

Mining, Mapping, and Accelerating Scholarly Networks

Katy Börner

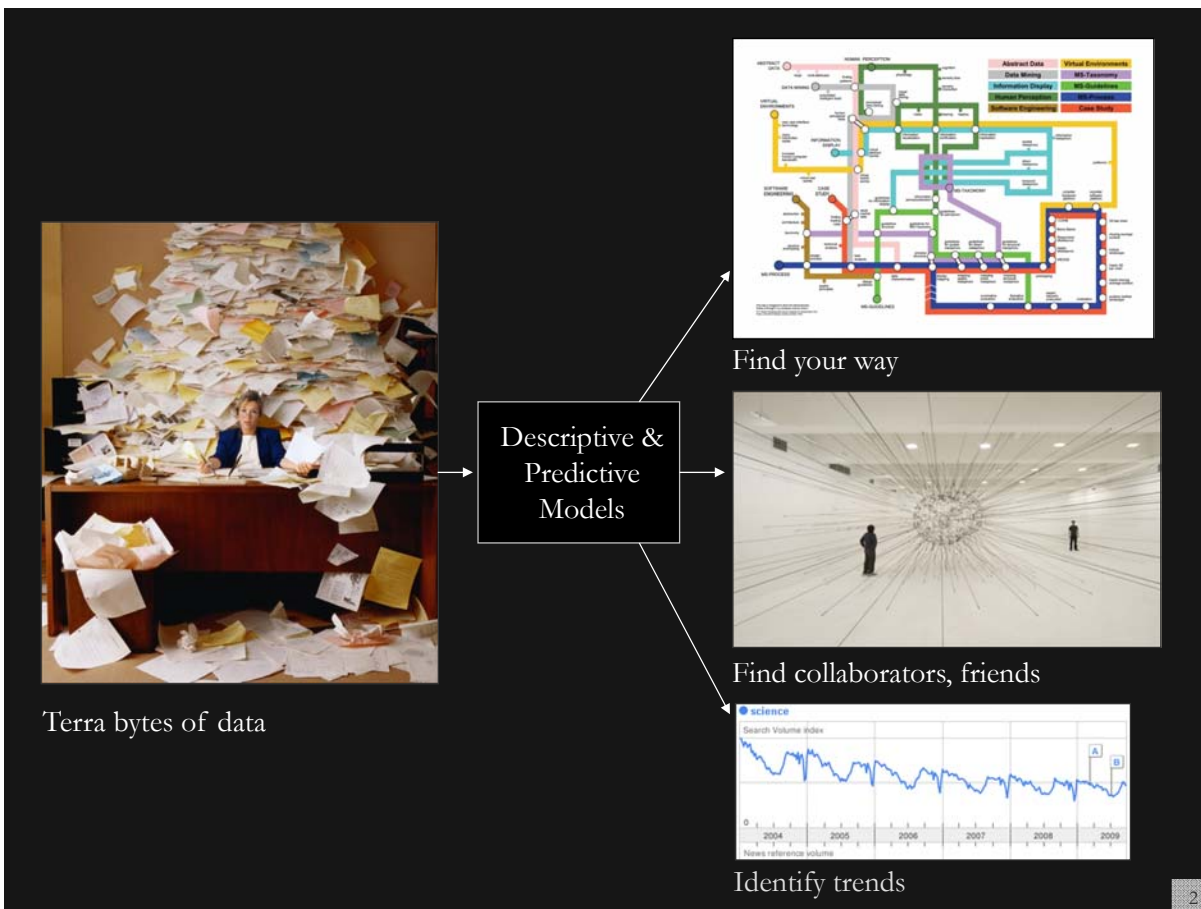
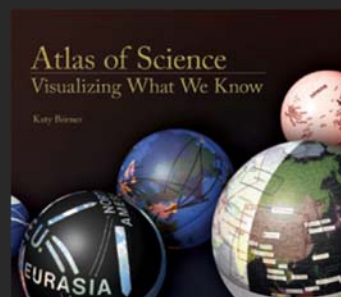
Cyberinfrastructure for Network Science Center, Director
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 School of Library and Information Science
 Indiana University, Bloomington, IN
katy@indiana.edu



With special thanks to the members at the Cyberinfrastructure for Network Science Center; the Sci2, NWB, and EpiC teams; and the VIVO Collaboration

Shared Horizons: Data, Biomedicine, and the Digital Humanities
 Maryland Institute for Technology.

April 11, 2013



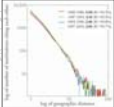
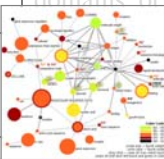



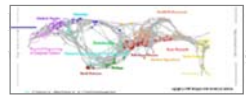
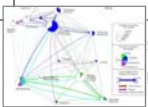
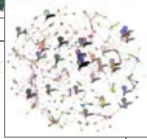

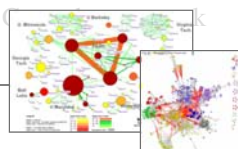
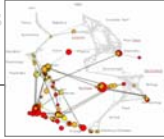
Type of Analysis vs. Level of Analysis

	<i>Micro/Individual (1-100 records)</i>	<i>Meso/Local (101-10,000 records)</i>	<i>Macro/Global (10,000 < records)</i>
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



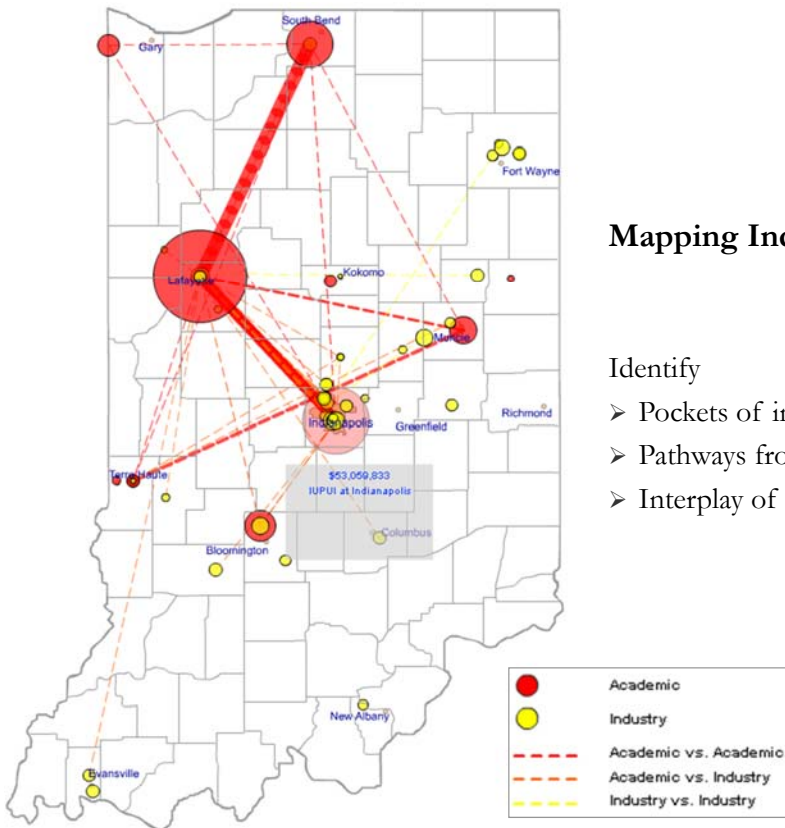
3

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Mapping Indiana's Intellectual Space

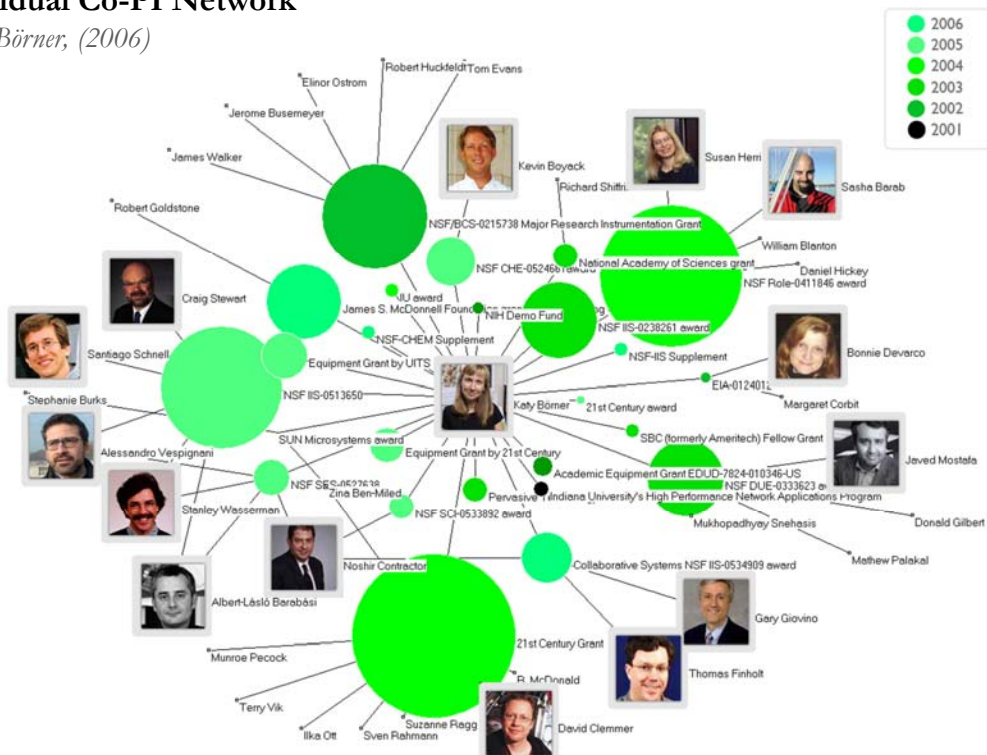
Identify

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

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Individual Co-PI Network

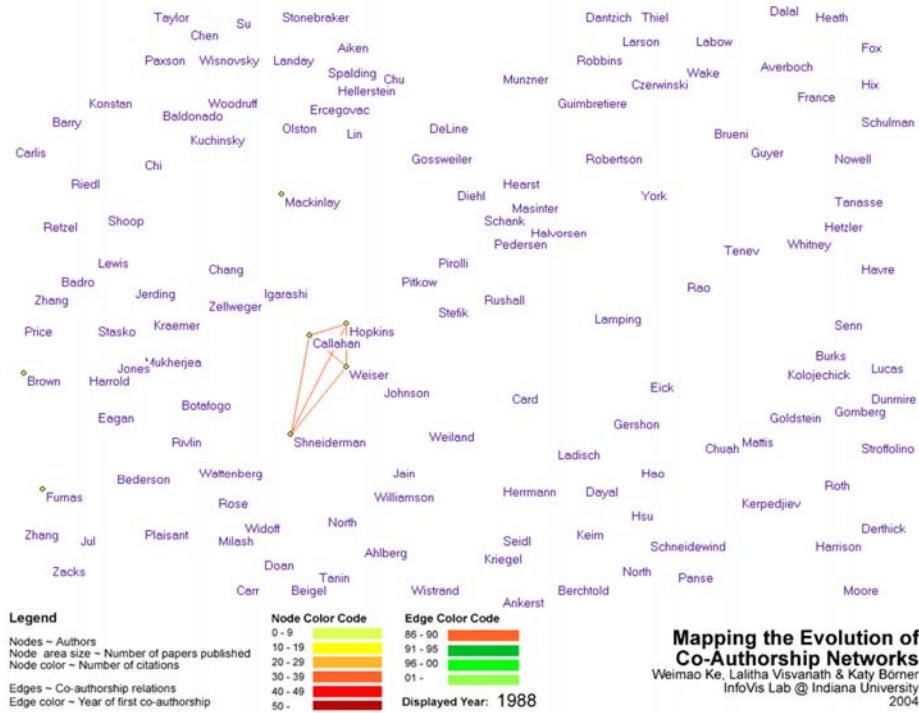
Ke & Börner, (2006)



