (2007).
Reaction-diffusion processes and metapopulation models in heterogeneous networks, V.Colizza, R. Pastor-Satorras, A.Vespignani, Nature Physics 3, 276-282 (2007).

Modeling the Worldwide Spread of Pandemic Influenza: Baseline Case and Containment Interventions, V. Colizza, A. Barrat, M. Barthelemy, A.-J. Valleron, A.Vespignani, PloS-Medicine 4, e13, 95-110 (2007).

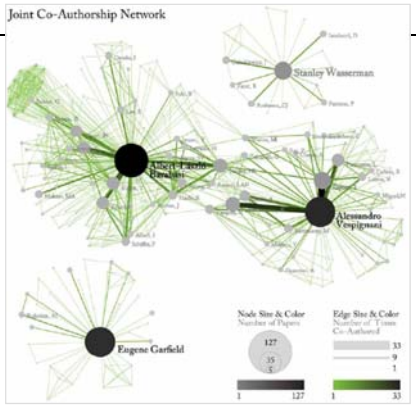


Sci² Tool – "Open Code for S&T Assessment"

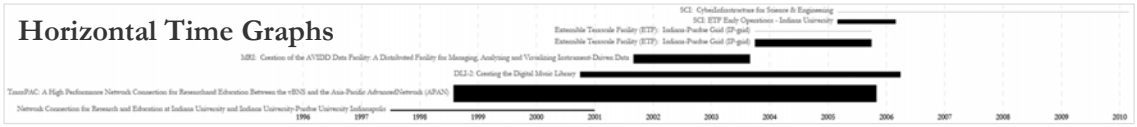
OSGi/CIShell powered tool with NWB plugins and many new scientometrics and visualizations plugins.



