

Mapping Scientific Discovery through Advanced Computing

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With special thanks to the members at the Cyberinfrastructure for Network Science Center, Kevin W. Boyack, the VIVO Consortium, and the Mapping Science exhibit advisory board.

*Plenary Talk at Scientific Discovery through Advanced Computing Program (SciDAC) Conference
Brown Palace Hotel in Denver, Colorado*

July 14, 2011



Take terra bytes of data

- > 1 million ISI publications/year
- > 10 billion triples in the Linked Open Data cloud

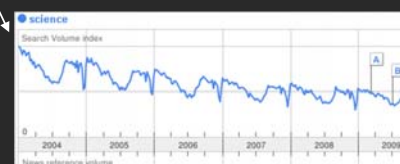
Black Box



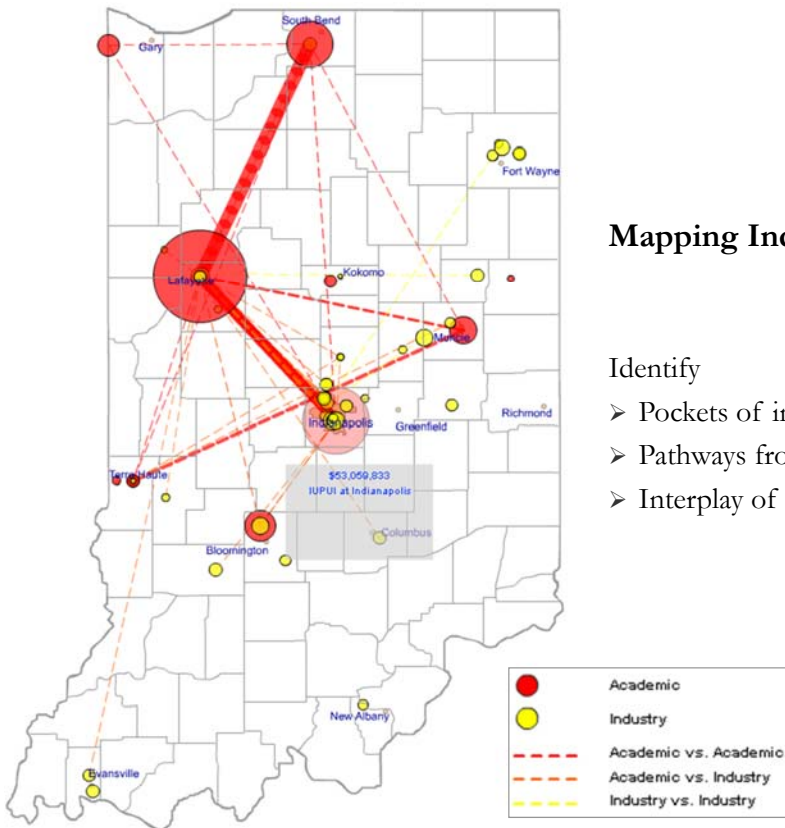
Find your way



Find collaborators, friends



Identify trends



Mapping Indiana's Intellectual Space

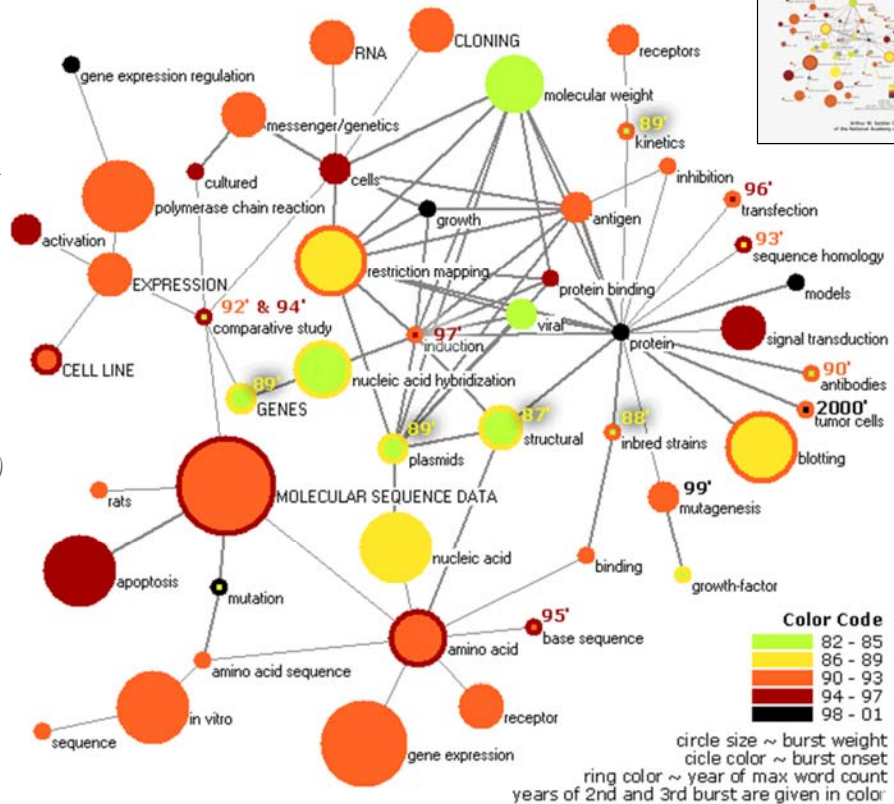
Identify

- 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.



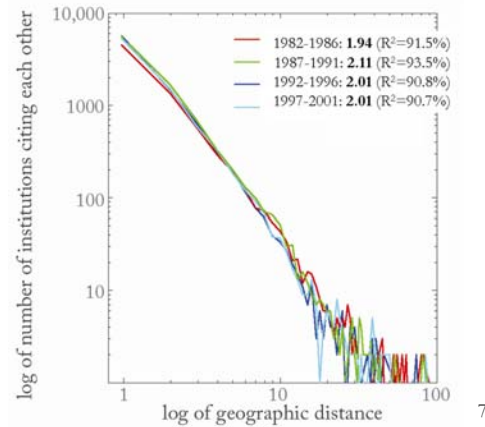
Research questions:

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 institutions?



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.

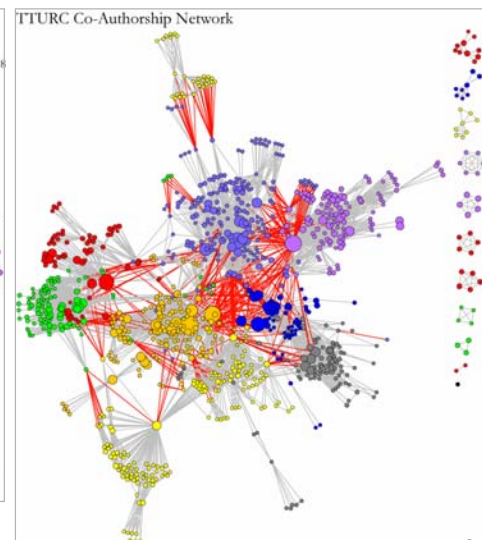
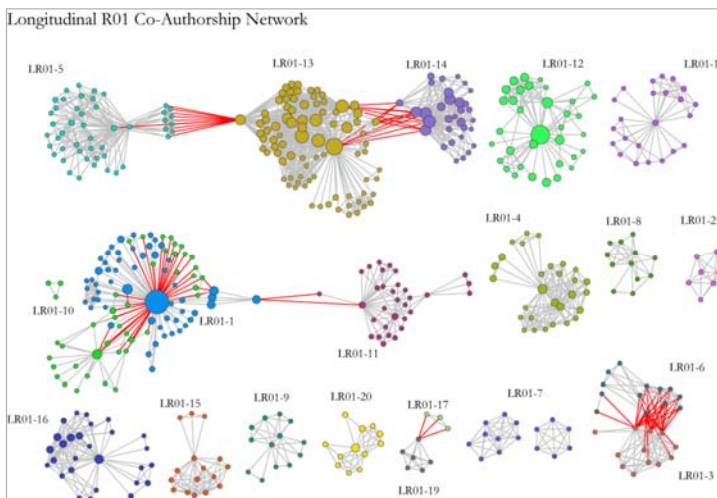
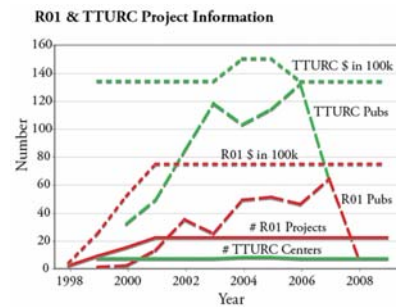


Mapping Transdisciplinary Tobacco Use Research Centers Publications

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

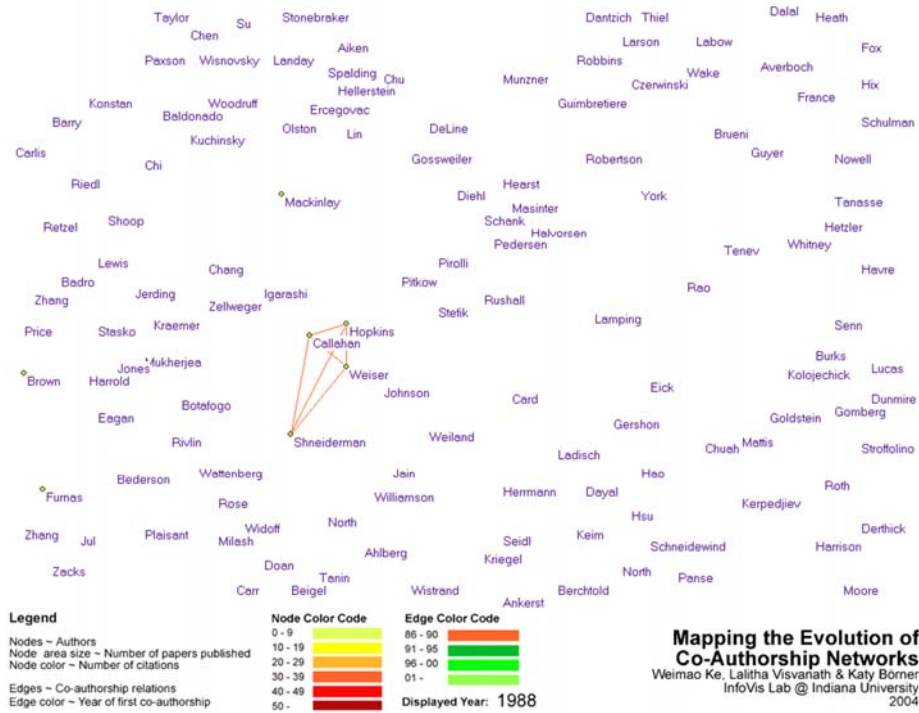
Zoss & Börner, forthcoming.