6

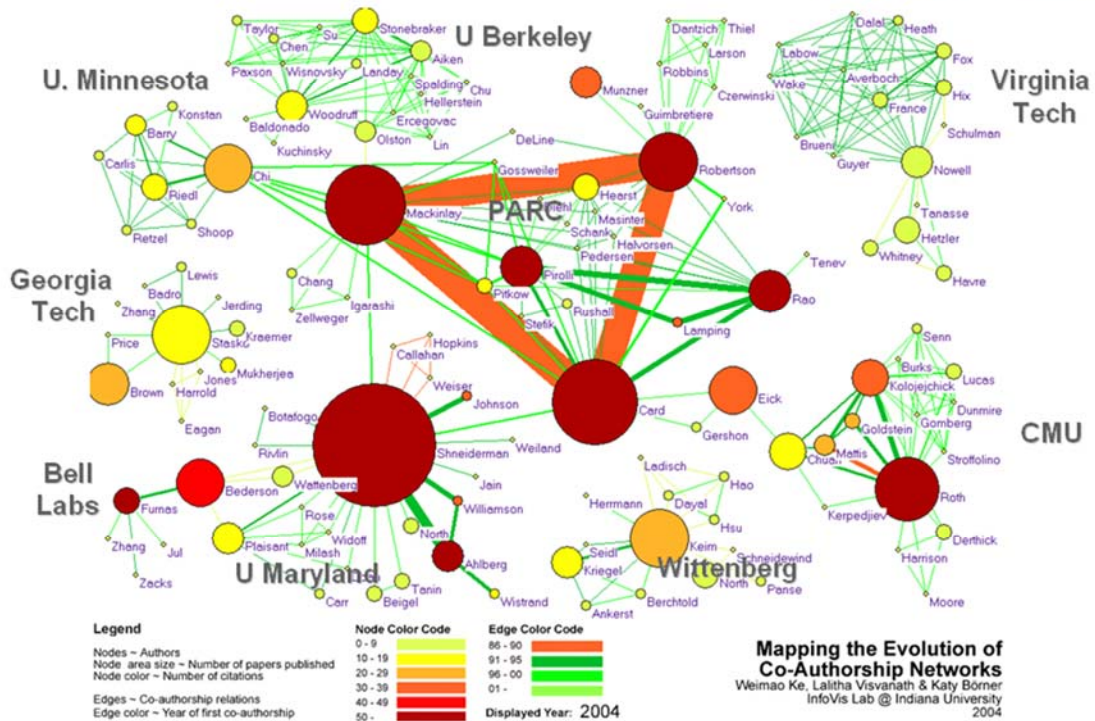
Mapping the Evolution of Co-Authorship Networks

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



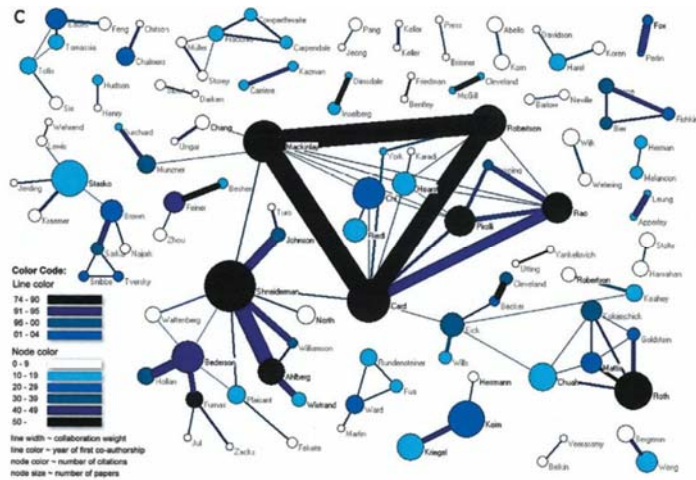
Mapping the Evolution of Co-Authorship Networks

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



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.

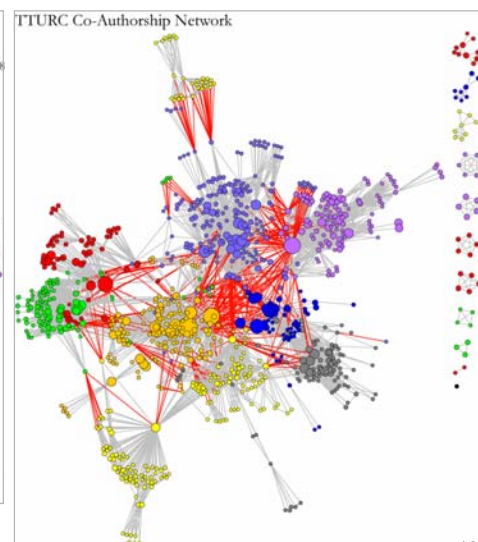
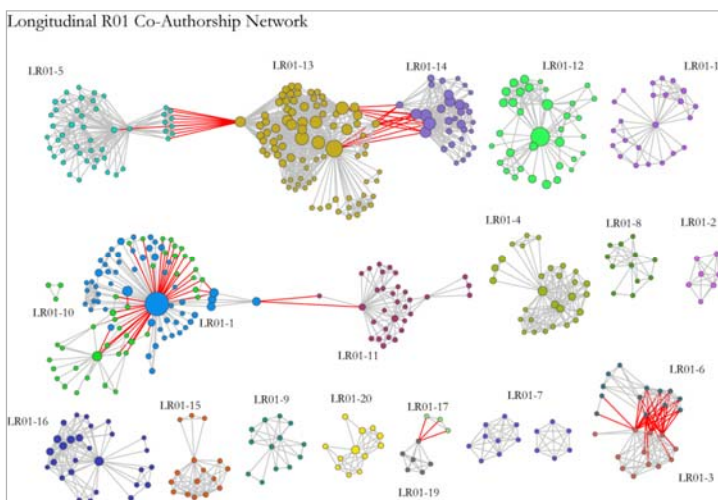
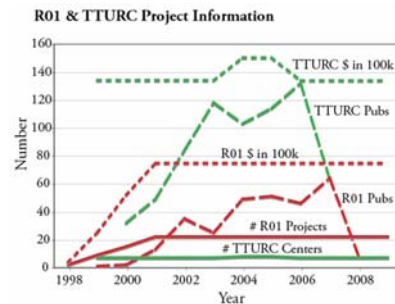
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Mapping Transdisciplinary Tobacco Use Research Centers Publications

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

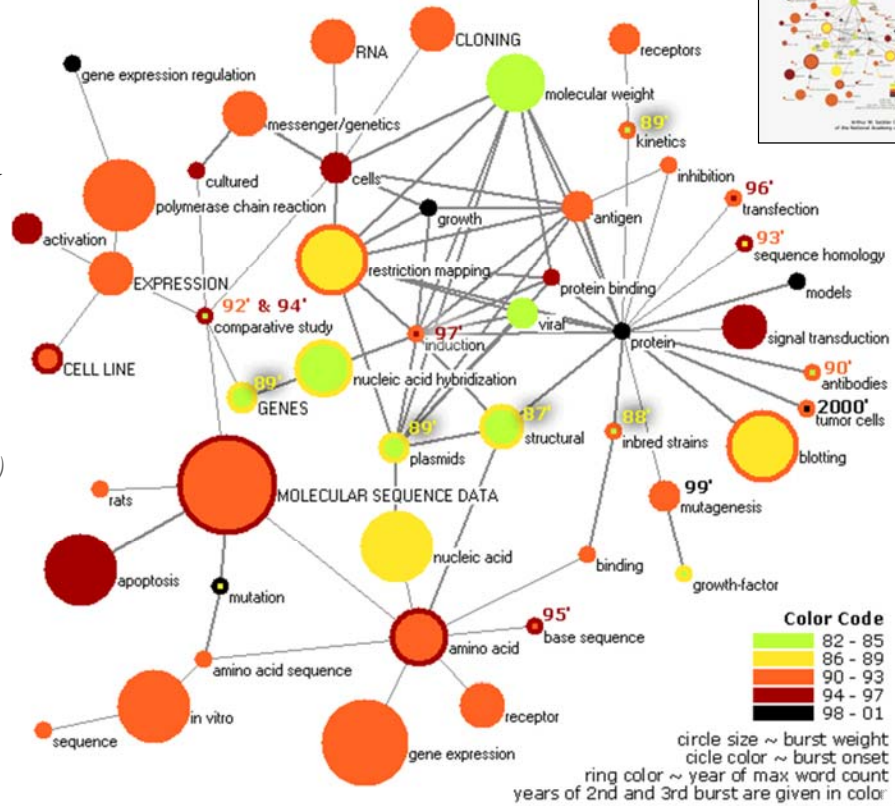


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Mapping Topic Bursts

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.*



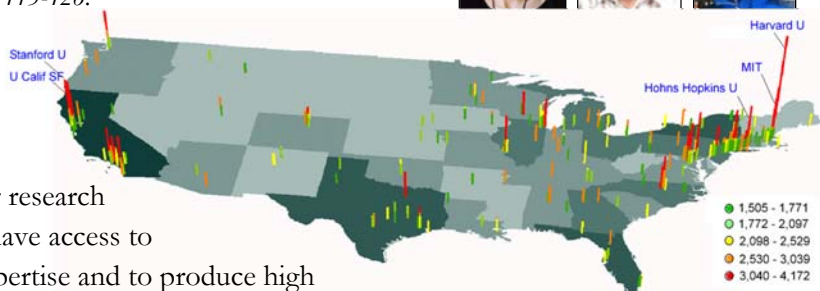
Spatio-Temporal Information Production and Consumption of Major U.S. Research Institutions

*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.*



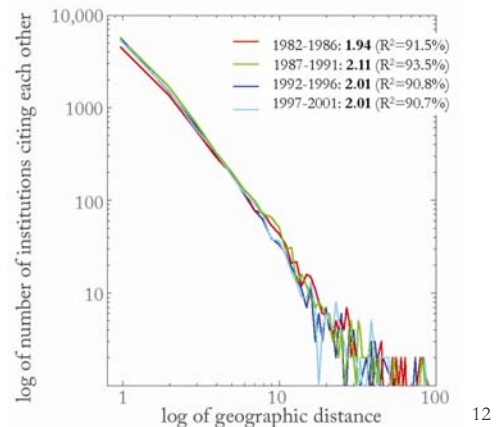
Research questions:

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?



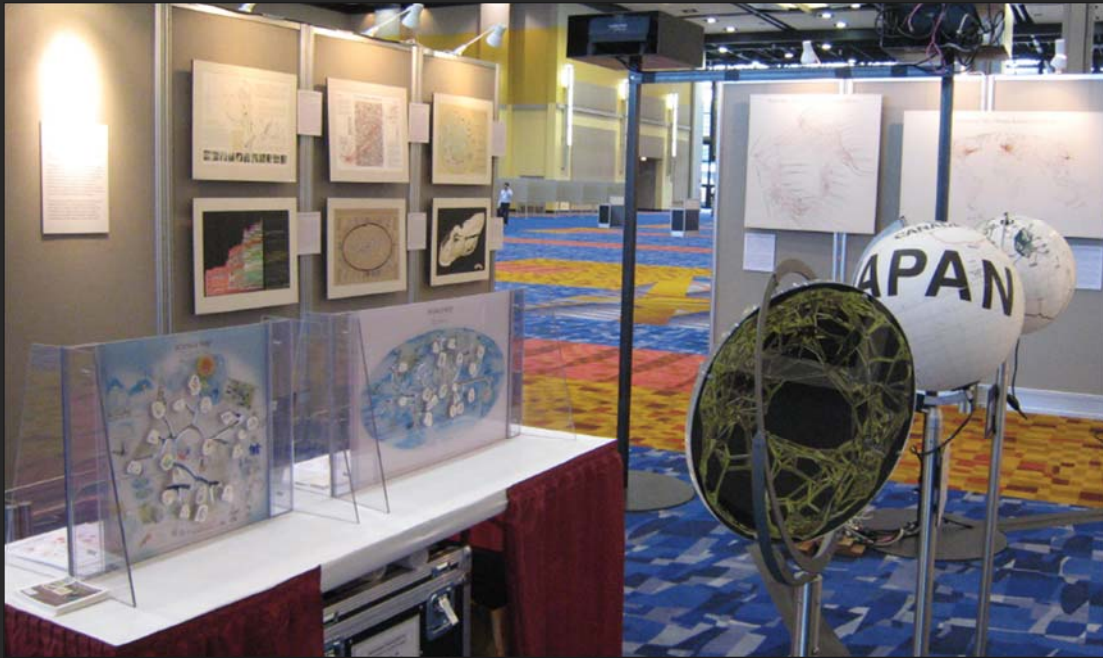
Contributions:

- 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.