Sci Maps

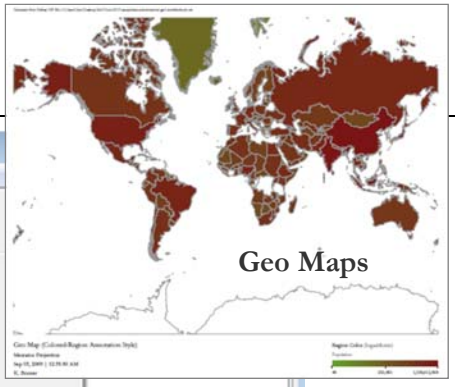


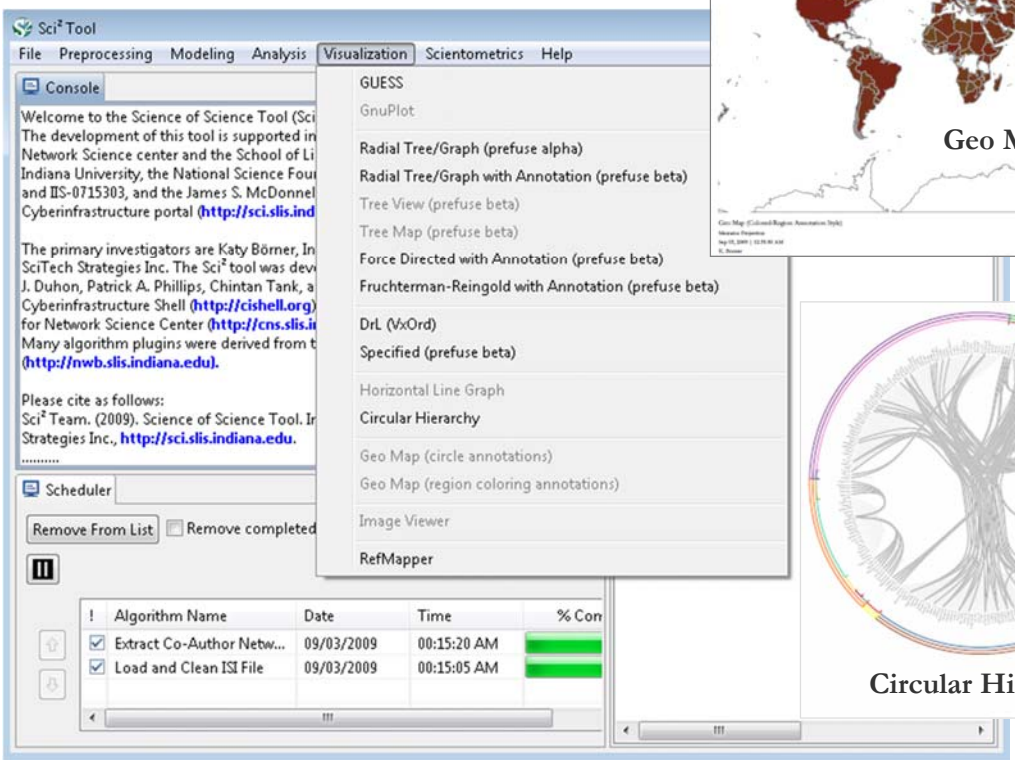
GUESS Network Vis

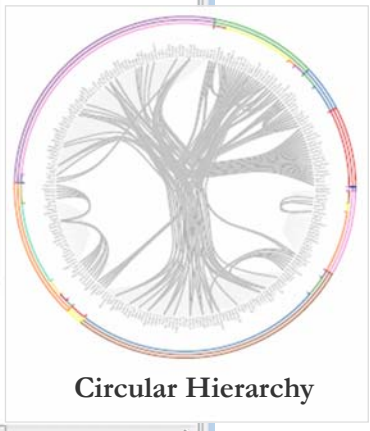


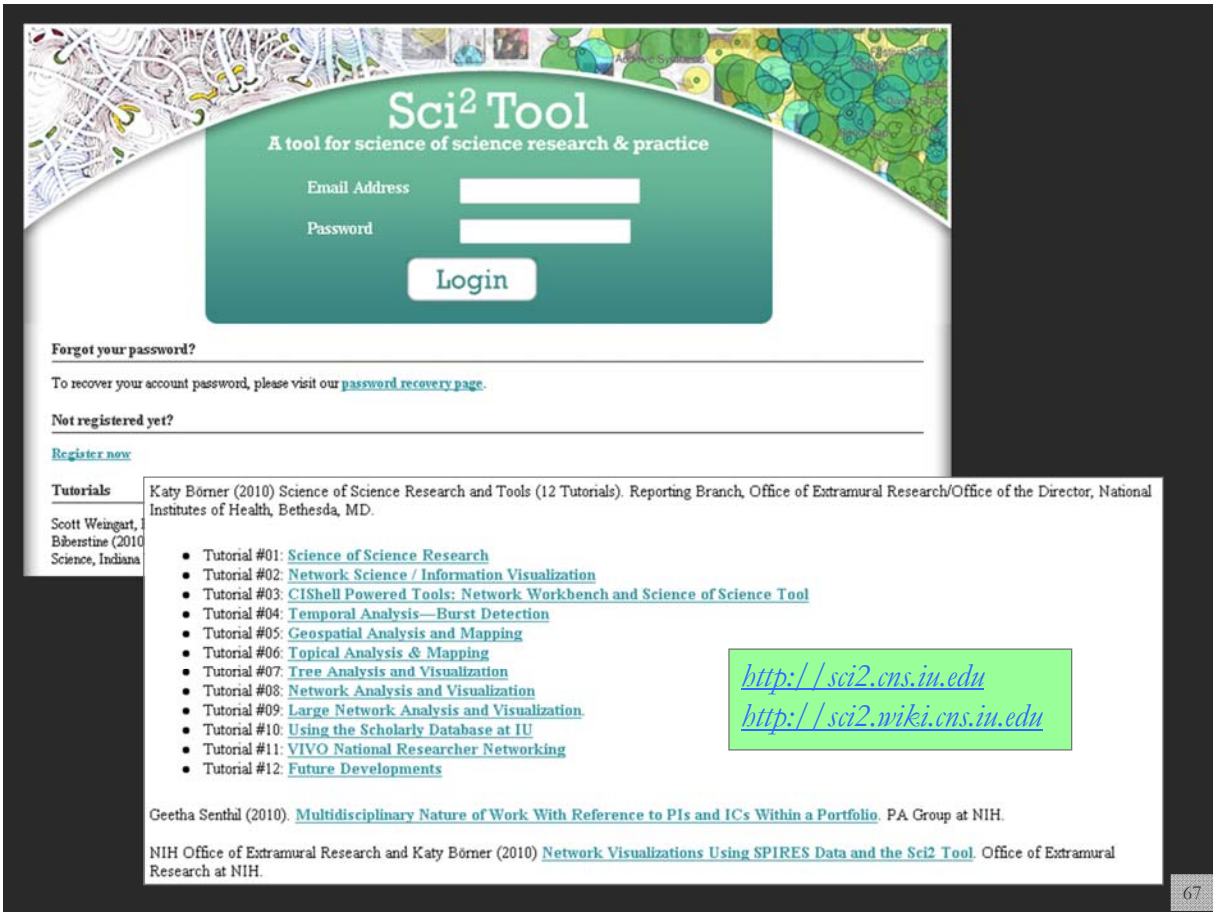
Börner, Katy, Huang, Weixia (Bonnie), Linnemeier, Micah, Duhon, Russell Jackson, Phillips, Patrick, Ma, Nianli, Zoss, Angela, Guo, Hanning & Price, Mark. (2009). Rete-Netzwerk-Red: Analyzing and Visualizing Scholarly Networks Using the Scholarly Database and the Network Workbench Tool. Proceedings of ISSI 2009: 12th International Conference on Scientometrics and Informetrics, Rio de Janeiro, Brazil, July 14-17 . Vol. 2, pp. 619-630.