Supported by NIH/NCI Contract HHSN261200800812



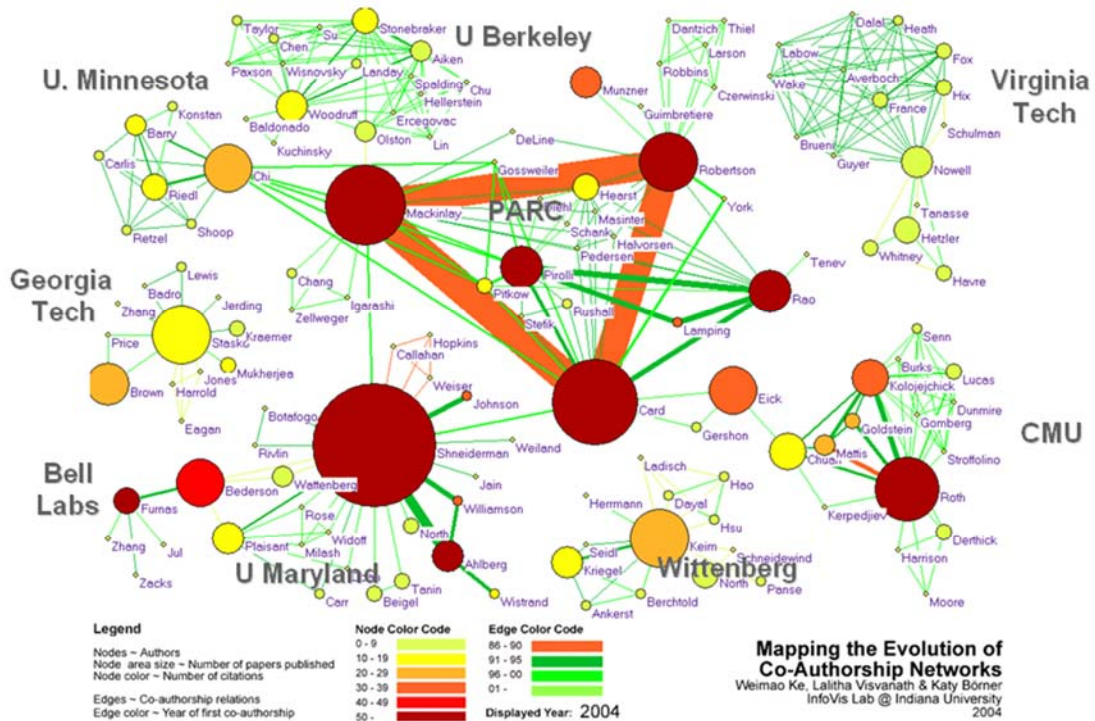
Mapping the Evolution of Co-Authorship Networks

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



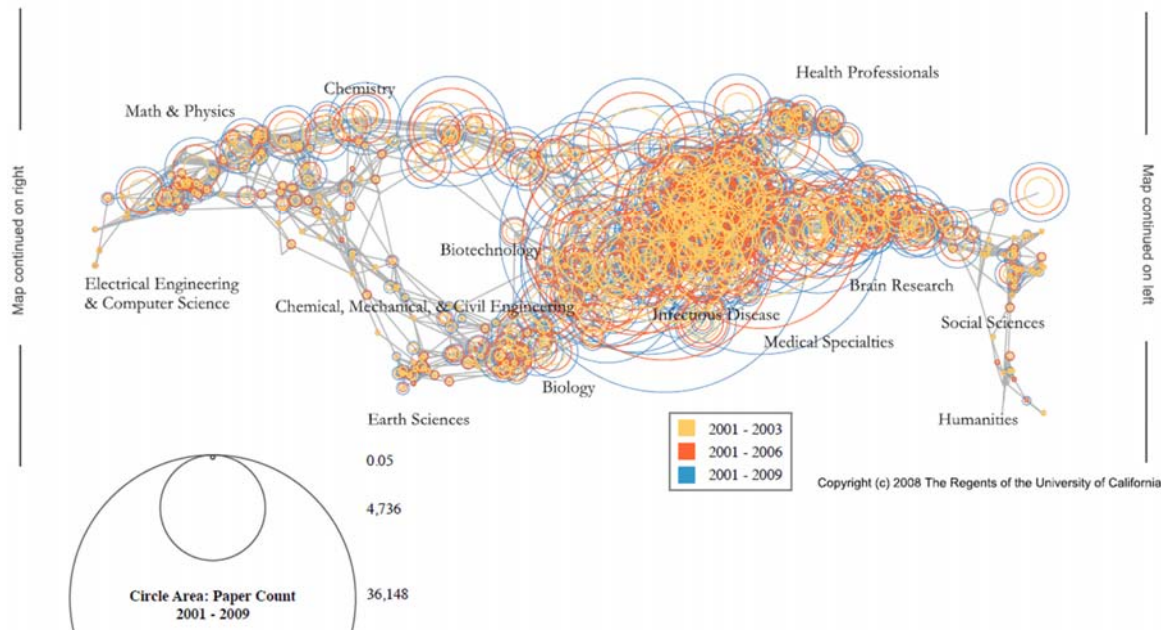
Mapping the Evolution of Co-Authorship Networks

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



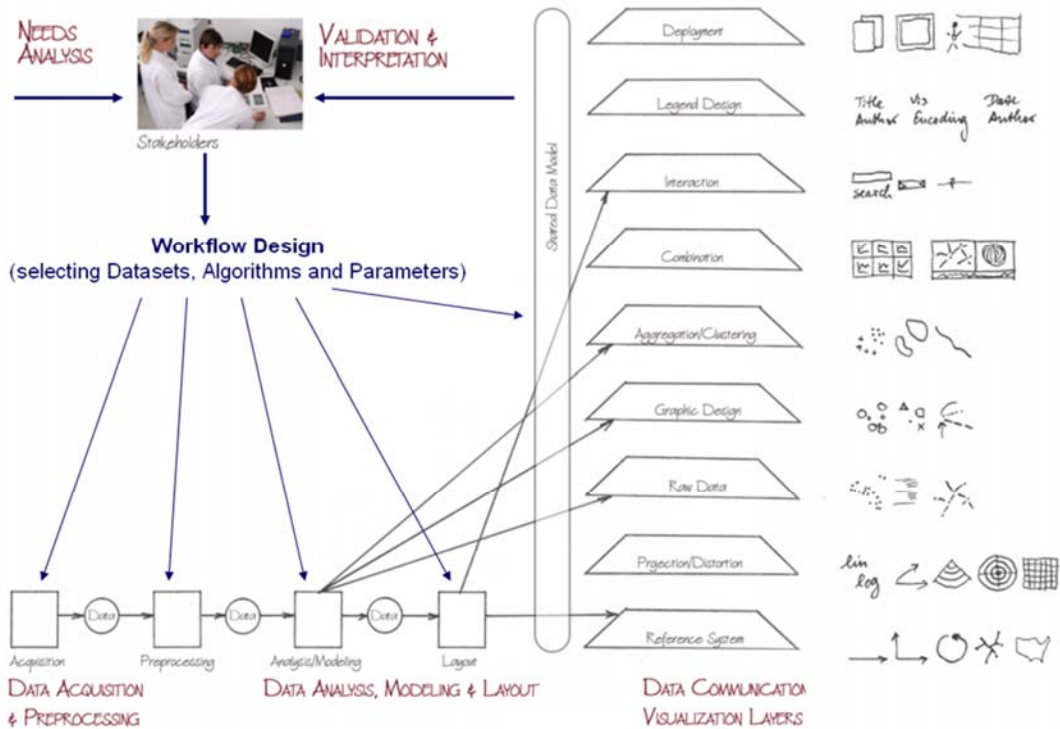
MEDLINE Publication Output by The National Institutes of Health (NIH) Using Nine Years of ExPORTER Data

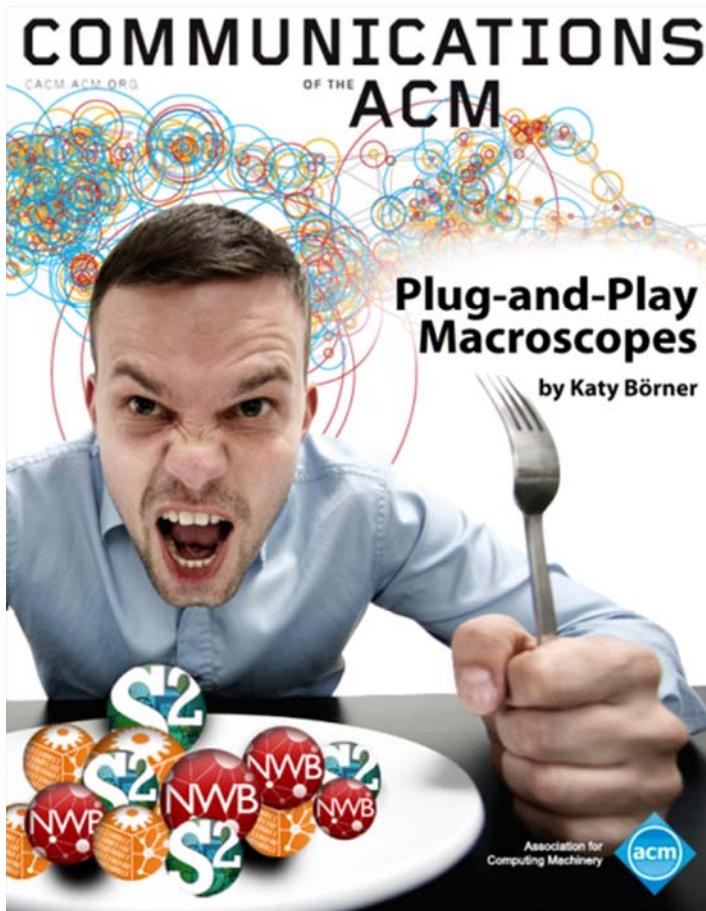
Katy Börner, Nianli Ma, Joseph R. Biberstine, Cyberinfrastructure for Network Science Center, SLIS, Indiana University, Robin M. Wagner, Rediet Berhane, Hong Jiang, Susan E. Ivey, Katrina Pearson and Carl McCabe, Reporting Branch, Division of Information Services, Office of Research Information Systems,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