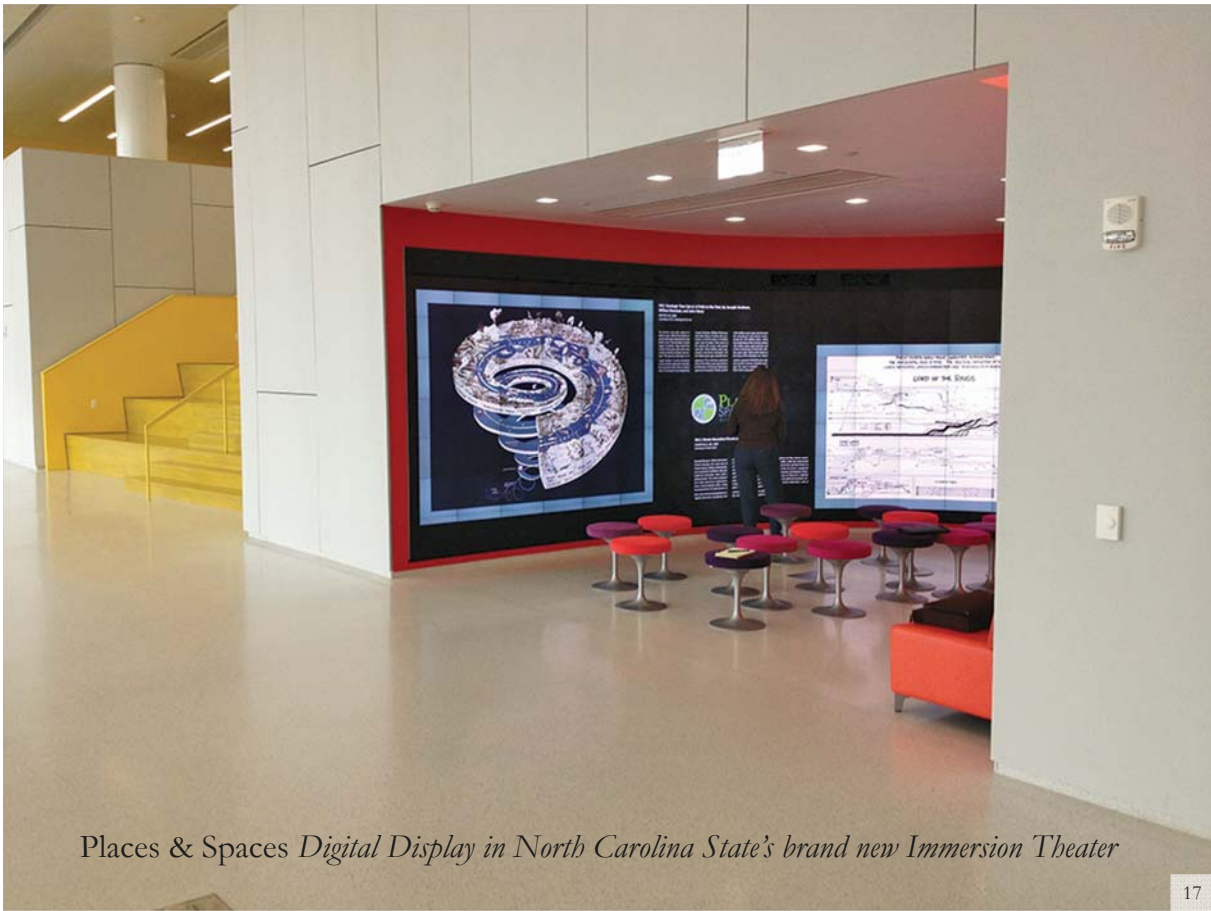


Mapping Science Exhibit – 10 Iterations in 10 years

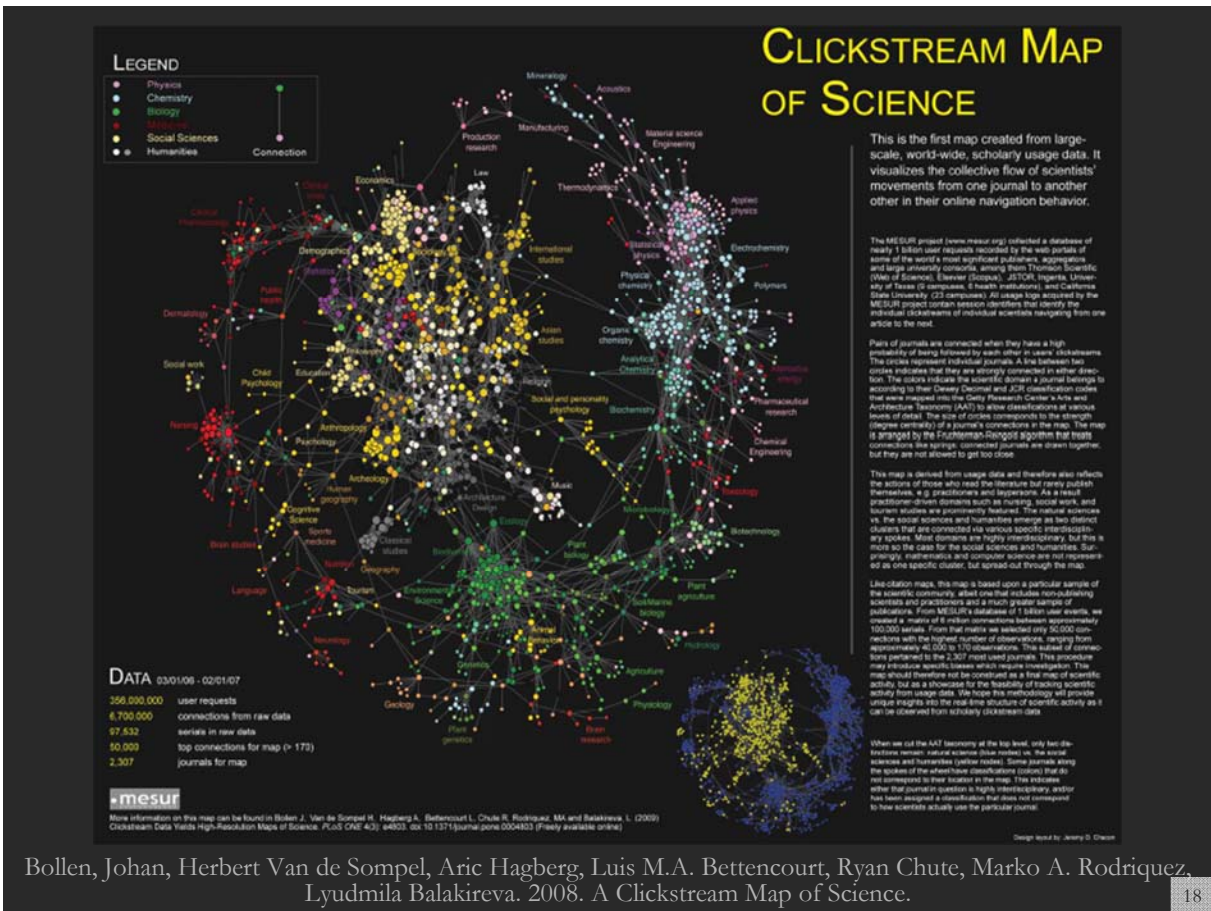
<http://scimaps.org/>



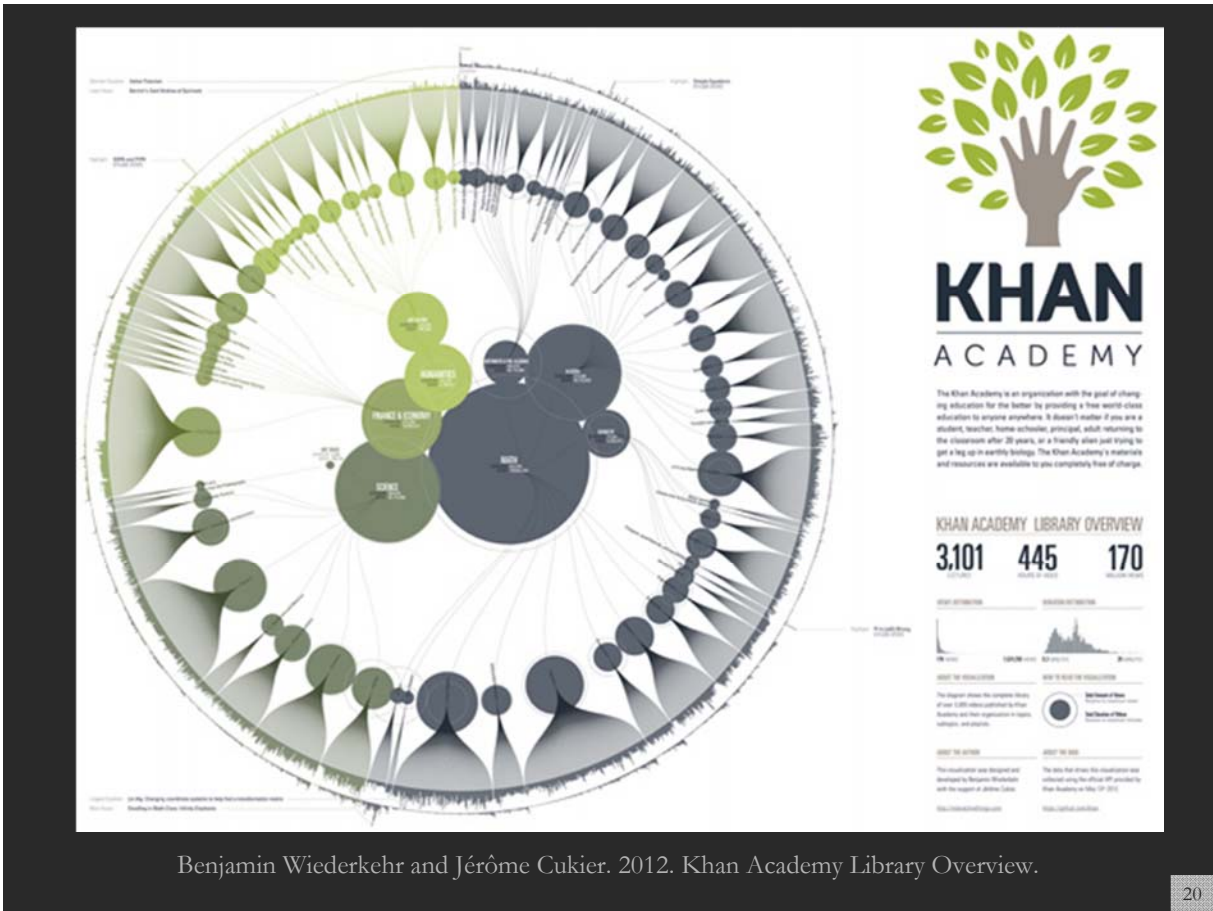
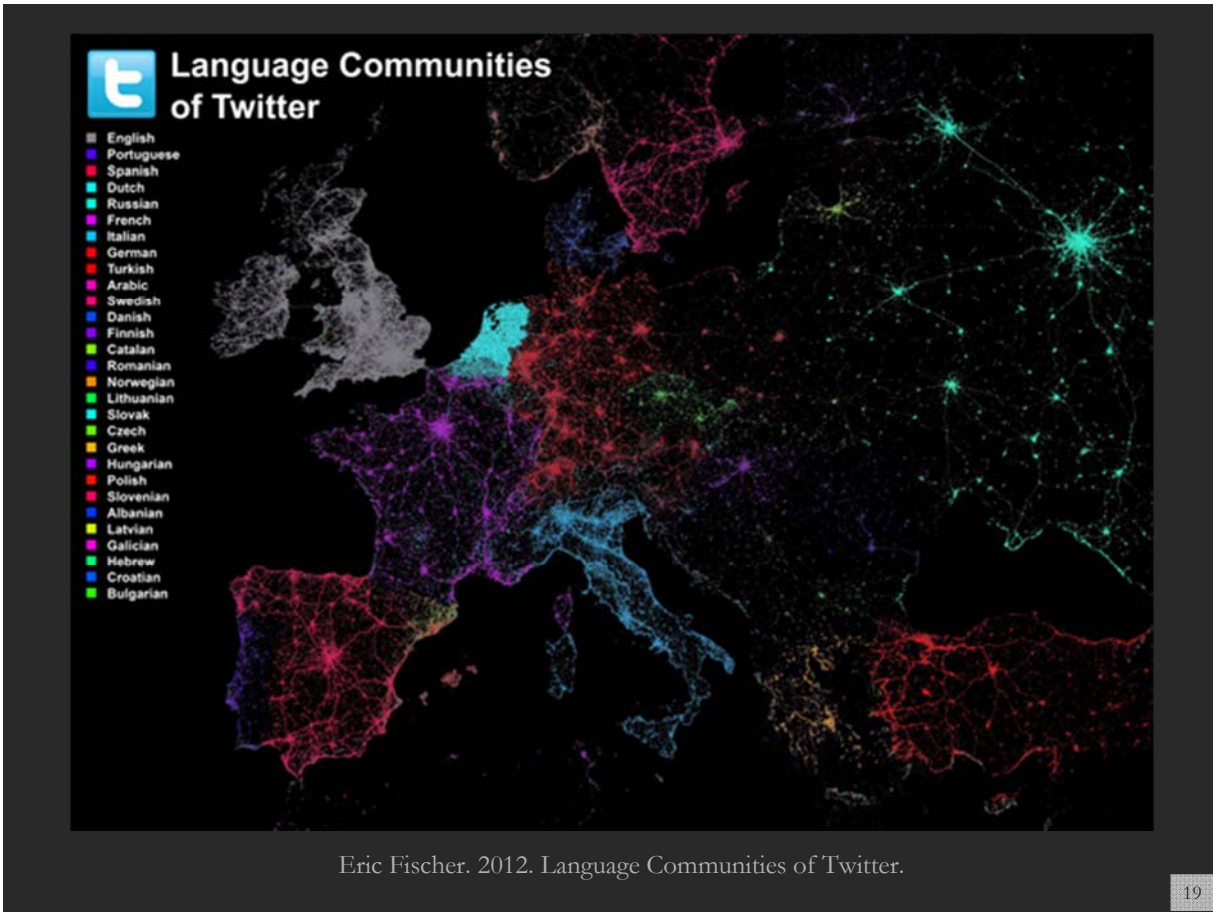
Mapping Science Exhibit at MEDIA X was on May 18, 2009 at Wallenberg Hall, Stanford University,
<http://mediax.stanford.edu>, <http://scaleindependentthought.typepad.com/photos/scimaps>



Places & Spaces *Digital Display in North Carolina State's brand new Immersion Theater*



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.