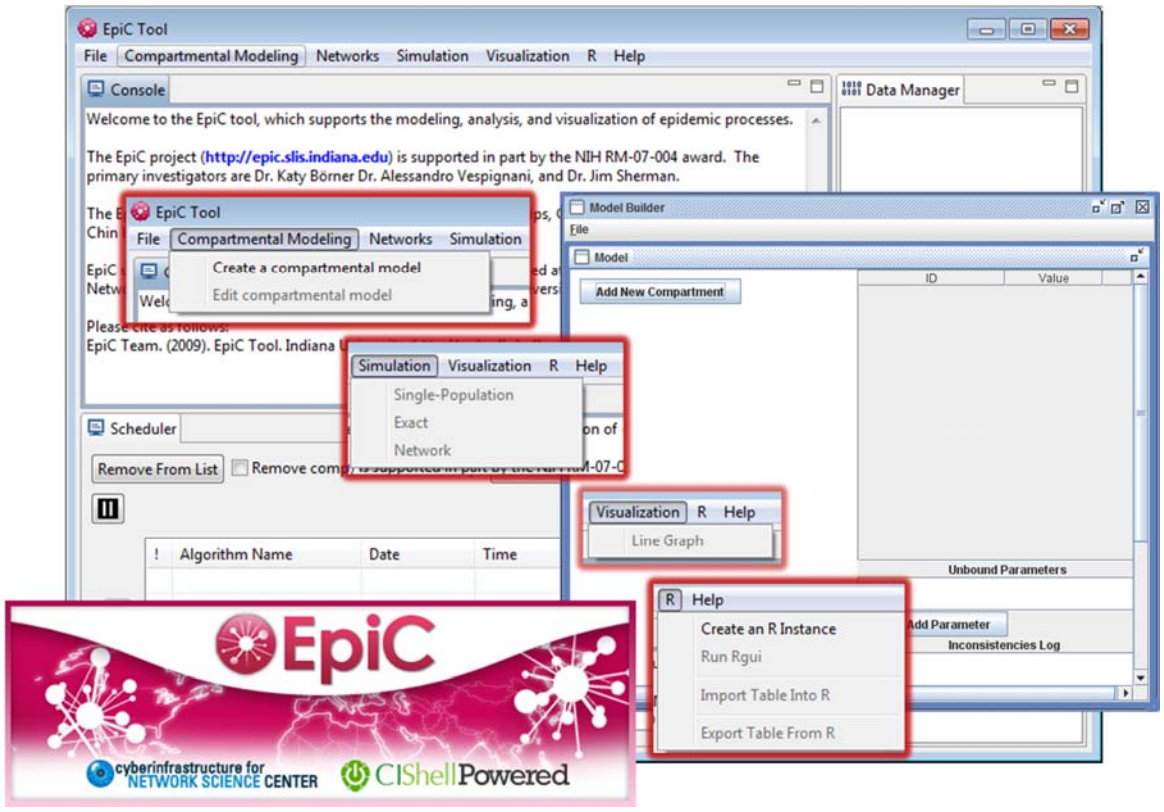
Sci² Tool Vis cont.