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





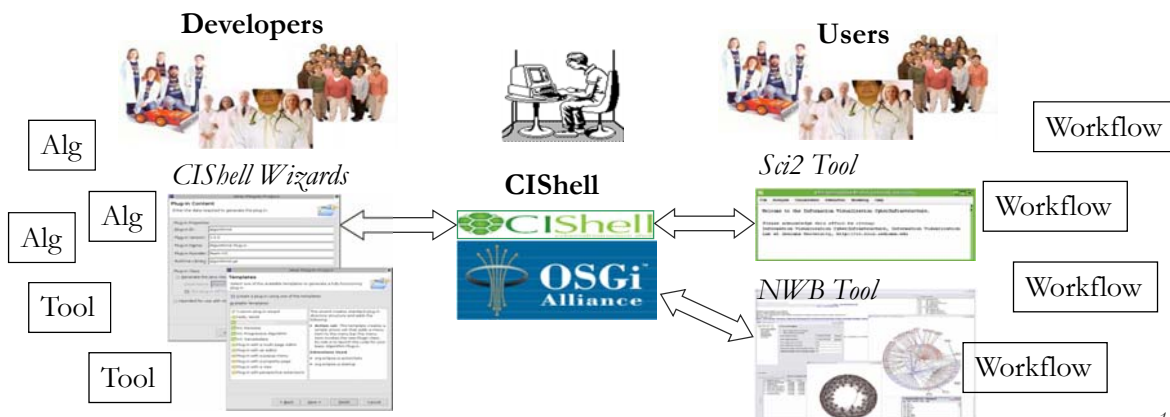
Börner, Katy. (March 2011). Plug-and-Play Macroscopes. *Communications of the ACM*, 54(3), 60-69.

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



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>)



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](#)

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CIShell Portal (<http://cishell.org>)

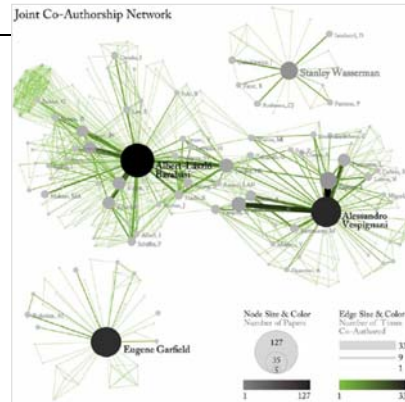
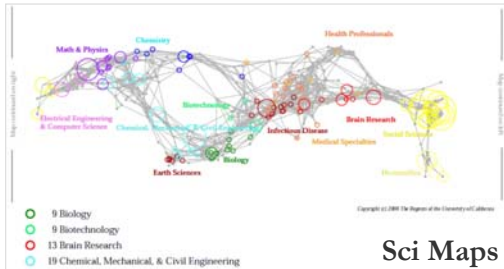
16



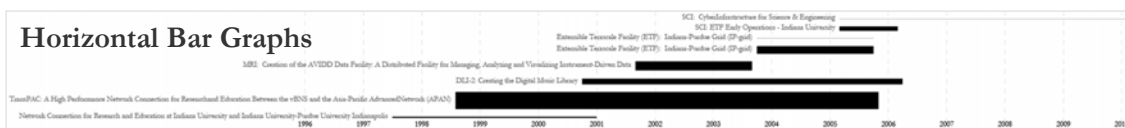
Sci² Tool – “Open Code for S&T Assessment”

<http://sci2.cns.iu.edu>

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



Horizontal Bar Graphs

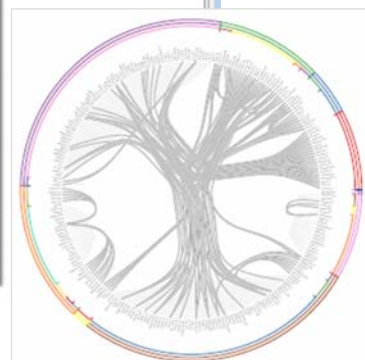
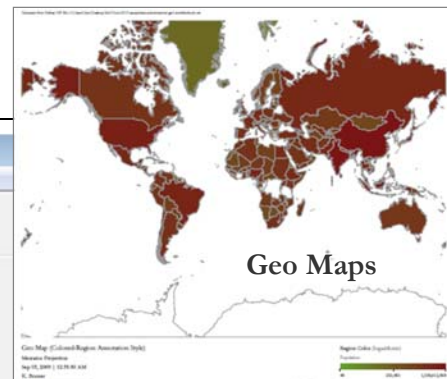


Börner, Katy, Huang, Weixia (Bonnie), Linnemeier, Micah, Dubon, Russell Jackson, Phillips, Patrick, Ma, Nianli, Zoss, Angela, Guo, Hanning & Price, Mark. (2009). *Reti-Netzwerk-Red: Analyzing and Visualizing Scholarly Networks Using the Scholarly Database and the Network Workbench Tool*. *Proceedings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



Sci² Tool

!	Algorithm Name	Date	Time	% Con
<input checked="" type="checkbox"/>	Extract Co-Author Netw...	09/03/2009	00:15:20 AM	<div style="width: 100%;"></div>
<input checked="" type="checkbox"/>	Load and Clean ISI File	09/03/2009	00:15:05 AM	<div style="width: 100%;"></div>





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](#)

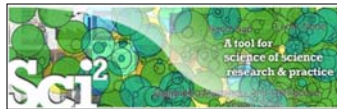
Tutorials
Katy Börner (2010) Science of Science Research and Tools (12 Tutorials). Reporting Branch, Office of Extramural Research/Office of the Director, National Institutes of Health, Bethesda, MD.

- 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.



Sci² Tool: Algorithms

Preprocessing

Extract Top N% Records
Extract Top N Records
Normalize Text
Slice Table by Line

Extract Top Nodes
Extract Nodes Above or Below Value
Delete Isolates

Extract top Edges
Extract Edges Above or Below Value
Remove Self Loops
Trim by Degree
MST-Pathfinder Network Scaling
Fast Pathfinder Network Scaling

Snowball Sampling (in nodes)
Node Sampling
Edge Sampling

Symmetrize
Dichotomize
Multipartite Joining

Geocoder
Extract ZIP Code

Modeling

Random Graph
Watts-Strogatz
Small World
Barabási-Albert Scale-Free
TARL

Analysis

Network Analysis Toolkit (NAT)
Unweighted & Undirected

Node Degree
Degree Distribution

K-Nearest Neighbor (Java)
Watts-Strogatz Clustering Coefficient
Watts Strogatz Clustering Coefficient over K

Diameter
Average Shortest Path
Shortest Path Distribution
Node Betweenness Centrality

Weak Component Clustering
Global Connected Components

Extract K-Core
Annotate K-Coreness

HITS

Weighted & Undirected

Clustering Coefficient
Nearest Neighbor Degree
Strength vs Degree
Degree & Strength
Average Weight vs End-point Degree
Strength Distribution
Weight Distribution
Randomize Weights

Blondel Community Detection

HITS

Unweighted & Directed

Node Indegree
Node Outdegree
Indegree Distribution
Outdegree Distribution

K-Nearest Neighbor
Single Node in-Out Degree Correlations

Dyad Reciprocity
Arc Reciprocity
Adjacency Transitivity

Weak Component Clustering
Strong Component Clustering



Sci² Tool: Algorithms cont.

<p>-----</p> <p>Extract K-Core Annotate K-Coreness</p> <p>-----</p> <p>HITS PageRank</p> <p>Weighted & Directed HITS Weighted PageRank</p> <p>Textual Burst Detection</p>	<p>Visualization GnuPlot GUESS Image Viewer</p> <p>-----</p> <p>Radial Tree/Graph (prefuse alpha) Radial Tree/Graph with Annotation (prefuse beta) Tree View (prefuse beta) Tree Map (prefuse beta) Force Directed with Annotation (prefuse beta) Fruchterman-Reingold with Annotation (prefuse beta)</p> <p>-----</p> <p>DrL (VxOrd) Specified (prefuse beta)</p> <p>-----</p> <p>Horizontal Bar Graph Circular Hierarchy Geo Map (Circle Annotation Style) Geo Map (Colored-Region Annotation Style) Science Map (Circle Annotation)</p>	<p>Scientometrics Remove ISI Duplicate Records Remove Rows with Multitudinous Fields Detect Duplicate Nodes Update Network by Merging Nodes</p> <p>-----</p> <p>Extract Directed Network Extract Paper Citation Network Extract Author Paper Network</p> <p>-----</p> <p>Extract Co-Occurrence Network Extract Word Co-Occurrence Network Extract Co-Author Network Extract Reference Co-Occurrence (Bibliographic Coupling) Network</p> <p>-----</p> <p>Extract Document Co-Citation Network</p>
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Soon:
Database support for ISI and NSF data.