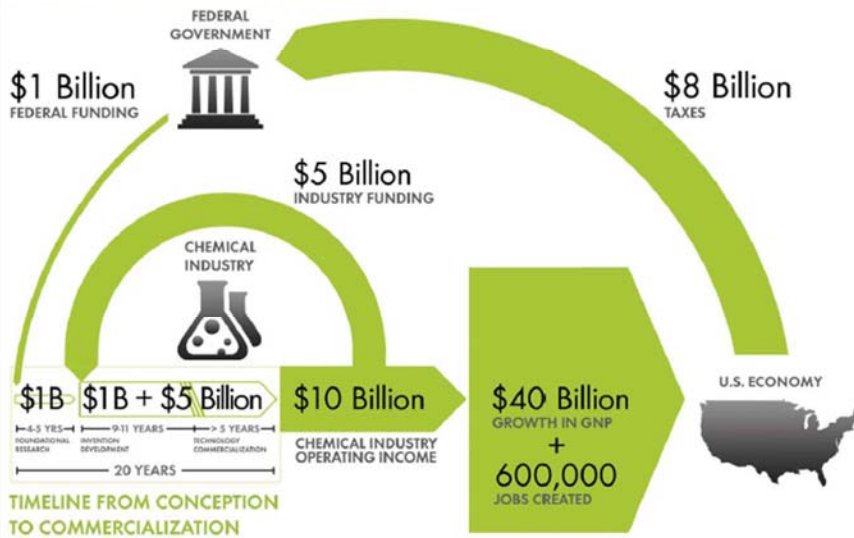
Chemical Research & Development Powers the U.S. Innovation Engine

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

The Council for Chemical Research (CCR)

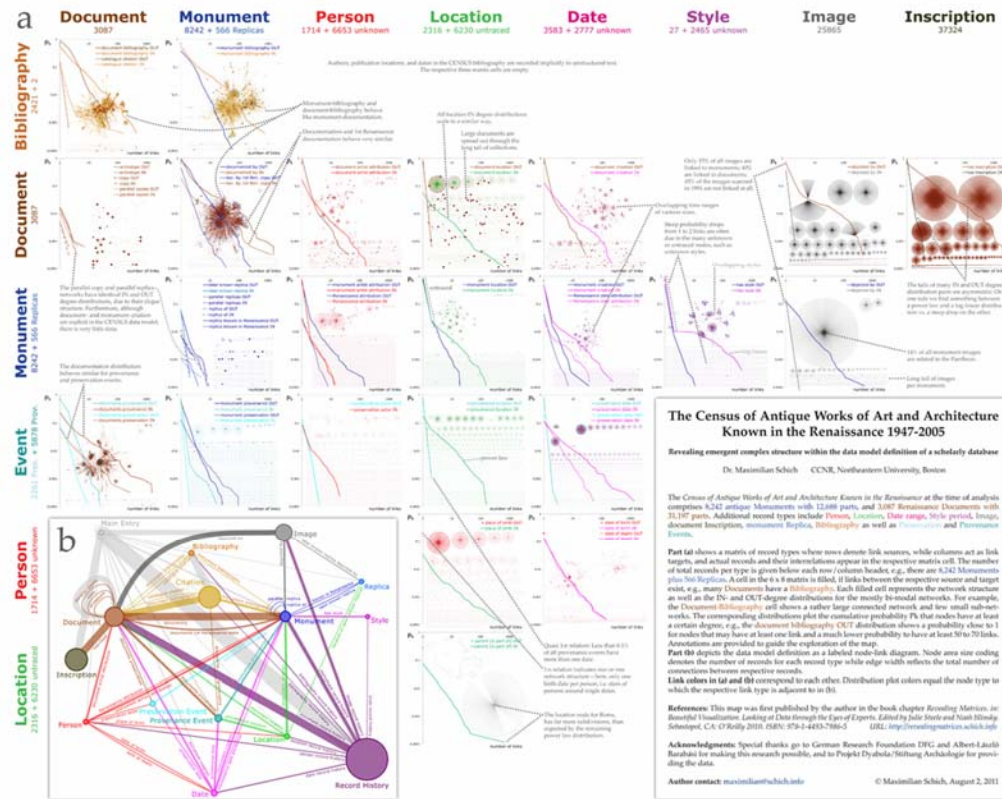
has provided the U.S. Congress and government policy makers with important results regarding the impact of Federal Research & Development (R&D) investments on U.S. innovation and global competitiveness through its commissioned 5-year two phase study. To take full advantage of typically brief access to 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.



Maximilian Schich. 2011. The Census of Antique Works of Art and Architecture Known in the Renaissance, 1947-2005.



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>



Illuminated Diagram Display
 soon on display at the Smithsonian
 in DC.

http://scimaps.org/exhibit_info/#ID

Geographic Map: Where Science Gets Done

Science Map: How Scientific Disciplines Relate

About

This Illuminated Diagram display adds the flexibility of an interactive program to the incredibly high data density of a print. This technique is generally useful when there is too much pertinent data to be displayed on a screen but the data is relatively stable. The computer can direct the eye to what's important by using projectors or screens as smart spotlights, animating the research impact of individuals, giving a "grand tour" of science, or highlighting query results (as when you touch the lectern or use the keyboard) with an overlay of moving light.

Elinor Ostrom - Nobel Prize in Economic Sciences 2009
 Born: 7 August 1933, New York, NY, USA
 Affiliation at the time of the award: Indiana University, Bloomington, IN, USA, Arizona State University, Tempe, AZ, USA
 Prize motivation: "for her analysis of economic governance, especially the commons"
 Field: Economic governance
 Contribution: Challenged the conventional wisdom by demonstrating how local property can be successfully managed by local commons without any regulation by central authorities or privatization.

Interact

Select any location on the Geographic Map location (by brushing your finger over an area on the lectern's touch screen) and topics studied in that area will highlight on the Science Map: the brighter a topic glows, the more papers on that topic originated in the selected area. Conversely, touching a scientific area in the Science Map illuminates places on the Geographic Map where that topic is studied. People and topic buttons support the exploration of publication output by selected Noble laureates and particular lines of research using MEDLINE data from 2000-2009.

Cancer	Cloning	HIV	Robert G. Edwards	Roger D. Kornberg	Elinor Ostrom
Obesity	Quality of Life	Smoking	Stanley B. Prusiner	Ahmed H. Zewail	View All

Keyword Search

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Science Map: How Scientific Disciplines Relate

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Top Five Continents

- North America - 4,000 records
- South & East Asia - 3,589
- Australia - 2,431
- Africa - 2,208
- South America - 1,562

Top Five Scientific Disciplines

- Math & Physics - 4,000 records
- Health Professions - 3,589
- Social Sciences - 2,431
- Aeronautical, Chemical, Mechanical & Civil Engineering - 2,208
- Humanities - 1,562

Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	"
Z	X	C	V	B	N	M			
Space									Go

Search

The keyboard supports retrieval and display of papers based on their Medical Subject Headings (MeSH) and MeSH qualifier terms. If multiple terms are entered in a field, they are automatically combined using "OR". So, "breast cancer" matches any record with "breast" or "cancer" in that field. You can put AND between terms to combine with "AND". Thus "breast AND cancer" would only match records that contain both terms. Double quotation can be used to match compound terms, e.g., "breast cancer" retrieves records with the phrase "breast cancer", and not records where "breast" and "cancer" are both present, but the exact phrase.

<http://scimaps.org>

People & Topics

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Ingo Gunther's Worldprocessor globe design now on display at the Giant Geo Cosmos OLED Display at the Museum of Emerging Science and Innovation in Tokyo, Japan

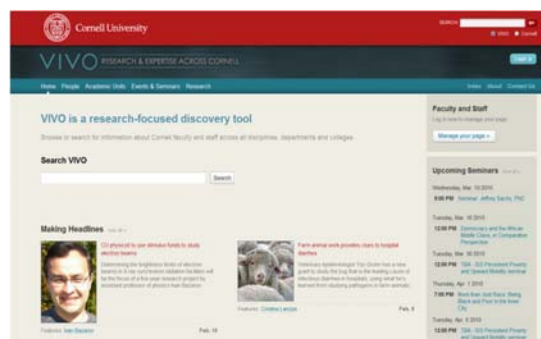


VIVO International Researcher Network

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 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 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, 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.

VIVO Enabling a National Network of Scientists

Home People Organizations Research Events

Davis, Vairie I | AST UNV LIBRA

Positions

- Michigan Science Library Outreach Librarian for Agricultural Sciences** (2002 - 2005)
- Michigan Science Library Staff Maintenance Supervisor** (2001 - 2005)
- AST UNV LIBRARIAN**

13 publications within the last 10 years (11 leads)

17 identifiers

1512772289

Primary Web Page

Michigan Science Library profile

Affiliation

Michigan Science Library Outreach Librarian for Agricultural Sciences

VIVO Enabling a National Network of Scientists

Home People Organizations Research Events

University of Florida

How do you want to compare?
by Publications

Who do you want to compare?
Search: [] X

Records 1 - 10 of 13

Entity Name	Publication Count	Entity Type
<input checked="" type="checkbox"/> Interdisciplinary Center for Bioremediation	18	UF Center, Agent, Center
<input checked="" type="checkbox"/> Continuing Education	24	UF Department, Agent, Non-Academic Department, Department
<input checked="" type="checkbox"/> Levin College of Law	17	Agent, UF College, College
<input checked="" type="checkbox"/> College of Agricultural and Life Sciences	14	Agent, UF College, College
<input type="checkbox"/> Mergenson College of Engineering	14	Agent, UF College, College
<input type="checkbox"/> Center for Environmental and Estuarine Science	8	UF Center, Agent, Center

Comparing Publications of Organizations in University of Florida

Total Number of Publications

You have selected 4 of a maximum 10 organizations to compare. **Clear**

- College of Agricultural and Life Sciences: 14
- Levin College of Law: 17
- Continuing Education: 24
- Interdisciplinary Center for Bioremediation: 18

VIVO Enabling a National Network of Scientists

Home People Organizations Research Events

Search results for 'geriatrics'

Show only results of this type: **people activities organizations research**

AMERICAN GERIATRICS SOCIETY

- Geriatrics Education Curriculum, Residents (Geri) Program
- Evidence Based Decision Making in Geriatrics, Geriatrics, Disability

AMERICAN GERIATRICS SOCIETY

- Harford Geriatrics Leadership Scholar
- Geriatrics and Aging Research Institute on Aging (GRI)
- AGS ON GERIATRICS ACADEMIC PROGRAMS
- US OLTH RESOURCES AND SERVICES ADMIN
- Suifortn Study
- 2003 Scholar, Harford Institute of Geriatrics, Nursing Research, John A. Harford Institute for Geriatrics, Nursing, New York University
- Gene, Polysomnograph and Prevention of Obstructive
- Insulinemia in the Sea Surface Echin
- Cardiac Mitral Regurgitation, Regurgitation and Mitral Regurgitation
- ARMS ACAD OF NURSING
- The Epidemiology of Stress and the Menopausal Syndrome
- Statement to a Sub-Committee

VIVO Enabling a National Network of Scientists

Home People Organizations Research Events

Welcome to VIVO

VIVO is a research-focused discovery tool that enables collaboration among scientists across all disciplines.

Browse or search information on people, departments, courses, grants, and publications.

Search VIVO

Log in

Email: []

ORCID: []

Password: []

Log in

Browse by

- Grants (11,814)
- People (48,721)
- Activities (11,818)
- Courses (1116)
- Events (379)
- Organizations (20,328)
- Research (11,283)
- Locations (376)
- Faculty Member (8882)
- Graduate Student (1)
- Librarian (67)
- Non-Academic (7536)
- Non-Faculty Academic (1)
- Alumn (8972)
- Professor Emeritus (802)