Sci² Tool
A tool for science of science research & practice
Email Address
Password
Login
Forgot your password?
To recover your account password, please visit our password recovery page.
Not registered yet?
Register now
Tutorials
Katy Börner (2010) Science of Science Research and Tools (12 Tutorials). Reporting Branch, Office of Extramural Research/Office of the Director, National Institutes of Health, Bethesda, MD.
Tutorial #01: Science of Science Research
Tutorial #02: Network Science / Information Visualization
Tutorial #03: CIShell Powered Tools: Network Workbench and Science of Science Tool
Tutorial #04: Temporal Analysis—Burst Detection
Tutorial #05: Geospatial Analysis and Mapping
Tutorial #06: Topical Analysis & Mapping
Tutorial #07: Tree Analysis and Visualization
Tutorial #08: Network Analysis and Visualization
Tutorial #09: Large Network Analysis and Visualization.
Tutorial #10: Using the Scholarly Database at IU
Tutorial #11: VIVO National Researcher Networking
Tutorial #12: Future Developments
http://sci2.cns.iu.edu
http://sci2.wiki.cns.iu.edu
Geetha Senthil (2010). Multidisciplinary Nature of Work With Reference to PIs and ICs Within a Portfolio. PA Group at NIH.
NIH Office of Extramural Research and Katy Börner (2010) Network Visualizations Using SPIRES Data and the Sci2 Tool. Office of Extramural Research at NIH.


EpiC Tool
File
Compartmental Modeling
Networks
Simulation
Visualization
R
Help
Console
Data Manager
Welcome to the EpiC tool, which supports the modeling, analysis, and visualization of epidemic processes.
The EpiC project (http://epic.slis.indiana.edu) is supported in part by the NIH RM-07-004 award. The primary investigators are Dr. Katy Börner Dr. Alessandro Vespignani, and Dr. Jim Sherman.
Create a compartmental model
Edit compartmental model
Model Builder
Model
Add New Compartment
ID
Value
Single-Population
Exact
Network
Scheduler
Remove From List
Algorithm Name
Date
Time
Line Graph
Unbound Parameters
Add Parameter
Inconsistencies Log
Create an R Instance
Run Rgui
Import Table Into R
Export Table From R
EpiC
cyberinfrastructure for NETWORK SCIENCE CENTER
CIShell Powered

OSGi/CIShell Adoption

A number of other projects recently adopted OSGi and/or CIShell:

USA

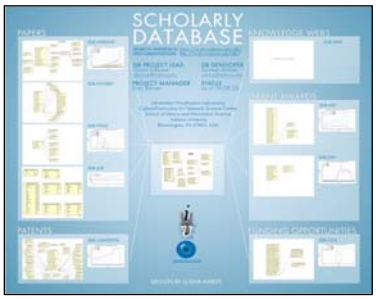
- *Cytoscape (http://cytoscape.org)* Led by Trey Ideker at the University of California, San Diego is an open source bioinformatics software platform for visualizing molecular interaction networks and integrating these interactions with gene expression profiles and other state data (Shannon et al., 2002).
- *MAEviz (https://wiki.ncsa.uiuc.edu/display/MAE/Home)* Managed by Jong Lee at NCSA is an open-source, extensible software platform which supports seismic risk assessment based on the Mid-America Earthquake (MAE) Center research.