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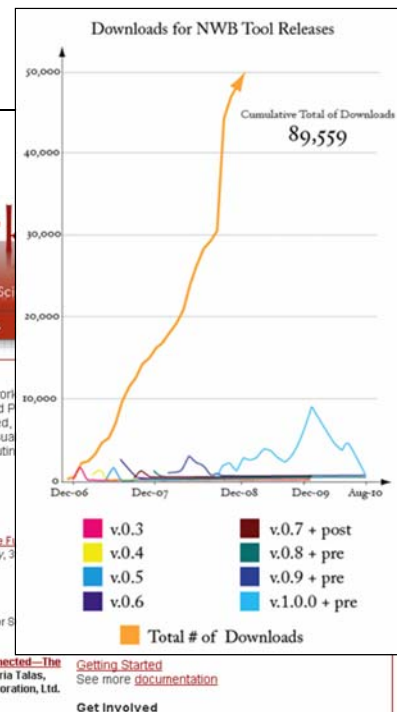
Network Workbench Tool <http://nwb.slis.indiana.edu>

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 than 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 89,000 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, Mibail C. (Eds.), *Progress in Convergence - Technologies for Human Wellbeing* (Vol. 1093, pp. 161-179), *Annals of the New York Academy of Sciences*, Boston, MA.

22

Computational Proteomics

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

Yildirim, 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 (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.

23

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).

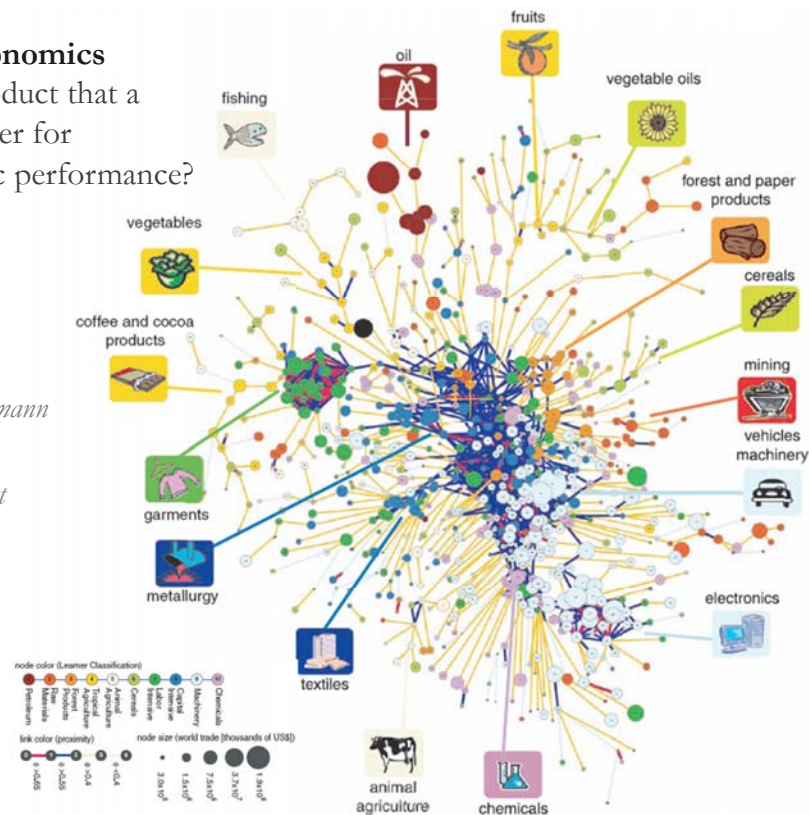


Fig. 1. The product space. (A) Hierarchically clustered proximity matrix representing the 775 SITC-4 product classes exported in the 1998–2000 period. (B) Network representation of the product space. Links are color coded with their proximity value. The sizes of the nodes are proportional to world trade,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

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Computational Social Science

Studying large scale social networks such as Wikipedia

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

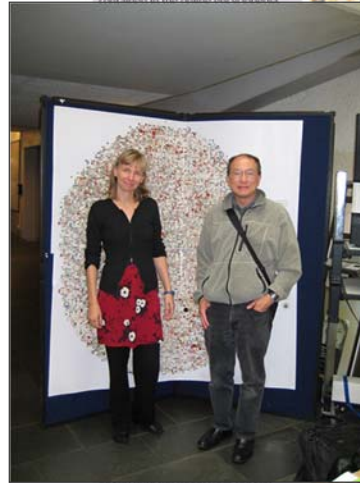


Second sight

Image: Bruce W. Hest and Todd M. Holloway

Power struggle

How do you keep track of the bobbling mass of information that is Wikipedia? This chaotic-looking mosaic is one attempt to show which topics are contained in the online encyclopedia.



...which were the most viewed pages at the time of writing include entries on Sheffield Wednesday football club, Mikhail Gorbachev and pigs). The mosaic has been commended in a competition for images that visualise network dynamics, coinciding with this week's International Workshop and Conference on Network Science in Bloomington.

www.newscientist.com



19 May 2007 | NewScientist | 55

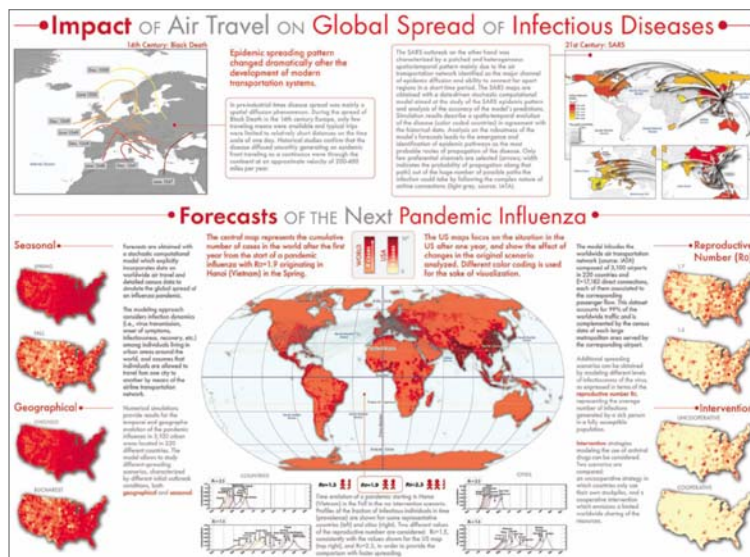
Computational Epidemics

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).





OSGi/CIShell Adoption

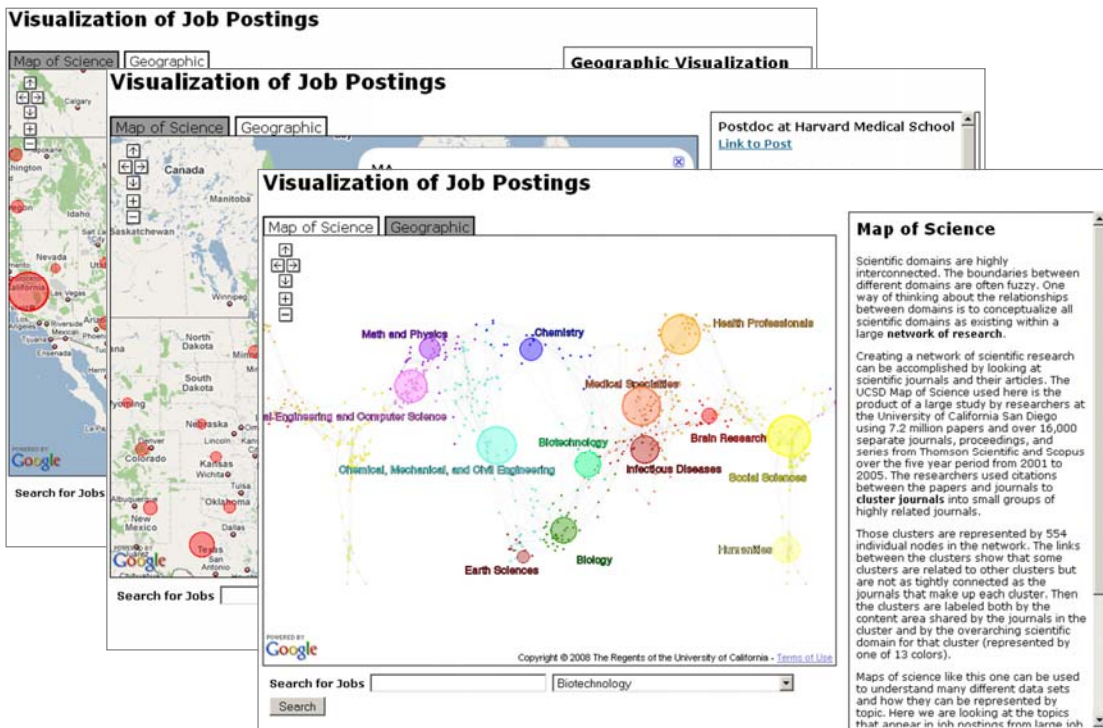
A number of other projects recently adopted OSGi and/or CIShell:

- *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).
- *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.
- *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.
- *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.

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.

Interactive World and Science Map of S&T Jobs

Angela Zoss, Michael Conover, Katy Börner (2010)



Geographic Map

Science Map



Detail

About

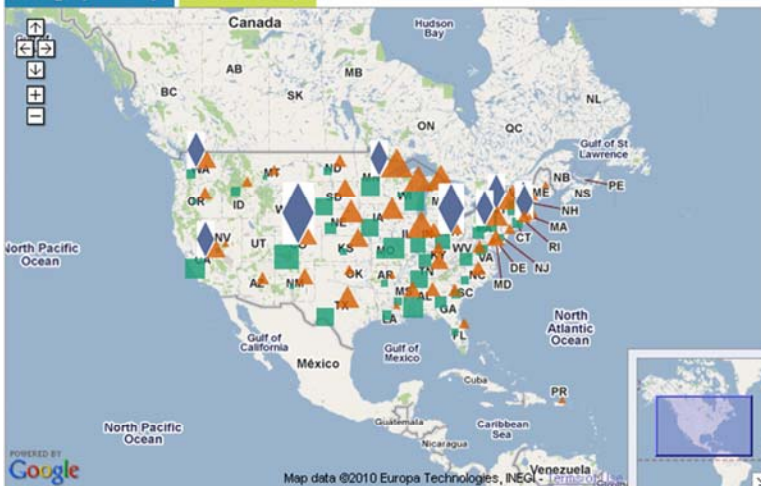
Geographic Visualization

Here we have a more traditional view of the records - a geographic overlay. Featured here are the records that list both a city and state in the United States. Feel free to search, zoom, pan, and click for descriptions.