University of Florida

How do you want to compare?
by Grants

Who do you want to compare?
Search: [] X

Records 1 - 10 of 30

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

Comparing Grants of Organizations in University of Florida

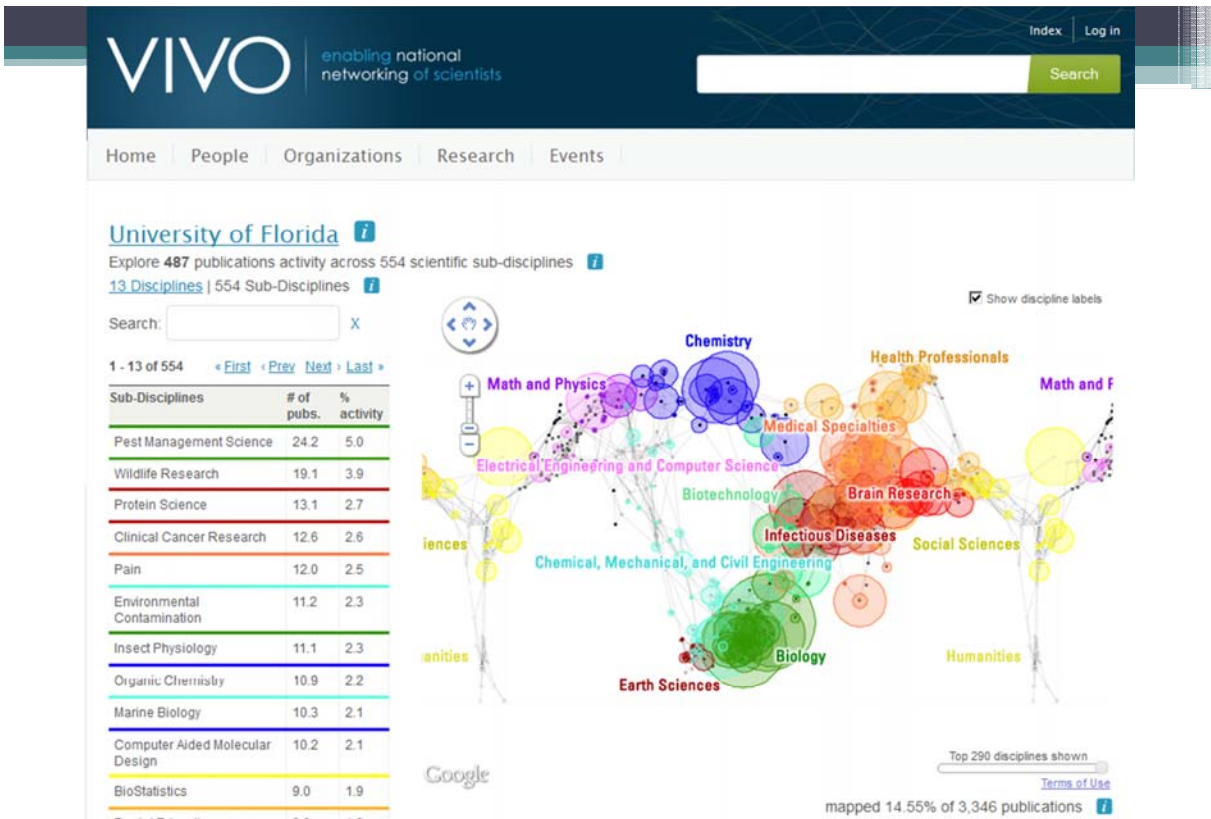
Total Number of Grants

You have selected 7 of a maximum 10 organizations to compare. **Clear**

- 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

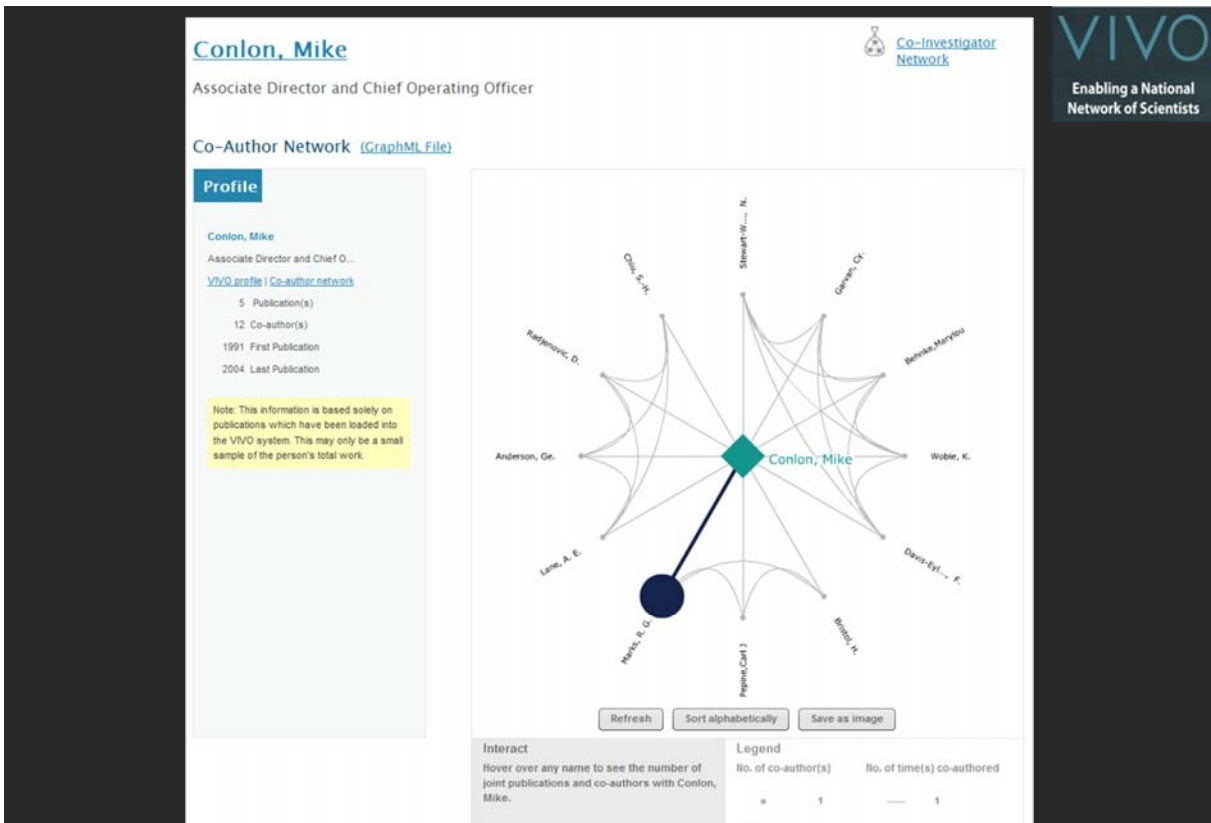
Save as CSV **Clear**

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)

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

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National Researcher Networking Visualization 1.0



<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



Online Interactive Maps for Sustainability Research and NIH

MAPSustain
Mapping Sustainability Research

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.

Funding
 NIH
 NSF
 USDA

Publications
 DOE
 ISI
 Medline

Patents
 USPTO

Citations Count

Amount Count

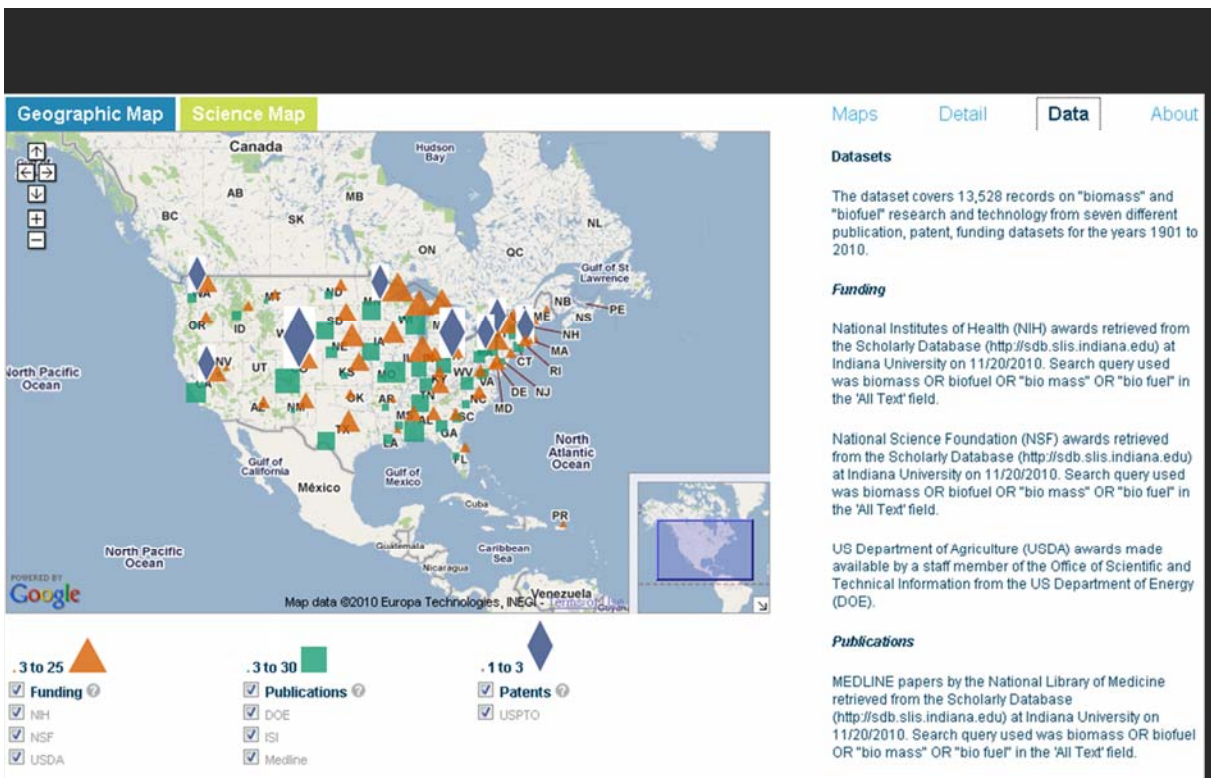
From year 1901 to year 2009

Search by keyword

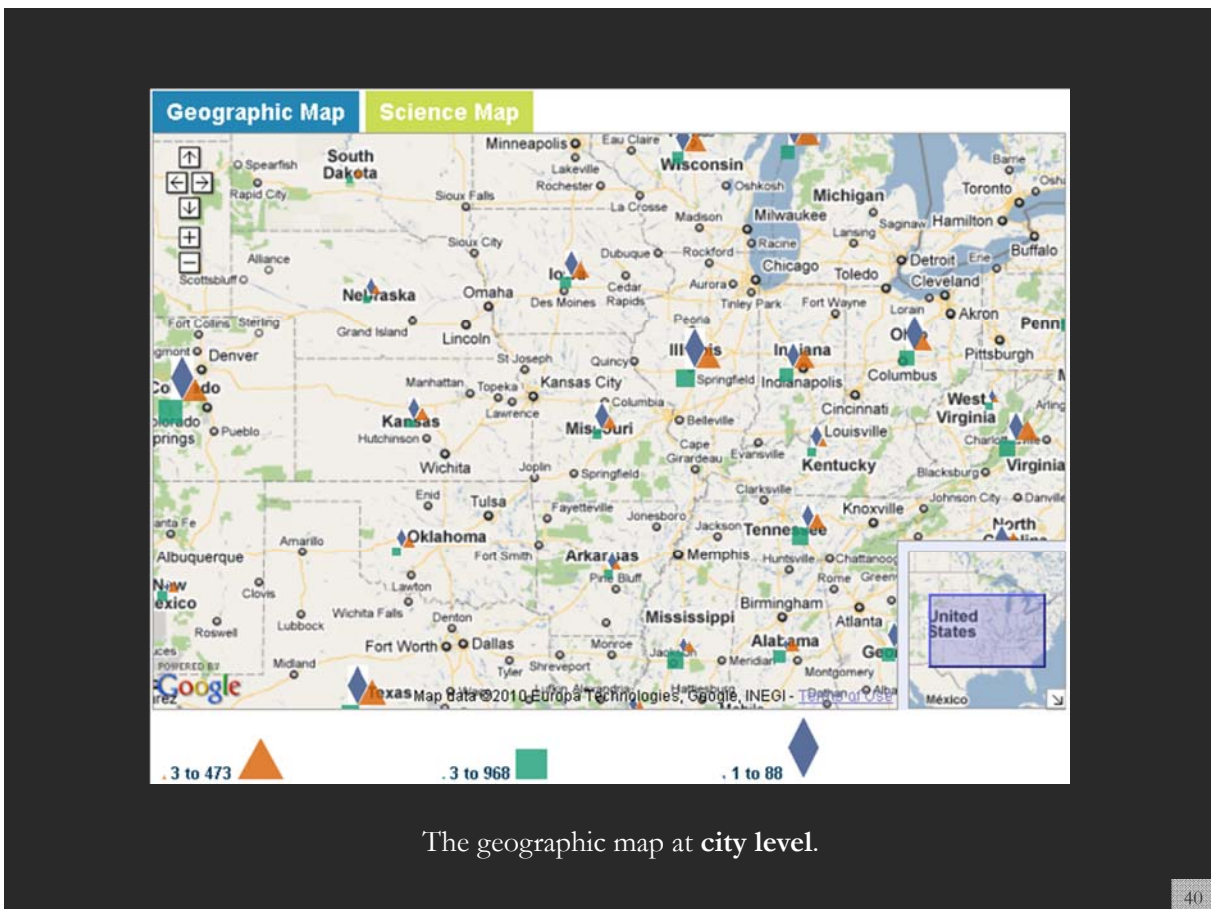
<http://mapsustain.cns.iu.edu>

CYBERINFRASTRUCTURE for NETWORK SCIENCE CENTER
School of Library and Information Science, Indiana University