Europe

- *Taverna Workbench (http://taverna.org.uk)* Developed by the myGrid team (http://mygrid.org.uk) led by Carol Goble at the University of Manchester, U.K. is a free software tool for designing and executing workflows (Hull et al., 2006). Taverna allows users to integrate many different software tools, including over 30,000 web services.
- *TEXTrend (http://textrend.org)* Led by George Kampis at Eötvös Loránd University, Budapest, Hungary supports natural language processing (NLP), classification/mining, and graph algorithms for the analysis of business and governmental text corpuses with an inherently temporal component.
- *DynaNets (http://www.dynanets.org)* Coordinated by Peter M.A. Sloot at the University of Amsterdam, The Netherlands develops algorithms to study evolving networks.
- *SISOB (http://sisob.lcc.uma.es)* An Observatory for Science in Society Based in Social Models.

As the functionality of OSGi-based software frameworks improves and the number and diversity of dataset and algorithm plugins increases, the capabilities of custom tools will expand.

Computational Scientometrics Cyberinfrastructures



Scholarly Database: 25 million scholarly records
http://sdb.cns.iu.edu

James S. McDonnell Foundation

VIVO Research Networking
http://vivoweb.org

Information Visualization Cyberinfrastructure
http://iv.cns.iu.edu

Network Workbench Tool & Community Wiki
http://nwb.cns.iu.edu

Science of Science (Sci²) Tool
http://sci2.cns.iu.edu

Epidemics Tool & Marketplace Forthcoming

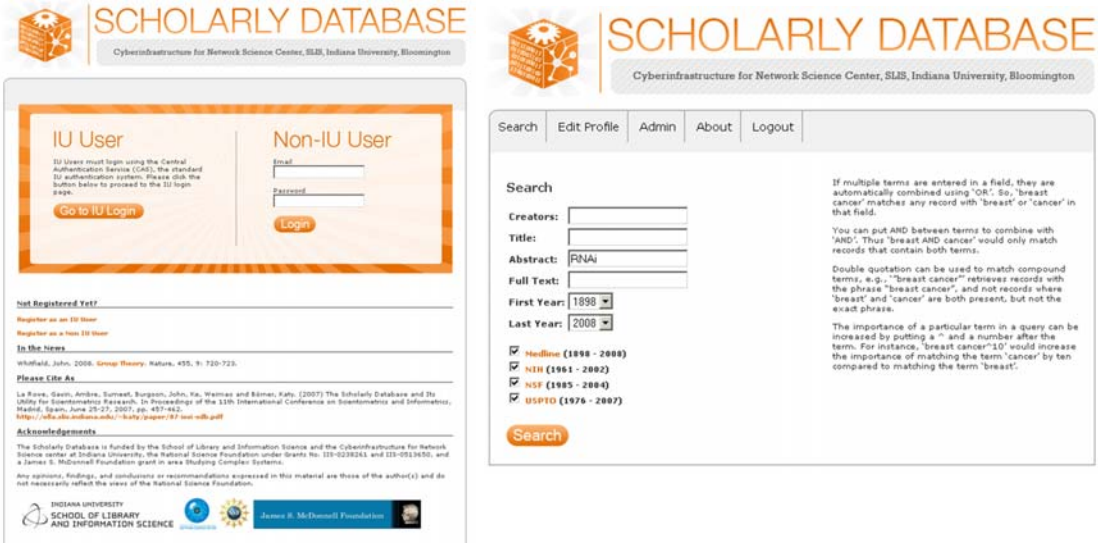
OSGi Alliance

CIShell cyberinfrastructure shell

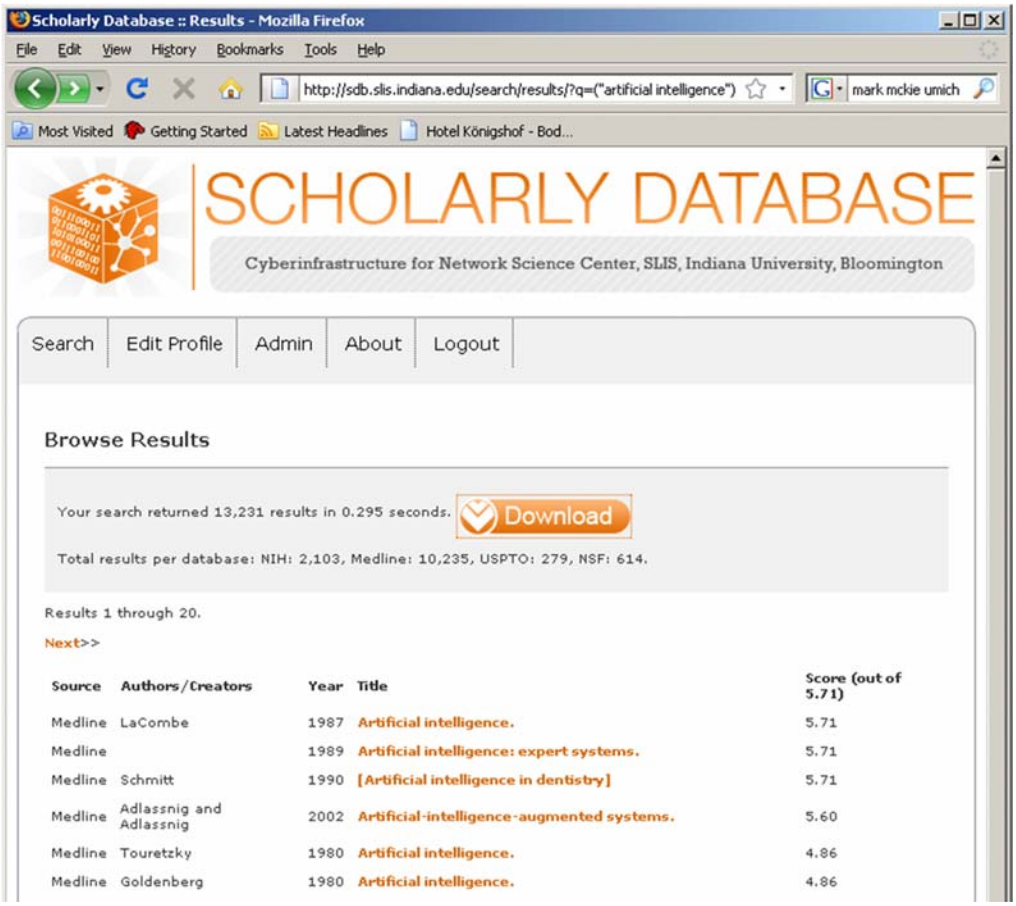
Scholarly Database at Indiana University