<http://mapsustain.cns.iu.edu>

Geographic Map

Science Map



Maps

Detail

Data

About

Datasets

The dataset covers 13,528 records on "biomass" and "biofuel" research and technology from seven different publication, patent, funding datasets for the years 1901 to 2010.

Funding

National Institutes of Health (NIH) awards retrieved from the Scholarly Database (<http://sdb.slis.indiana.edu>) at Indiana University on 11/20/2010. Search query used was biomass OR biofuel OR "bio mass" OR "bio fuel" in the 'All Text' field.

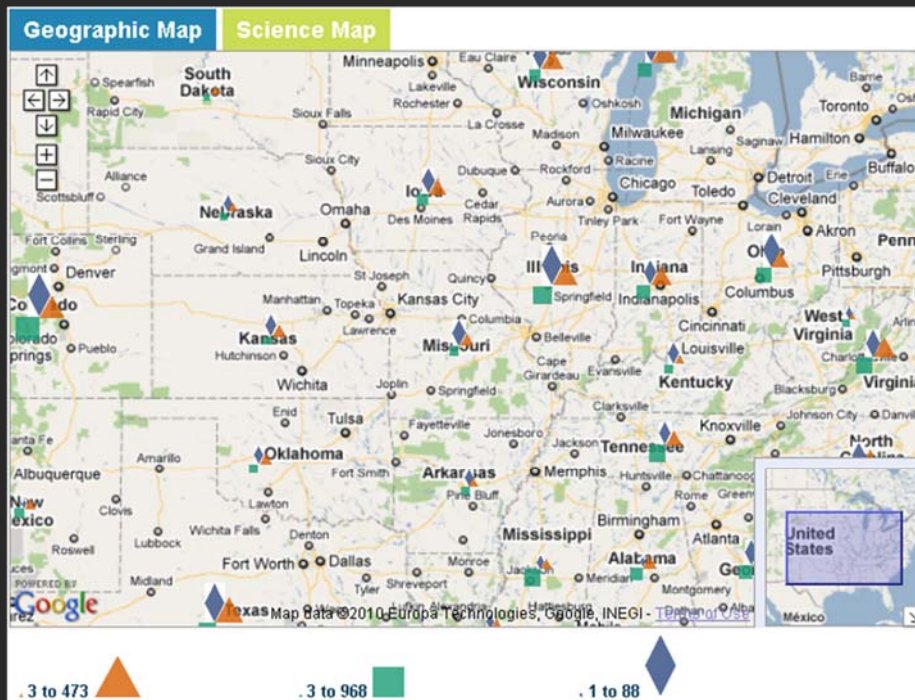
National Science Foundation (NSF) awards retrieved from the Scholarly Database (<http://sdb.slis.indiana.edu>) at Indiana University on 11/20/2010. Search query used was biomass OR biofuel OR "bio mass" OR "bio fuel" in the 'All Text' field.

US Department of Agriculture (USDA) awards made available by a staff member of the Office of Scientific and Technical Information from the US Department of Energy (DOE).

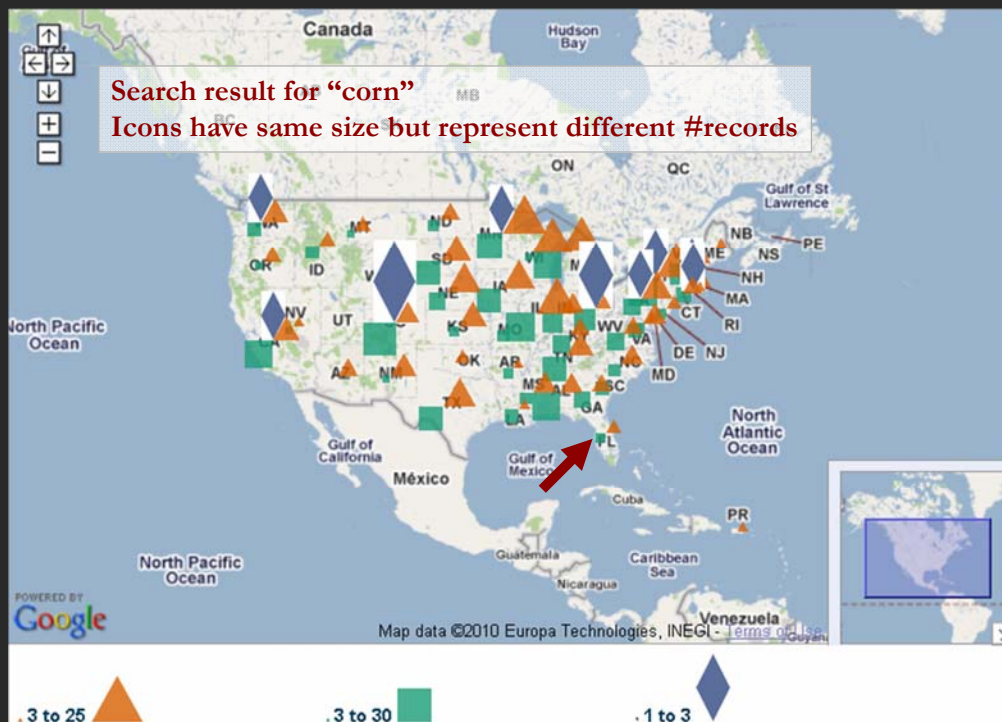
Publications

MEDLINE papers by the National Library of Medicine retrieved from the Scholarly Database (<http://sdb.slis.indiana.edu>) at Indiana University on 11/20/2010. Search query used was biomass OR biofuel OR "bio mass" OR "bio fuel" in the 'All Text' field.

The geographic map at state level.

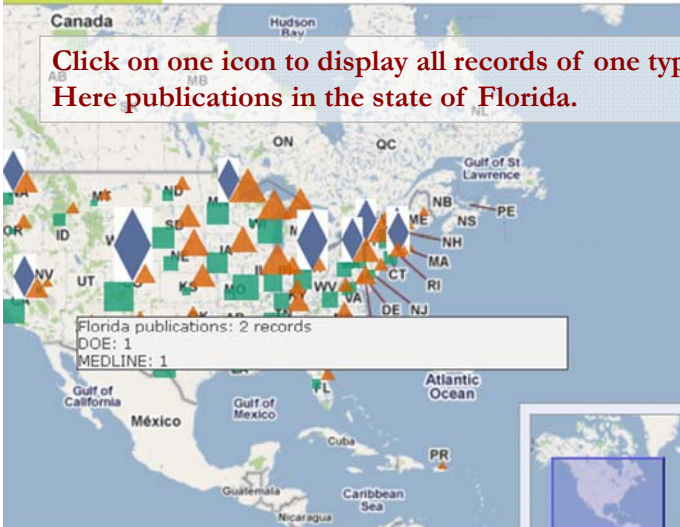


The geographic map at city level.



Science Map

Click on one icon to display all records of one type.
Here publications in the state of Florida.



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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Information Bridge: DOE Scientific and Technical Information - - Document #5789929 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.osti.gov/bridge/product.biblio.jsp?osti_id=5789929

MapSustain x Information Bridge: DOE Scientifi... x

DOE Scientific and Technical Information

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Full Text Availability information may be found in the Availability, Publisher, Research Organization, Resource Relation and/or Author (affiliation information) fields and/or via the "Full-text Availability" link. For a journal article, please see the Resource Relation field.

Title Enzymatic hydrolysis and fermentation of corn for fuel alcohol
[Word Cloud](#) | [More Like This](#)

Creator/Author [Mullins, J.T.](#)

Publication Date 1985 Jan 01

OSTI Identifier OSTI ID: 5789929

Other Number(s) Journal ID: CODEN: BIBA

Resource Type Journal Article

Resource Relation Journal Name: Biotechnol. Bioeng.; (United States); Journal Volume: 27:3

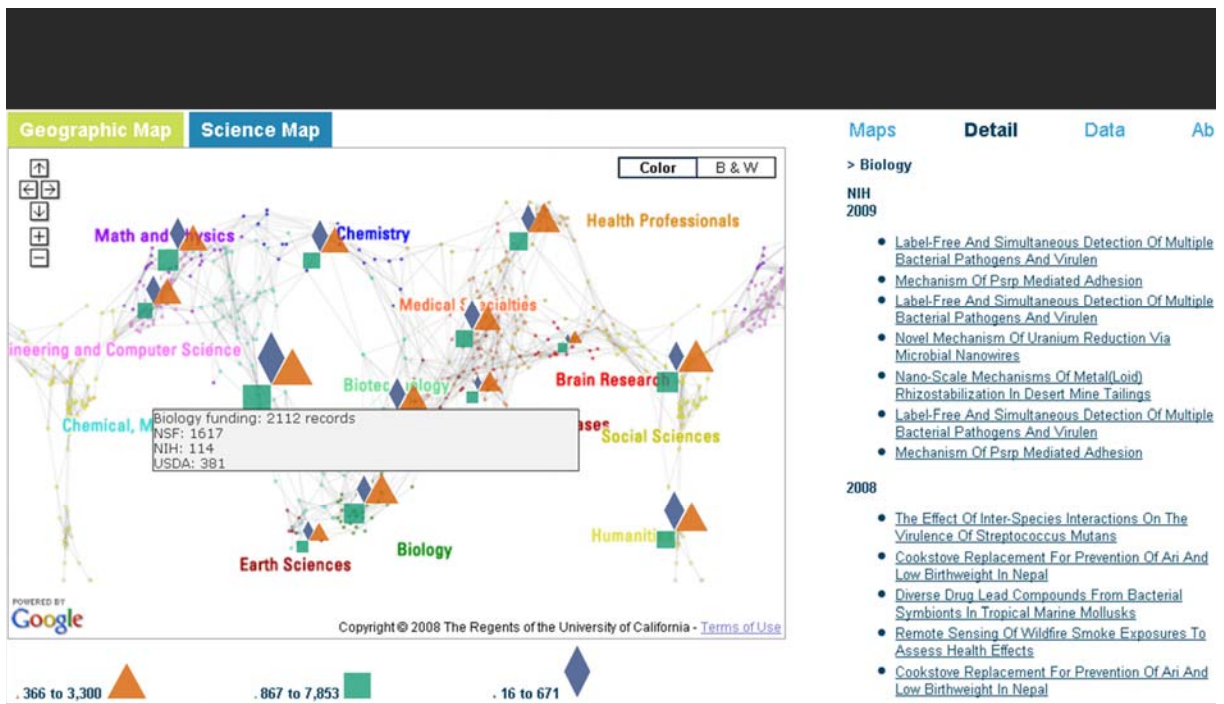
Research Org Univ. of Florida, Gainesville