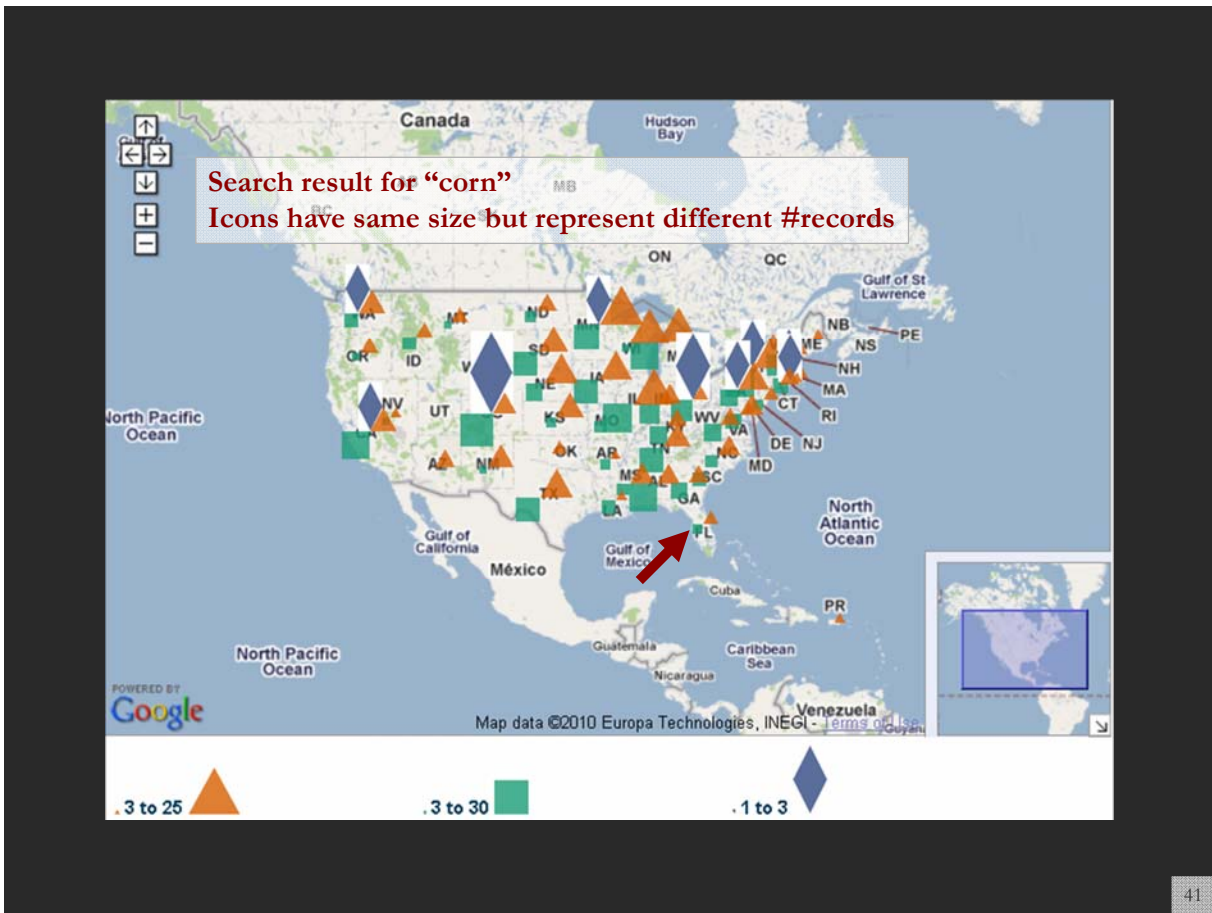
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The geographic map at state level.



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.

Florida publications: 2 records
DOE: 1
MEDLINE: 1

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

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

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: 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; CEREALS; CHEMICAL REACTIONS; DATA; DECOMPOSITION; EFFICIENCY; FUELS; GRASS; HYDROLYSIS; INFORMATION; LYSIS; NUMERICAL DATA; PLANTS;

Done

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

43

Geographic Map Science Map

Color B & W

Math and Physics Chemistry Health Professionals

Engineering and Computer Science Medical Societies

Biotechnology Brain Research

Chemical, Materials Social Sciences

Earth Sciences Biology Humanities

Biology funding: 2112 records
 NSF: 1617
 NIH: 114
 USDA: 391

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Maps Detail Data Ab

> Biology

NIH
 2009

- Label-Free And Simultaneous Detection Of Multiple Bacterial Pathogens And Virulen
- Mechanism Of Psp Mediated Adhesion
- Label-Free And Simultaneous Detection Of Multiple Bacterial Pathogens And Virulen
- Novel Mechanism Of Uranium Reduction Via Microbial Nanowires
- Nano-Scale Mechanisms Of Metal(Loid) Rhizostabilization In Desert Mine Tailings
- Label-Free And Simultaneous Detection Of Multiple Bacterial Pathogens And Virulen
- Mechanism Of Psp Mediated Adhesion

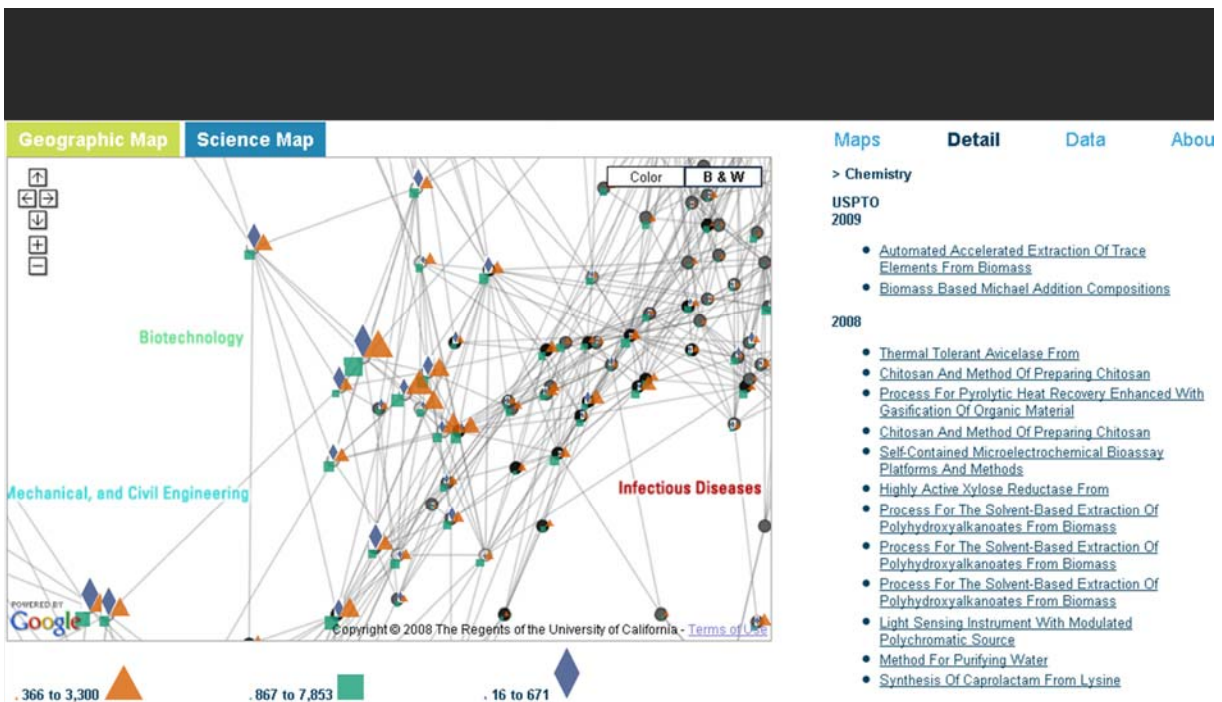
2008

- The Effect Of Inter-Species Interactions On The Virulence Of Streptococcus Mutans
- Cook-stove Replacement For Prevention Of Ari And Low Birthweight In Nepal
- Diverse Drug Lead Compounds From Bacterial Symbionts In Tropical Marine Mollusks
- Remote Sensing Of Wildfire Smoke Exposures To Assess Health Effects
- Cook-stove Replacement For Prevention Of Ari And Low Birthweight In Nepal

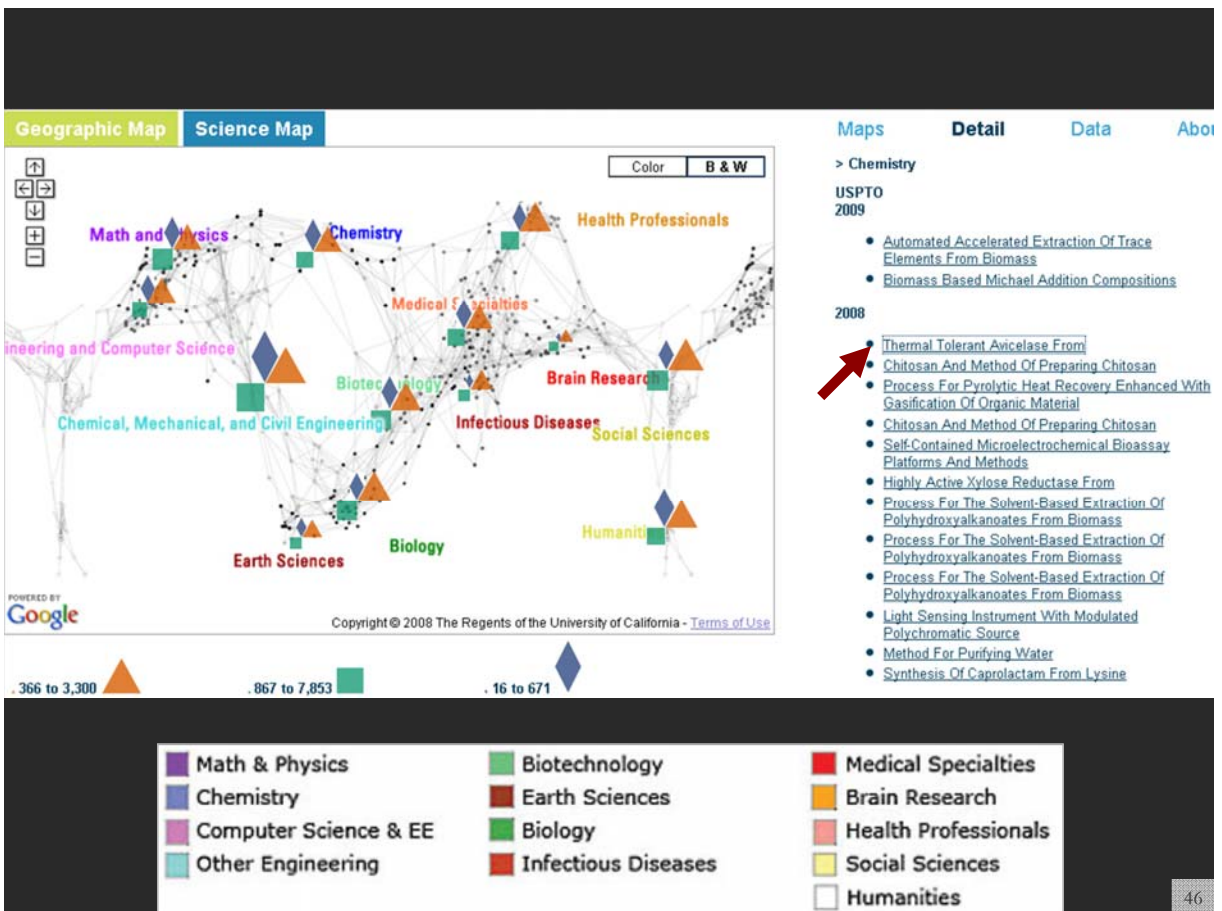
.366 to 3,300 .867 to 7,853 .16 to 671

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

44



The science map at 554 sub-disciplines level.



NIH TOPIC MAPS

A Topic Database of NIH-Funded Grants

NIH Topic Browser - Institute Information

[NLM](#)
[NCI](#)
[NEI](#)
[NCCAM](#)
[NIEHS](#)
[NIGMS](#)
[NINR](#)
[NICHD](#)
[NINDS](#)
[NIA](#)
[NCMHD](#)
[NIAMS](#)
[NIH](#)
[NIDDK](#)
[NHLBI](#)
[NIAAA](#)
[NIMH](#)
[NHGRI](#)
[FIC](#)
[NIBIB](#)
[NIDCR](#)
[NCRR](#)
[NIAID](#)
[NIDA](#)

Institute: NCI - National Cancer Institute

Export Data

Top Topics

%	Topic	Topic Words	Title Words	Phrases
4.05	210	cancer cancer_center program cancer_research	cancer_center, program, cancer, core, spore, tre	anderson cancer_center, shared resource, canc
2.42	597	cancer tumor tumorigenesis tumors myc tumor_	cancer, tumorigenesis, myc, tumor_suppressor,	tumor progression, malignant transformation, tu
2.28	430	cancer treatment therapy patients tumor diseas	cancer, therapy, treatment, tumor, prostate, bre	cancer treatment, treatment cancer, metastatic
1.73	16	metastasis invasion tumor metastatic progressi	metastasis, cancer, invasion, breast, tumor, pro	tumor progression, invasion metastasis, cancer
1.47	345	clinical_trials trials oncology cancer treatment cli	clinical_trials, clinical_oncology, oncology, unit, p	clinical_trials unit, phase_j clinical_trials, cancer
1.43	686	cancer breast cancers cancer_risk cancer_patien	breast, cancer, cancer_risk, women, cancer_sur	breast cancer, breast cancer_risk, breast cancer
1.41	370	tumor immunotherapy t_cells t_cell immunity an	tumor, immunotherapy, t_cell, immunity, t_cells,	antitumor immunity, adoptive immunotherapy, t
1.14	480	therapeutic agents treatment therapies targets	therapeutic, targeting, agents, treatment, ther	therapeutic agents, therapeutic targets, therap
1.08	346	biomarkers markers biomarker disease patients	biomarkers, biomarker, markers, disease, cancer	disease progression, biomarker validation, seru
0.98	660	prostate cancer pca cancer_cells incap androge	prostate, cancer, cancer_cells, androgen_recep	prostate cancer, prostate cancer_cells, prostate
0.90	171	scientific committee administrative management	core, administrative, administration, planning, a	steering committee, internal external, institutor
0.87	182	breast cancer her2 cancer_cells human mcf7 neu	breast, cancer, cancer_cells, her2, human, estre	breast cancer, breast cancer_cells, her2 neu, br
0.85	437	risk risk_factors cases cohort prospective high_r	risk, risk_factors, cancer, prospective, women, e	cases controls, prospective cohort_study, modif
0.85	23	tumor tumors tumor_growth mice treatment tun	tumor, tumors, cancer, tumor_growth, targeting	tumor regression, tumor burden, tumor progres
0.85	695	core statistical projects biostatistics investigat	core, biostatistics, data_management, bioinform	biostatistics core, projects core, data_managem
0.79	603	intervention interventions program prevention p	intervention, prevention, interventions, program	randomized_controlled trial, intervention reduce

<https://app.nihmaps.org>

NIH TOPIC MAPS

A Topic Database of NIH-Funded Grants

NIH Topic Browser

Show Map Viewer ?