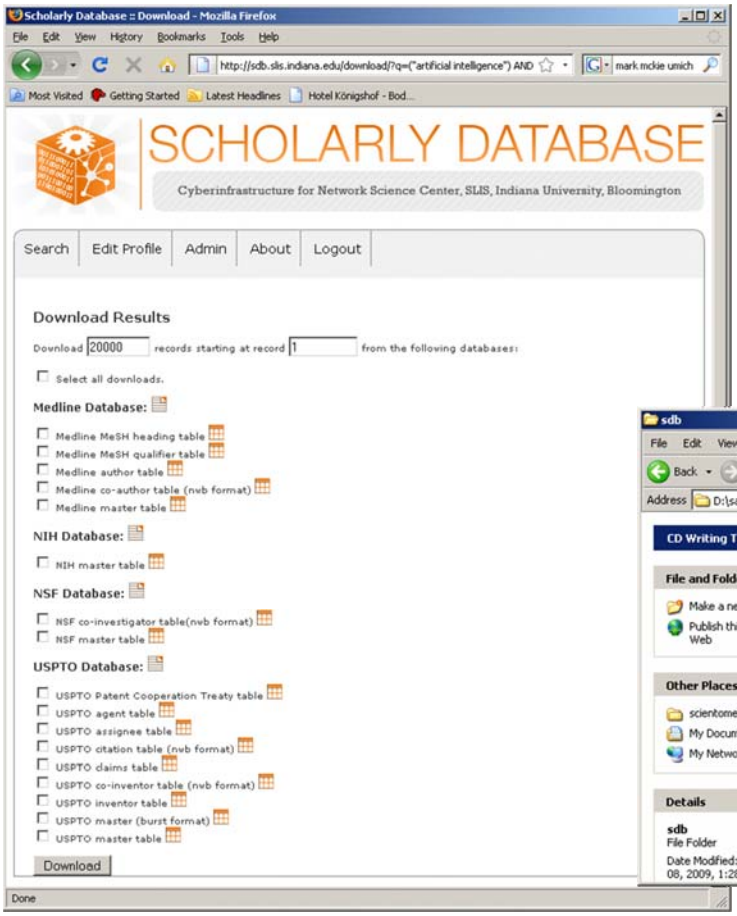
http://sdb.wiki.cns.iu.edu

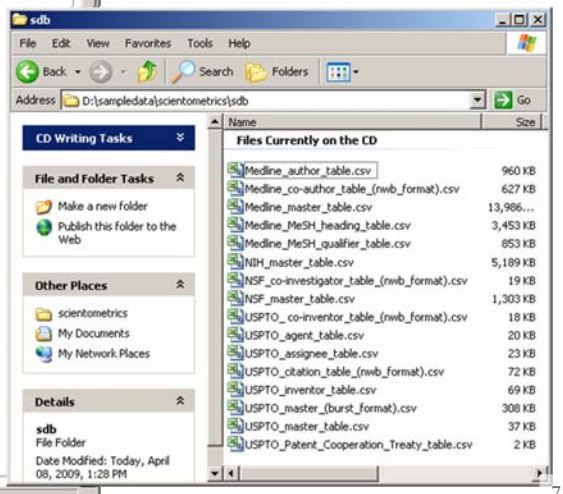
Supports federated search of 25 million publication, patent, grant records.
Results can be downloaded as data dump and (evolving) co-author, paper-citation networks.



Register for free access at http://sdb.cns.iu.edu







Since March 2009:
Users can download networks:
- Co-author
- Co-investigator
- Co-inventor
- Patent citation

and tables for
burst analysis in NWB.

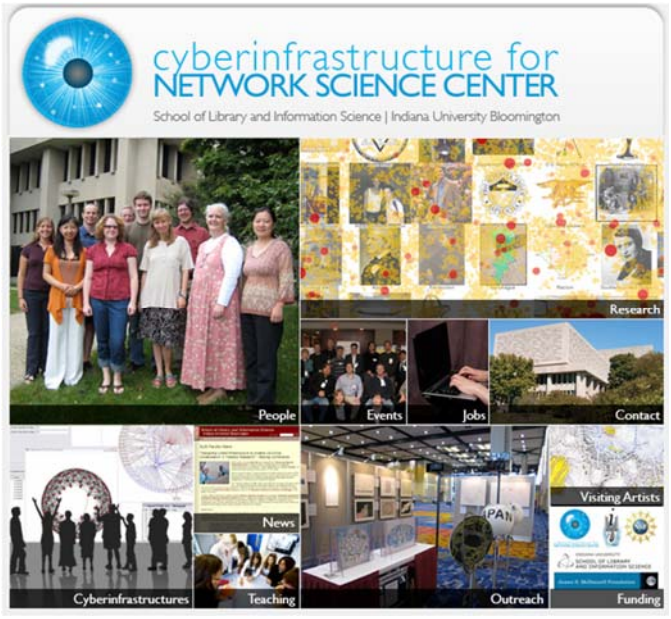
"Sci2 Tool: A Tool for Science of Science Research and Practice" Tutorial

Instructor: Dr. Katy Börner
Time/Date: 10:30a-12:30 and 13:30-15:30 on 13 April, 2012

Place: OECD Conference Centre (CC) Auditorium, OECD
2, rue André Pascal, 75775 Paris Cedex 16, France

Format: Lecture and "hands-on" training. Please bring your laptop.
Audience: This tutorial is designed for researchers and practitioners interested to use advanced data mining algorithms and visualizations in their research and daily decision making.
Cost: Free, but required to register via
http://www.surveymonkey.com/s/NPLF97Q

Abstract:
The Science of Science Tool (Sci²) (http://sci2.cns.iu.edu) was designed for researchers and practitioners interested to study and understand the structure and dynamics of science. Today it is used by major federal agencies in the US but also by researchers from more than 40 countries and from many different areas of research.



All papers, maps, tools, talks, press are linked from http://cns.iu.edu

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Mapping Science Exhibit Facebook: http://www.facebook.com/mappingscience