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; CEREALES; CHEMICAL REACTIONS; DATA; DECOMPOSITION; EFFICIENCY; FUEL; GLASS; HYDROLYSIS; INFORMATION; LYSIS; NUMERICAL DATA; PLANTS;

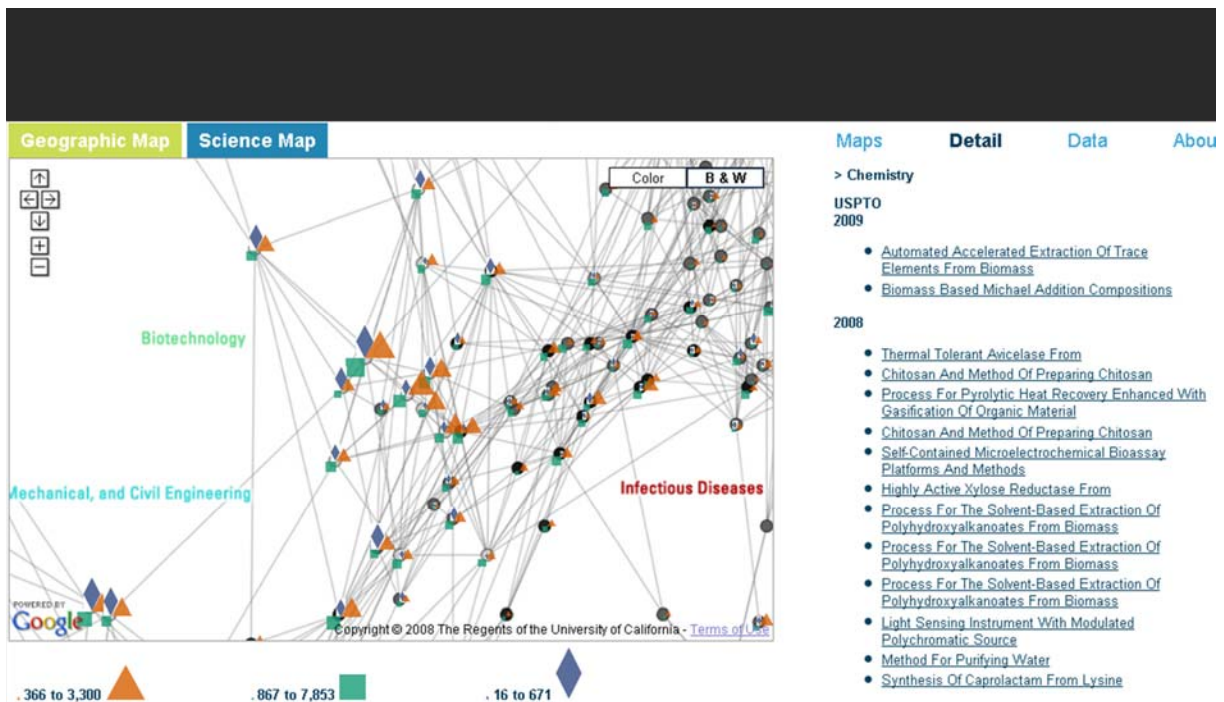
Done

Detailed information on demand
via original source site for exploration and study.

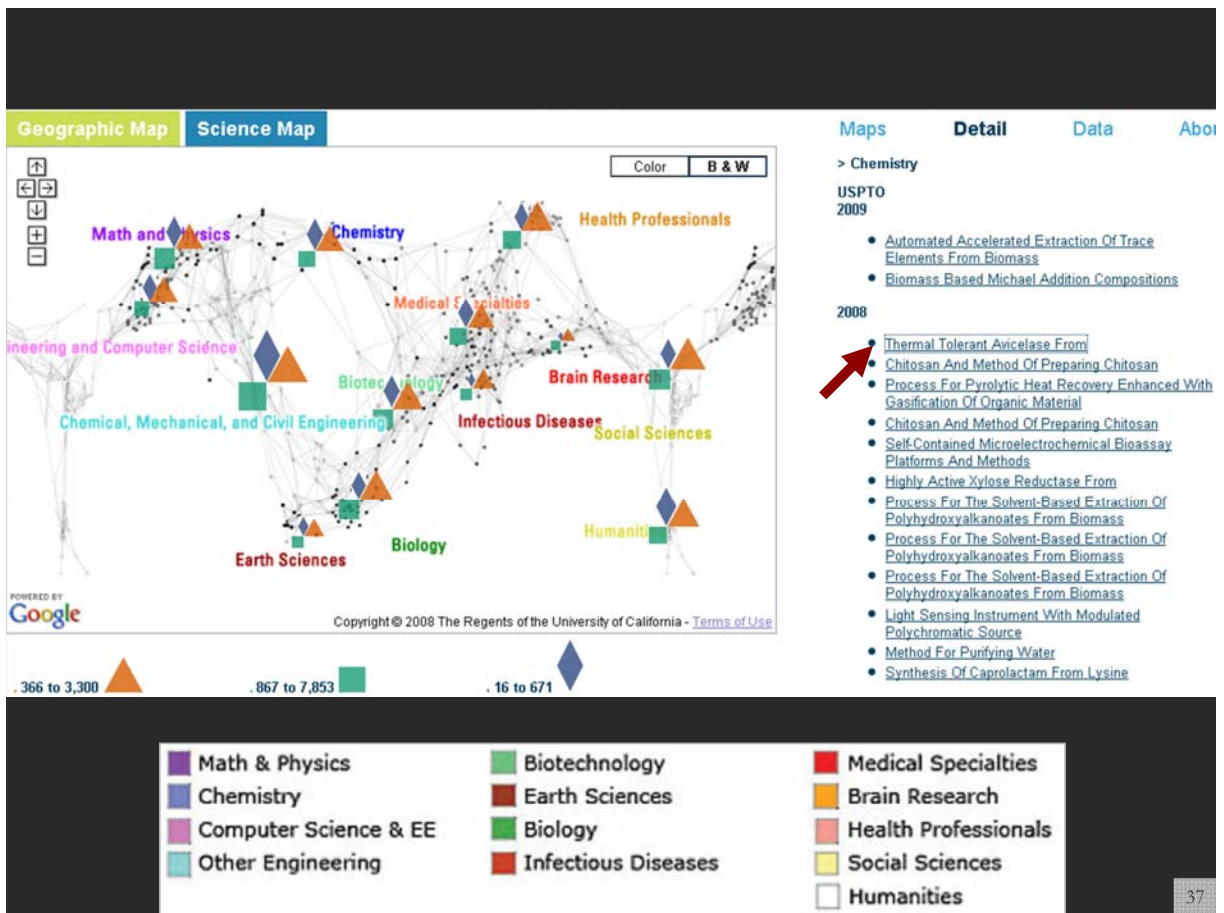
34



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



The science map at 554 sub-disciplines level.



- Maps Detail Data About
- > 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

United States Patent: 7364890 - Mozilla Firefox

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http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=/netacgi/PTO/srch

MapSustain United States Patent: 7364890 United States Patent: 7364890 Information Bridge: DOE Scientific a...

USPTO PATENT FULL-TEXT AND IMAGE DATABASE

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(1 of 1)

United States Patent 7,364,890
Ding, et al. April 29, 2008

Thermal tolerant avicelase from *Acidothermus cellulolyticus*

Abstract

The invention provides a thermal tolerant (thermostable) cellulase, AvIII, that is a member of the glycoside hydrolase (GH) family. AvIII 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)
Appl. No.: 09/017,276

Done

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NIH TOPIC MAPS

A Topic Database of NIH-Funded Grants

NIH Map Viewer

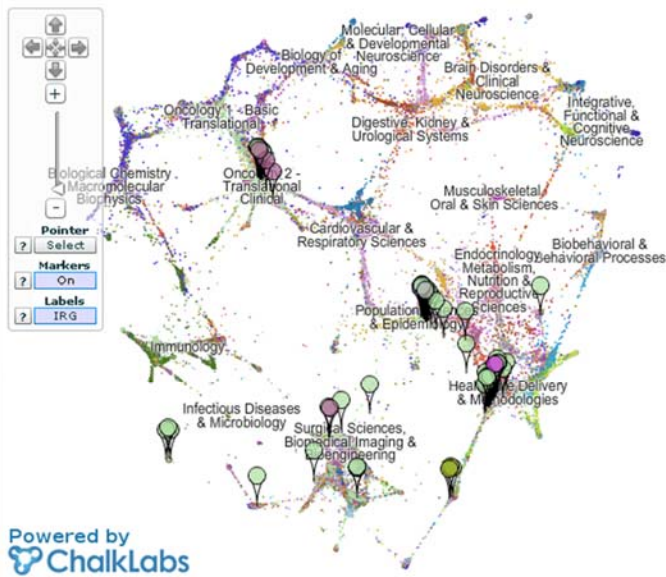
Show Topic Browser ?