Export Data

Methods

Feedback

Topics by NIH Institute

Topics by Category

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 Wor	NIH Inst	# Grants	Count
	NCRR	3P20RR011792-10S2	OBESITY, INSULIN RESISTANCE, IGF'S, AND BREAST CANCER RISK IN AFRICAN AMERICANS	CUI, YONG	686	cancer brea...	NCI	116	
	NCI	3R01CA120562-03S1	Commonly Used Medications and Breast Cancer Recurrence	BOUDREAU, DENISE M	686	cancer brea...	NCRR	10	
	NCI	5R01CA120562-03	Commonly Used Medications and Breast Cancer Recurrence	BOUDREAU, DENISE M	686	cancer brea...	NIEHS	5	
	NCI	5R01CA093772-06	Long-term Survivorship in Older Women with Early Stage Breast Cancer	SILLIMAN, REBECCA A	686	cancer brea...	NCMHD	1	
	NCI	5R01CA064277-11	Shanghai Breast Cancer Study	ZHENG, WEI	686	cancer brea...	NIA	1	
							NCCAM	1	
							NICHD	1	
							NINR	1	
							NHGRI	1	

Topics

Similar Grants

Show Top 100 on Map

%	Topic	Topic Words	Title Words	Similar	NIH Inst	Grant
25.91	686	cancer breast cancers cancer_risk cancer_patients	breast, cancer, car	6.51	NCI	1R01CA129639-01A2 Genome-Wide Association Study of Radiation Exposure and Bilateral Breast Cancer PI: BERNSTEIN, JONINE LISA
3.86	437	risk risk_factors cases cohort prospective high_ris	risk, risk_factors, v	6.46	NCI	1M07CA136758-01A1 Genetic variants in the PI3K pathway in mammographic density and breast cancer PI: THOMPSON, CHERYL L.
3.76	544	snps snp genome_wide_association cases genes	genome_wide_ass	6.31	NCI	5P50CA116199-05 UTMADACC SPORE in Breast Cancer PI: HORTOBAGYI, GABRIEL N.
3.70	173	genetic genes risk susceptibility polymorphisms g	genetic, genetics,	6.02	NCI	2R01CA050385-21A1 Risk Factors for Breast Cancer in Younger Nurses PI: WILLETT, WALTER C.
2.62	252	treatment patients management patient outcom	management, tre	4.6	NCI	5R01CA127617-02 Who Cares For Older Breast Cancer Survivors And How Does It Affect Quality? PI: MANDELBLATT, JEANNE
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			

<https://app.nihmaps.org>

NIH TOPIC MAPS

A Topic Database of NIH-Funded Grants

3P20RR011792-10S2 6914

Map Viewer

Topic Browser

Export Data

Methods

Feedback

2009 NCCR CUI, YONG

NIH RePORTer

Map Similar Grants

Highlight on Map

Show Parent/Other Subs

OBESITY, INSULIN RESISTANCE, IGF'S, AND BREAST CANCER RISK IN AFRICAN AMERICANS

The purpose of this study is to better understand how lifestyle factors and their interaction with genetic factors influence a women's risk of developing breast cancer. In order to learn more about the causes of breast cancer, we need to compare the lifestyles of people who have breast cancer with those who do not. 600 women are expected to be enrolled.

Top Topics

50.00	686	cancer breast cancers cancer_risk cancer_patients women cancer_surv...
11.54	378	african_american white ethnic racial african_americans black race white...
11.54	348	obesity weight bmi obese overweight weight_loss body_mass_index kg

Tags

NIH Reporting Categories
Breast Cancer... Cancer... Obesity
NIH Concept Keywords
African American... cancer risk... Clinical Research... Computer Retrieval of Information on

Similar Grants

Similar	Co NIH Insti	Project/Subprojec	Title	Investigator(s)	# 1 Topic	# 1 Topic Words
0.54	NCI	3K22CA127519-03S1	Beyond Adiposity: Insulin and Inflammation in Postmenopausal Breast Cancer	NUNEZ, NOMELI PANIAGUA	686 (33%)	cancer breast...
0.54	NCI	5K22CA127519-03	Beyond Adiposity: Insulin and Inflammation in Postmenopausal Breast Cancer	NUNEZ, NOMELI PANIAGUA	686 (33%)	cancer breast...
0.48	NCI	5R01CA128799-02	Mechanisms for Increased Breast Cancer Risk in Type 2 Diabetes	LEROITH, DEREK	66 (17%)	diabetes diab...
0.48	NCI	3P30CA013696-36S2 0007	BREAST CANCER RESEARCH	PARSONS, RAMON E	210 (40%)	cancer cancer...
0.48	NCI	3P30CA013696-36S3 0007	BREAST CANCER RESEARCH	PARSONS, RAMON E	210 (40%)	cancer cancer...

<https://app.nihmaps.org>

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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

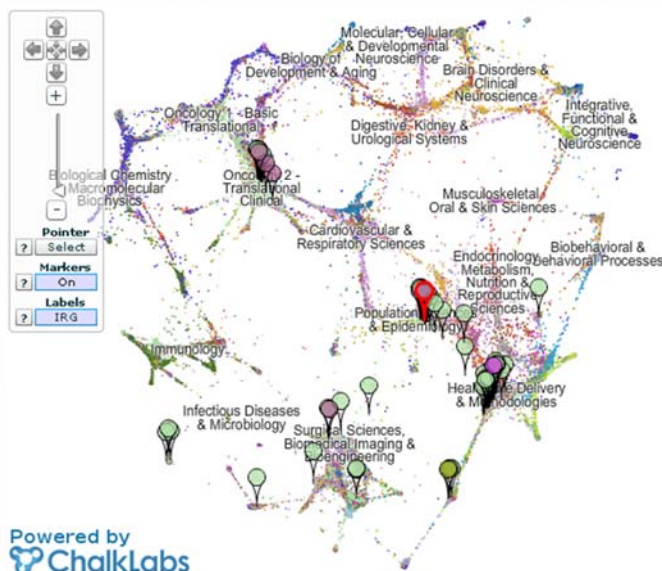
Related Grants

7960745

Top 100

Search

Clear Search



Powered by ChalkLabs

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

Institutes (3)

NIH Inst	#Grants	Count
NCI	94	94
NCCR	6	6
NCMHD	1	1

Topics

%	Title	Words
14.7%	breast, cancer, cancer_risk, women, cancer_sui	94
11.0%	breast, mammography, mammographic, canc	94
9.60%	risk, risk_factors, cancer, prospective, women,	94
3.23%	genome_wide_association, lod, genome_wide,	94

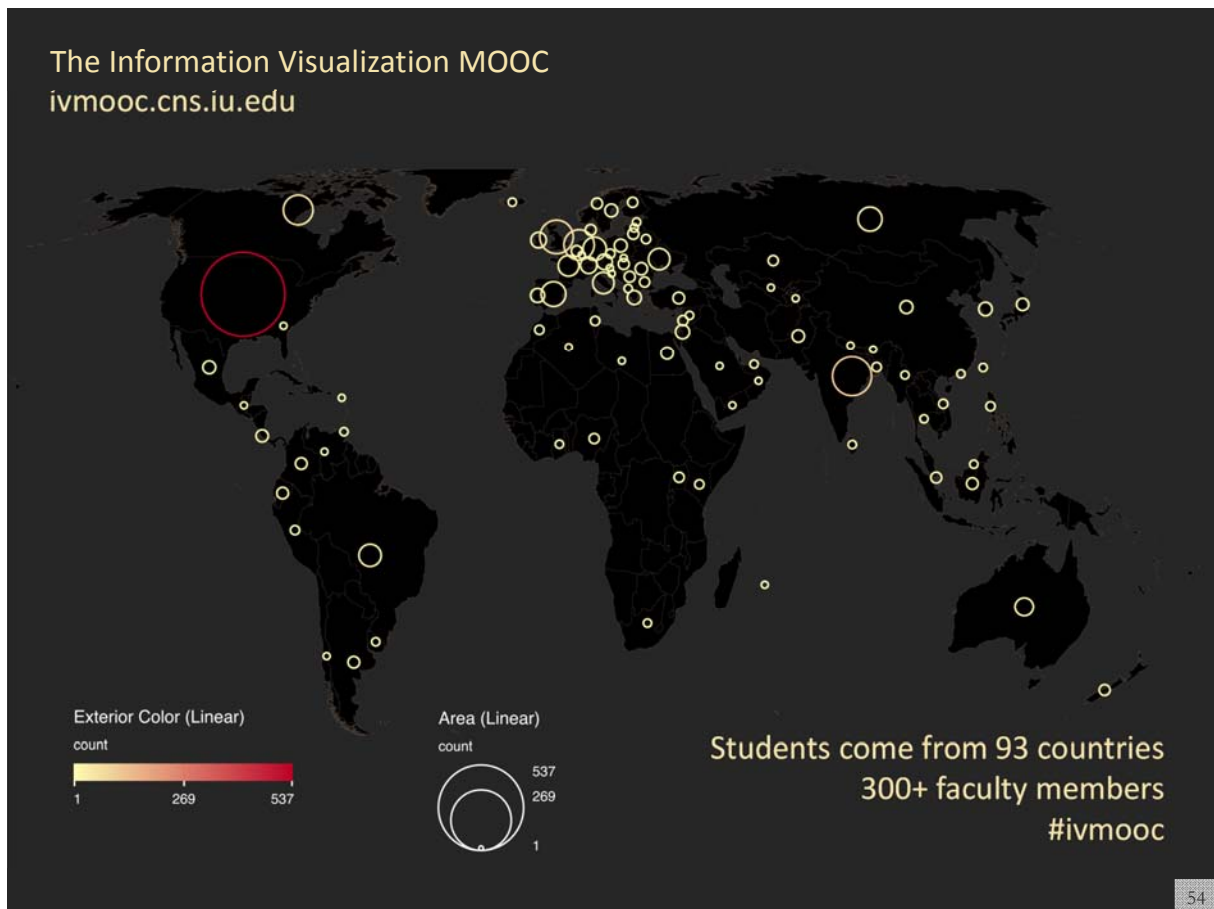
Grants (101)

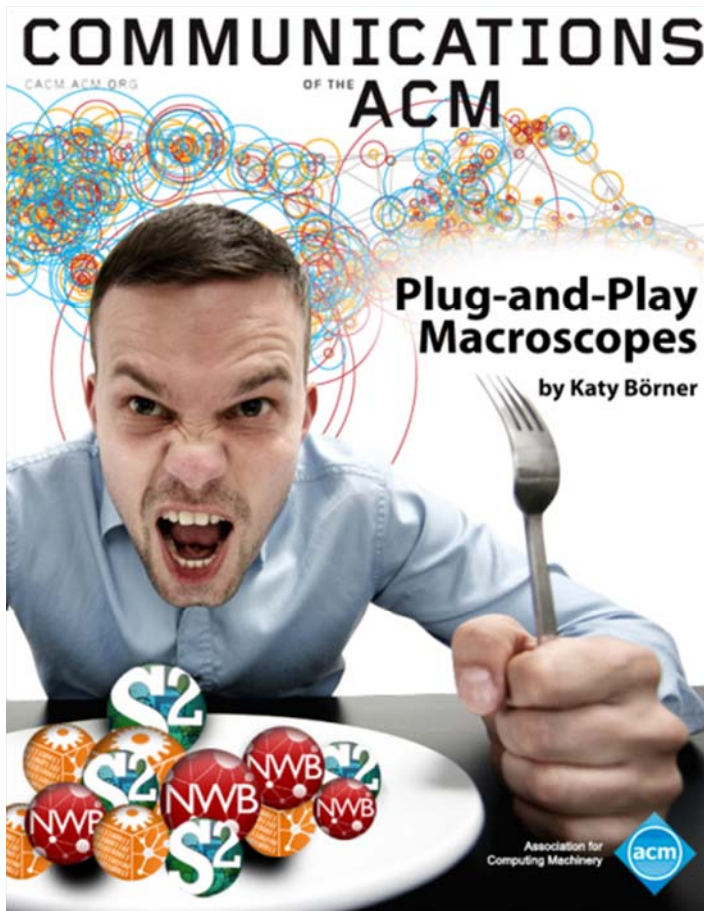
NIH Inst	Grant
NCCR	3P20RR011792-10S2 6914 OBESITY, INSULIN RESISTANCE, IGF'S, AND BREAST CANCER RISK IN AFRICAN AMERICANS P1: CUI, YONG
NCI	3R01CA120562-03S1 Commonly Used Medications and Breast Cancer Recurrence PI: BOUDREAU, DENISE M
NCI	5R01CA120562-03 Commonly Used Medications and Breast Cancer Recurrence PI: BOUDREAU, DENISE M
NCI	5R01CA093772-06 Long-term Survivorship in Older Women with Early Stage Breast

<https://app.nihmaps.org>

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The Information Visualization MOOC





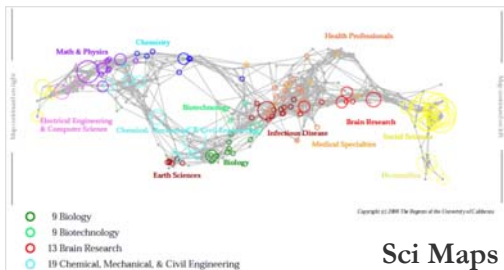
Börner, Katy. (2011).
 Plug-and-Play Macroscopes.
Communications of the ACM,
 54(3), 60-69.

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

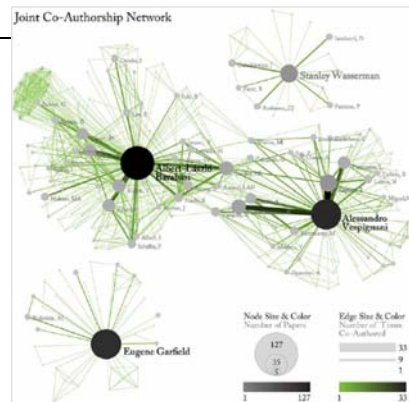


Sci² Tool – “Open Code for S&T Assessment”

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

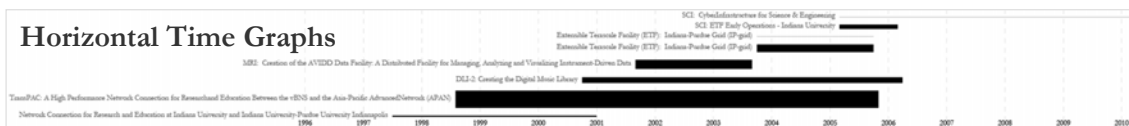


Sci Maps

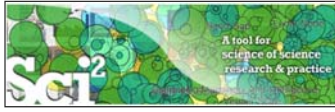


GUESS Network Vis

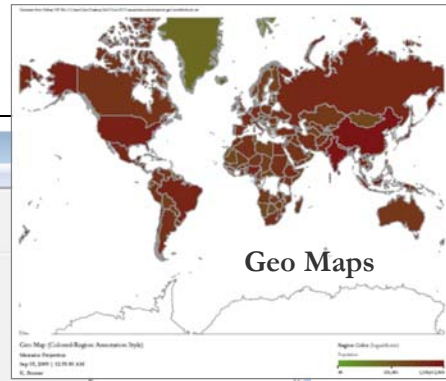
Horizontal Time Graphs



Börner, Katy, Huang, Weixia (Bonnie), Linnemeier, Micah, Dubon, 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 ISIS 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

File Preprocessing Modeling Analysis Visualization Scientometrics Help

Console

Welcome to the Science of Science Tool (Sci²). The development of this tool is supported in part by the Network Science center and the School of Informatics at Indiana University, the National Science Foundation (NSF) grant IIS-0715303, and the James S. McDonnell Cyberinfrastructure portal (<http://scis.slis.indiana.edu>).

The primary investigators are Katy Börner, Ingrid Isenhardt, SciTech Strategies Inc. The Sci² tool was developed by J. Duhon, Patrick A. Phillips, Chintan Tank, a Cyberinfrastructure Shell (<http://cishell.org>) for Network Science Center (<http://cns.slis.indiana.edu>). Many algorithm plugins were derived from the Network Science Center (<http://nwb.slis.indiana.edu>).

Please cite as follows:
Sci² Team. (2009). Science of Science Tool. In Proceedings of the 2009 ACM Conference on Knowledge Discovery and Data Mining, New York, NY, USA, August 15-18, 2009. Copyright 2009 ACM 978-1-60558-325-9/09/08...\$5.00.

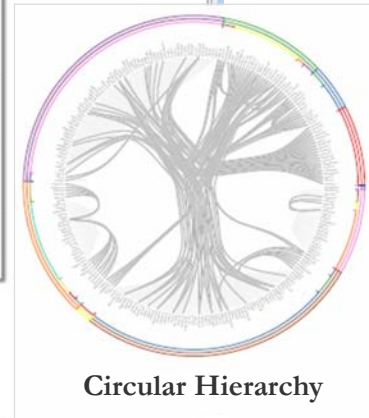
Scheduler

Remove From List Remove completed

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

Visualization menu items:

- GUESS
- GnuPlot
- 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)
- DrL (VxOrd)
- Specified (prefuse beta)
- Horizontal Line Graph
- Circular Hierarchy
- Geo Map (circle annotations)
- Geo Map (region coloring annotations)
- Image Viewer
- RefMapper



Mapping NEH awards and MEDLINE publications, 1980-2009

NEH Grants:

41,258 grants of 47,197 started between 1980 and 2009, encompassing 3.21 billion of the 3.77 billion dollars awarded.

Geo-coding by zipcode:

36,512 of 41,258 grants encompassing 3.13 billion of a potential 3.21 billion were geocoded to 3,510 distinct locations.

Science-coding by topic:

37,132 of 41,258 grants encompassing 2.09 billion of a potential 3.21 billion were mapped to 42 distinct subdisciplines.

MEDLINE publications:

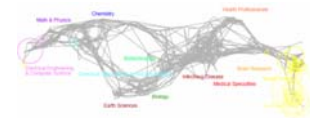
12.95 million papers were published between 1980 and 2009.

Geo-coding:

Not possible with the data we have.

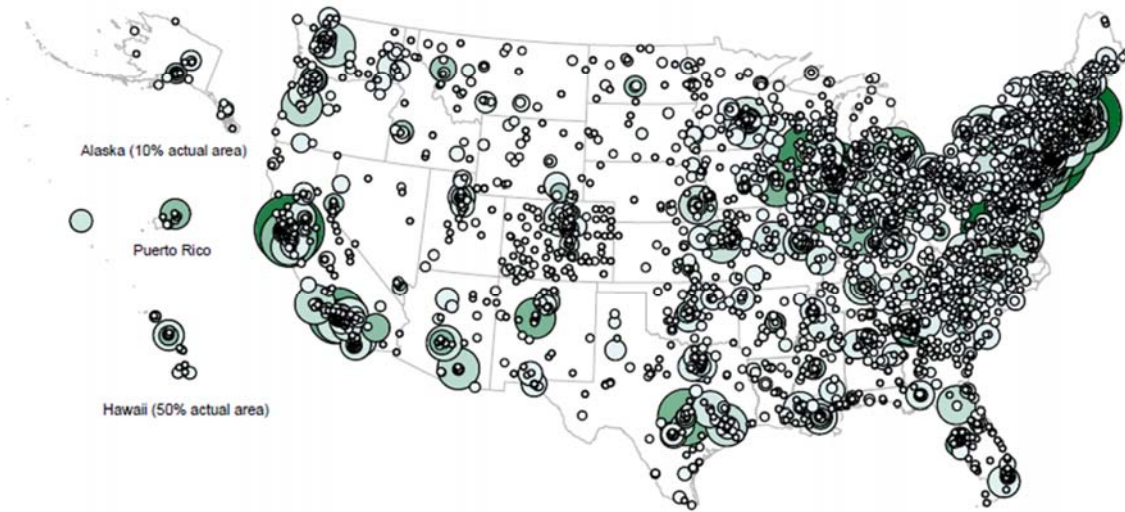
Science-coding by journal:

11.62 million of 12.95 million papers were science located (89.7%). Science located 5,941 out of 14,561 journals (40.8%) to 415 distinct subdisciplines.

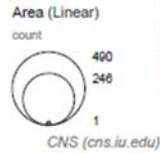
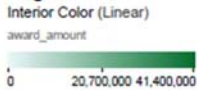


Geospatial Visualization (Proportional Symbol Map)

NEH Grants by ZIP Code (1980-2009)
Apr 09, 2013 | 01:09:37 PM EDT



Legend

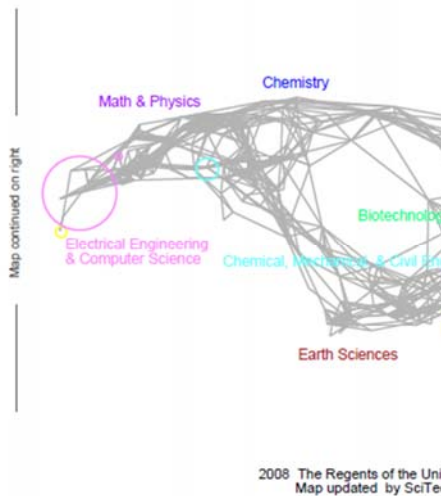


How to Read this Map

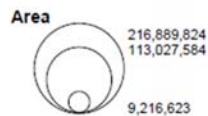
This *proportional symbol map* shows 52 U.S. states and other jurisdictions using the Albers equal-area conic projection with Alaska, Puerto Rico, and Hawaii inset. Each dataset record is represented by a circle centered at its geolocation. The area, interior color, and exterior color of each circle may represent numeric attribute values. Minimum and maximum data values are given in the legend.

Topical Visualization: UCSD Map of Science

NEH grants, mapped based on categories



Legend
Circle area: Dollars Awarded
Unclassified = 0
Minimum = 8,471
Maximum = 509,399,136
Color: Discipline



Chemical, Mechanical, & Civil Engineering

13,469,200 Mechanical Design Engineering

Electrical Engineering & Computer Science

153,044,896 Library Science; Information Retrieval
724,505 Logic

Humanities

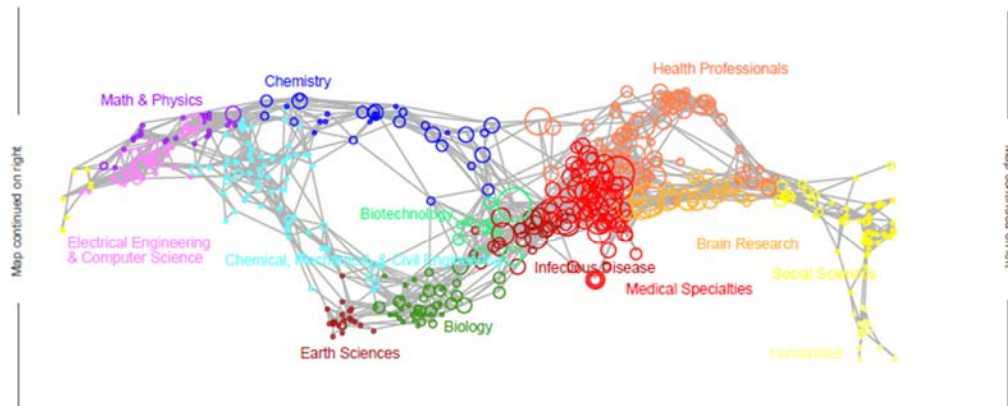
509,399,136 American History
101,708,568 Art History
87,938,056 Asian Studies
15,956,450 Biblical Literature
33,668,248 Classics
347,050 Critical Studies
36,538,632 Cross Disciplinary Studies
238,170,928 English Literature
8,471 Ethics
4,126,550 German Studies
38,912,520 Hispanic Studies
2,234,555 Italian Studies
36,181,320 Linguistics
33,062,848 Literary Criticism
56,233,540 Medieval History
65,690,320 Modern Language
98,065,344 Music & Theatre
58,949,420 Philosophy Psychology
42,320,944 Science History
905,530 Semiotics
52,800,752 Social History
100,976,304 Socio-Cultural Anthropology

Social Sciences

2,593,480 Child Development
1,852,100 Communication Research
1,482,022 Economics
58,847,100 Education
53,223,792 Ethnology
79,414,408 Higher Education
71,120 Human Resource Management
15,179,400 International Development
3,008,390 International Economics
10,232,764 Law
4,693,470 Political Geography
28,897,260 Political Science
832,157 Public Administration
21,255,080 Regional Studies
1,967,490 Rural Studies
15,774,390 Sociology
4,333,450 Urban Studies

Topical Visualization: UCSD Map of Science

Medline papers, mapped based on journal names

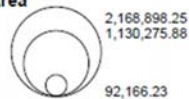


2008 The Regents of the University of California and SciTech Strategies.
Map updated by SciTech Strategies, OST, and CNS in 2011.

Legend

Circle area: Fractional Journal Count
Unclassified = 0
Minimum = 0
Maximum = 344,175
Color: Discipline

Area



How To Read This Map

The UCSD map of science depicts a network of 554 subdiscipline nodes that are aggregated to 13 main disciplines of science. Each discipline has a distinct color and is labeled. Overlaid are circles, each representing all records per unique subdiscipline. Circle area is proportional to the number of fractionally assigned records. Minimum and maximum data values are given in the legend.

CNS (cns.uc.edu)

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 (2012) **Models of Science Dynamics**. Springer Verlag.





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

CNS Facebook: <http://www.facebook.com/cnscenter>

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