Export Data

Methods

Feedback

2009 ? add delete AND Topic Words cancer breast cancers cancer_risk cancer_p 20 0/0 ? Search Clear Search



- FIC
- NCCAM
- NCI
- NCMHD
- NCRR
- NEI
- NHGRI
- NHLBI
- NIA
- NIAAA
- NIAID
- NIAMS
- NIBIB
- NICHD
- NIDA
- NIDCD
- NIDCR
- NIDDK
- NIEHS
- NIGMS
- NIMH
- NINDS
- NINR
- NLM
- OD

Institutes (9)

NIH Inst	# Grants	Count	+
NCI	116		
NCRR	10		
NIEHS	5		
NCMHD	1		
NIA	-		

Topics

%	Title Words	+
25.9	breast, cancer, cancer_risk, women, cancer_sui	
3.86	risk, risk_factors, cancer, prospective, women,	
3.76	genome_wide_association, loci, genome_wide,	
3.70	genetic, genetics, genes, gene_environment, i	

Grants (137)

C NIH Inst	Grant	+
NCRR	3P20RR011792-10S2 6914 OBESITY, INSULIN RESISTANCE, IGF'S, AND BREAST CANCER RISK IN AFRICAN AMERICANS PI: CUI, YONG	
NCI	3R01CA120562-03S1 Commonly Used Medications and Breast Cancer Recurrence PI: BOUDREAU, DENISE M	
NCI	5R01CA120562-03 Commonly Used Medications and Breast Cancer Recurrence PI: BOUDREAU, DENISE M	
NCI	5R01CA093772-06 Long-term Survivorship in Older Women with Early Stage Breast	

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<https://app.nihmaps.org>

NIH TOPIC MAPS

A Topic Database of NIH-Funded Grants

NIH Topic Browser

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Methods

Feedback

2009 ? add delete AND Exact Text cancer Search Clear Search

2009 Grants (137)

Institutes (9)

Col	NIH Inst	Project/Subproj	Title	Investigator(s)	# 1 Topi	# 1 Topic Word
	NCRR	3P20RR011792-10S2 6914	OBESITY, INSULIN RESISTANCE, IGF'S, AND BREAST CANCER RISK IN AFRICAN AMERICANS	CUI, YONG	686 (50%)	cancer brea...
	NCI	3R01CA120562-03S1	Commonly Used Medications and Breast Cancer Recurrence	BOUDREAU, DENISE M	686 (42%)	cancer brea...
	NCI	5R01CA120562-03	Commonly Used Medications and Breast Cancer Recurrence	BOUDREAU, DENISE M	686 (42%)	cancer brea...
	NCI	5R01CA093772-06	Long-term Survivorship in Older Women with Early Stage Breast Cancer	SILLIMAN, REBECCA A	686 (42%)	cancer brea...
	NCI	5R01CA064277-11	Shanghai Breast Cancer Study	ZHENG, WEI	686 (41%)	cancer brea...

NIH Inst	# Grants	Count	+
NCI	116		
NCRR	10		
NIEHS	5		
NCMHD	1		
NIA	1		
NCCAM	1		
NICHD	1		
NINR	1		
NHGRI	1		

Topics

Similar Grants

Show Top 100 on Map

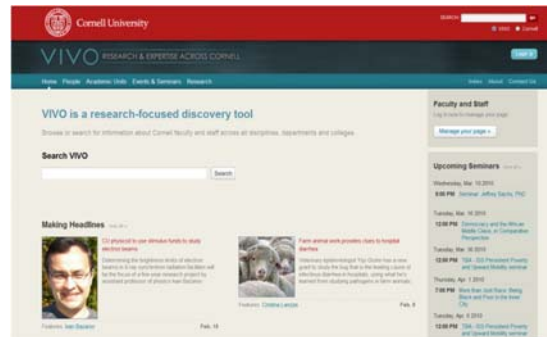
%	Topic	Topic Words	Title Words	+
25.91	686	cancer breast cancers cancer_risk cancer_patients	breast, cancer, ca	
3.86	437	risk risk_factors cases cohort prospective high_ris	risk, risk_factors,	
3.76	544	snps snp genome_wide_association cases genes	genome_wide_ass	
3.70	173	genetic genes risk susceptibility polymorphisms	genetic, genetics,	
2.62	252	treatment patients management patient outcom	management, tre	
1.64	235	conference meeting workshop symposium scienti	th, conference, sy	
1.63	351	community implementation community_based he	community, preve	
1.54	325	million disease treatment united_states public_h	disease, treatmen	
1.51	580	training candidate career skills applicant program	treatment, depres	

Simil	C NIH Inst	Grant	+
6.51	NCI	1R01CA129639-01A2 Genome-Wide Association Study of Radiation Exposure and Bilateral Breast Cancer PI: BERNSTEIN, JONINE LISA	
6.46	NCI	1M07CA136758-01A1 Genetic variants in the PI3K pathway in mammographic density and breast cancer PI: THOMPSON, CHERYL L.	
6.31	NCI	5P50CA116199-05 UTMADACC SPORE in Breast Cancer PI: HORTOBAGYI, GABRIEL N	
6.02	NCI	2R01CA050385-21A1 Risk Factors for Breast Cancer in Younger Nurses PI: WILLETT, WALTER C.	
4.6	NCI	5R01CA127617-02 Who Cares For Older Breast Cancer Survivors And How Does It Affect Quality? PI: MANDELBLATT, JEANNE	

<https://app.nihmaps.org>

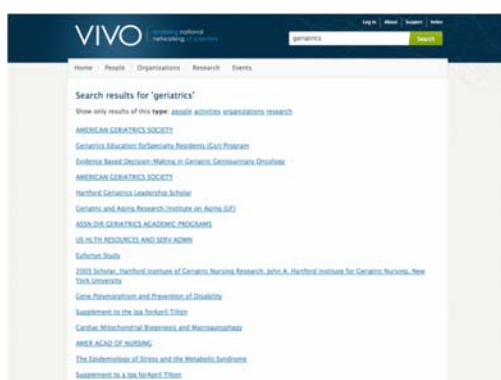
VIVO: A Semantic Approach to Creating a National Network of Researchers (<http://vivoweb.org>)

- 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 Ferreira, 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 Ping, 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, Michaelen 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.



University of Florida

How do you want to compare?
by Grants

Who do you want to compare?
Search: X

Records 1 - 10 of 30 < First < Prev Next > Last >

Entity Label	Grant Count	Entity Type
<input checked="" type="checkbox"/> Continuing Education	562	UF Department, Agent, Non-Academic Department, Department
<input checked="" type="checkbox"/> Florida Museum of Natural History	203	Museum, Agent
<input checked="" type="checkbox"/> College of Agricultural and Life Sciences	166	Agent, UF College, College
<input checked="" type="checkbox"/> College of Engineering	103	Agent, UF College, College
<input checked="" type="checkbox"/> Evelyn F. and William L. McKnight Brain Institute of the University of Florida	64	UF Center, Agent, Center
<input checked="" type="checkbox"/> International Center	54	UF Department, Agent, Non-Academic Department, Department
<input checked="" type="checkbox"/> Florida Sea Grant	44	UF Center, Agent, Center
<input type="checkbox"/> Whitney Laboratory for Marine Bioscience	42	UF Research Laboratory, Agent, Laboratory, Research Laboratory
<input type="checkbox"/> Water Institute	38	UF Center, Agent, Center
<input type="checkbox"/> College of Dentistry	35	Agent, UF College, College

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Comparing Grants of Organizations in University of Florida

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- Florida Sea Grant 44
- International Center 54
- Evelyn F. and William L. McKnight Brain Institute of the University of Florida 64
- College of Engineering 103
- College of Agricultural and Life Sciences 166
- Florida Museum of Natural History 203
- Continuing Education 562

Temporal Analysis (When) Temporal visualizations of the number of papers/funding award at the institution, school, department, and people level 43

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University of Florida ?

Explore 487 publications activity across 554 scientific sub-disciplines ?

[13 Disciplines](#) | 554 Sub-Disciplines ?

Search: X

1 - 13 of 554 < First < Prev Next > Last >

Sub-Disciplines	# of pubs.	% activity
Pest Management Science	24.2	5.0
Wildlife Research	19.1	3.9
Protein Science	13.1	2.7
Clinical Cancer Research	12.6	2.6
Pain	12.0	2.5
Environmental Contamination	11.2	2.3
Insect Physiology	11.1	2.3
Organic Chemistry	10.9	2.2
Marine Biology	10.3	2.1
Computer Aided Molecular Design	10.2	2.1
BioStatistics	9.0	1.9

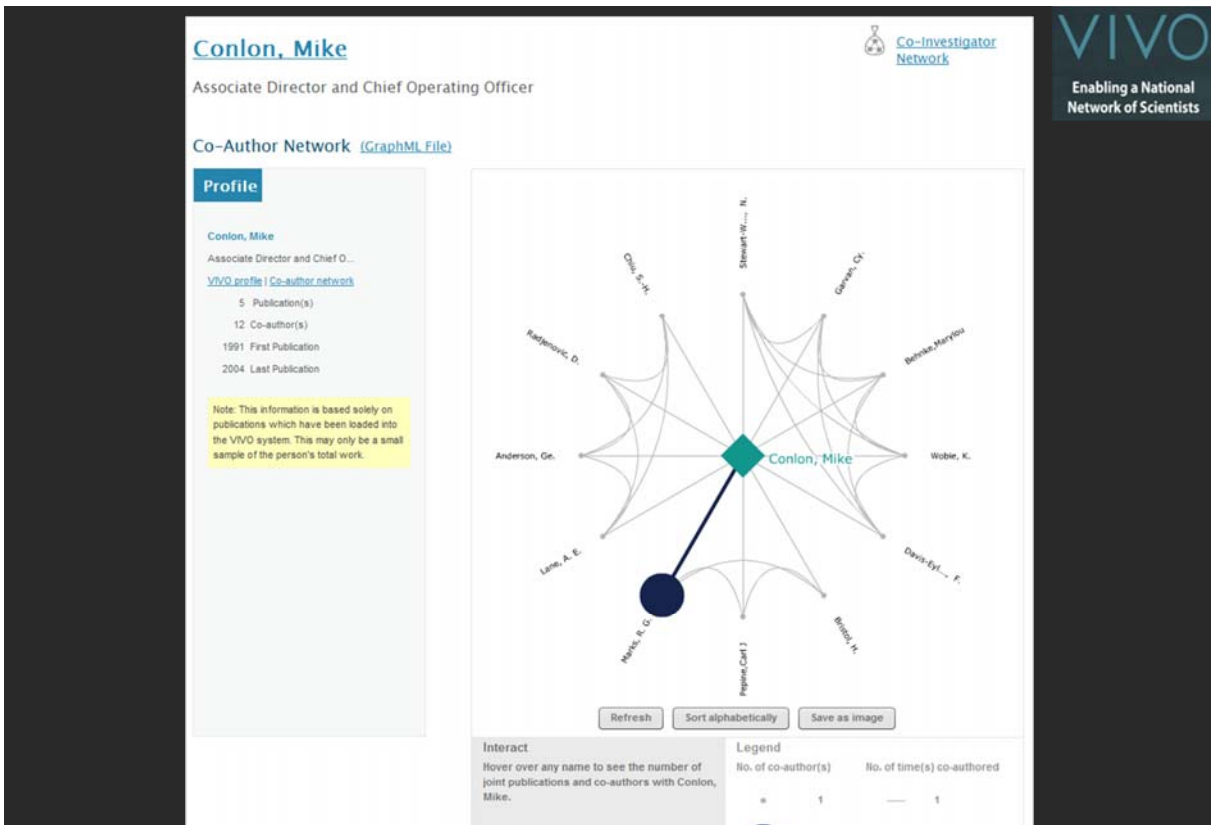
Show discipline labels

Top 290 disciplines shown

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mapped 14.55% of 3,346 publications ?

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?



Mapping Science Exhibit – 10 Iterations in 10 years

<http://scimaps.org>



Mapping Science Exhibit at MEDIA X, Wallenberg Hall, Stanford University

<http://mediax.stanford.edu>, <http://scaleindependentthought.typepad.com/photos/scimaps>

47

Mapping Science Exhibit – 10 Iterations in 10 years

<http://scimaps.org>

The Power of Maps (2005)



The Power of Reference Systems (2006)



The Power of Forecasts (2007)



Science Maps for Economic Decision Makers (2008)



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)

Towards Science Mapping Standards (2014)

Exhibit has been shown in 72 venues on four continents. Currently at
- NSF, 10th Floor, 4201 Wilson Boulevard, Arlington, VA
- Center of Advanced European Studies and Research, Bonn, Germany
- University of North Texas, Denton, Texas



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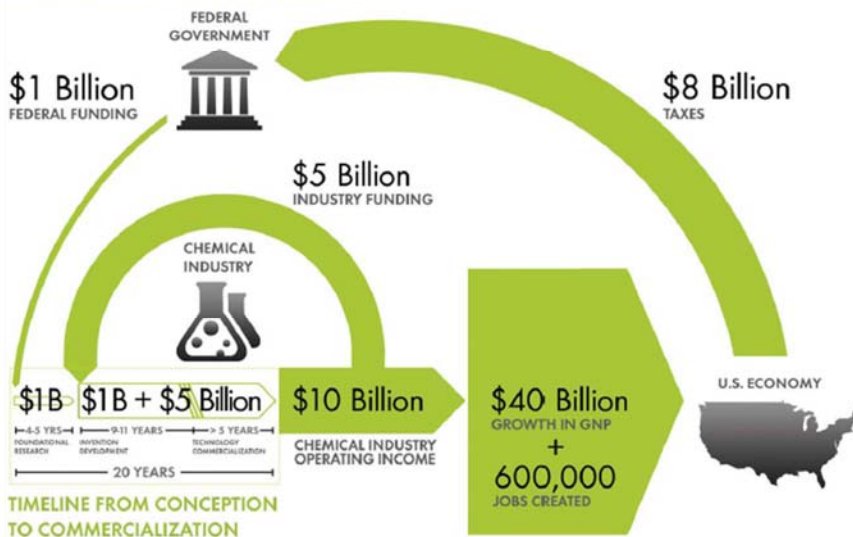
Chemical Research & Development Powers the U.S. Innovation Engine

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

The Council for Chemical Research (CCR)

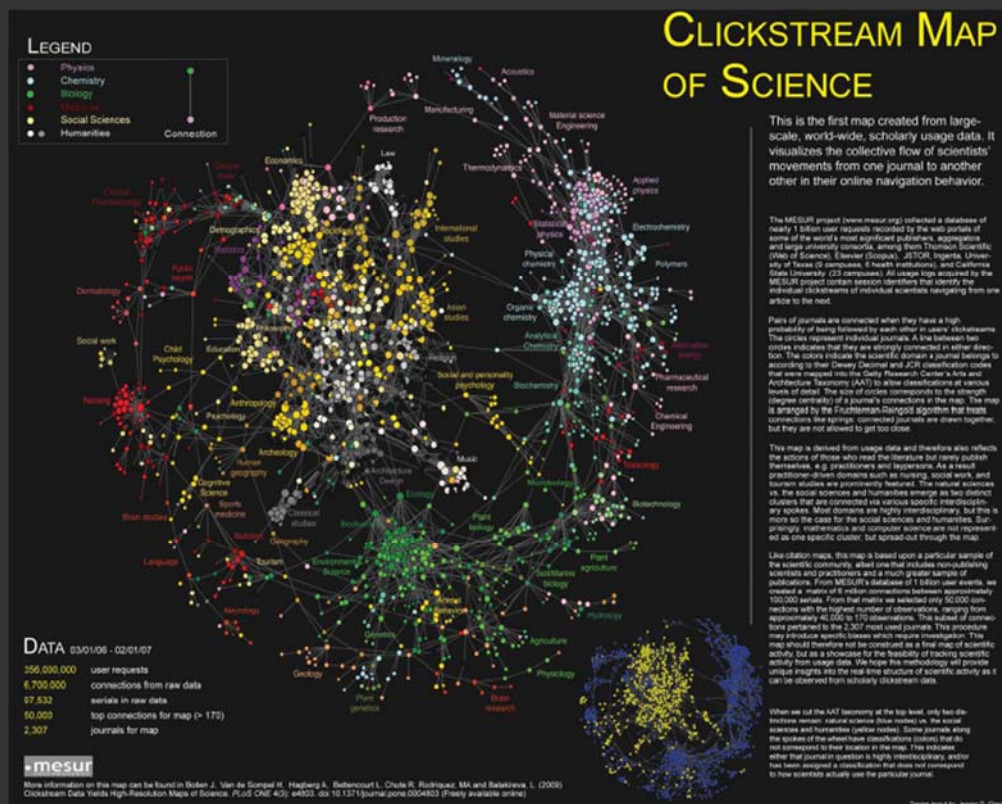
has provided the U.S. Congress and government policy makers with important results regarding the impact of Federal Research & Development (R&D) investments on U.S. innovation and global competitiveness through its commissioned 5-year two phase study. To take full advantage of typically brief access to policy makers, CCR developed the graphic below as a communication tool that distills the complex data produced by these studies in direct, concise and clear terms.

INVESTMENT IN CHEMICAL SCIENCE R&D



The design shows that an input of \$1B in federal investment, leveraged by \$5B industry investment, brings new technologies to market and results in \$10B of operating income for the chemical industry, \$40B growth in the Gross National Product (GNP) and further impacts the US economy by generating approximately 600,000 jobs, along with a return of \$8B in taxes. Additional details, also reported in the CCR studies, are depicted in the map to the left. This map clearly shows the two R&D investment cycles, the shorter industry investment at the innovation stage to commercialization cycle; and the longer federal investment cycle which begins in basic research and culminates in national economic and job growth along with the increase tax base that in turn is available for investment in basic research.

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



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



Science Maps in "Expedition Zukunft" science train visiting 62 cities in 7 months, 12 coaches, 300 m long. <http://www.expedition-zukunft.de>

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



References

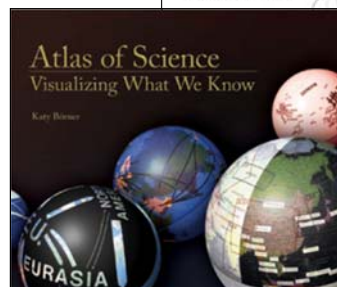
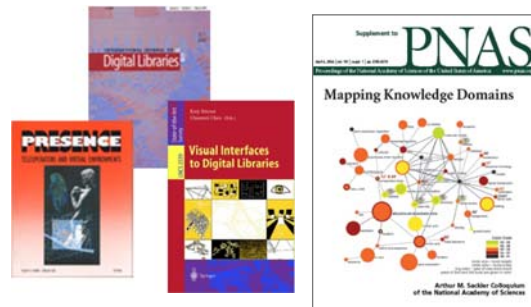
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<http://ivl.slis.indiana.edu/km/pub/2003-borner-arist.pdf>

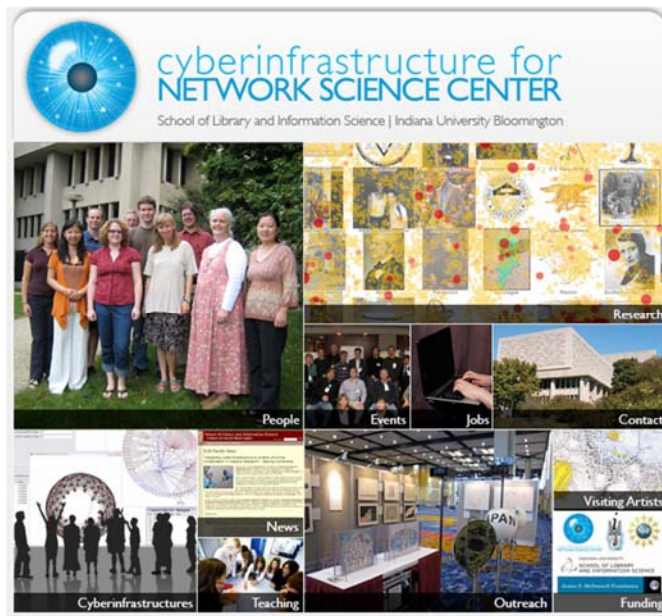
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All papers, maps, tools, talks, press are linked from <http://cns.iu.edu>

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