Open Source Data and Tools for Global Science Decision-Making

Katy Börner, Cyberinfrastructure for Network Science Center
School of Informatics and Computing
Indiana University, USA

PEGASCIS Scoping Meeting
Platform for Enhancing Global Academic Strategic Collaboration in Science
Department of State, Washington D.C.

July 21, 2014

Map of Scientific Collaborations from 2005-2009

Olivier H. Beauchesne, 2011.
Map of Scientific Collaborations from 2005-2009.

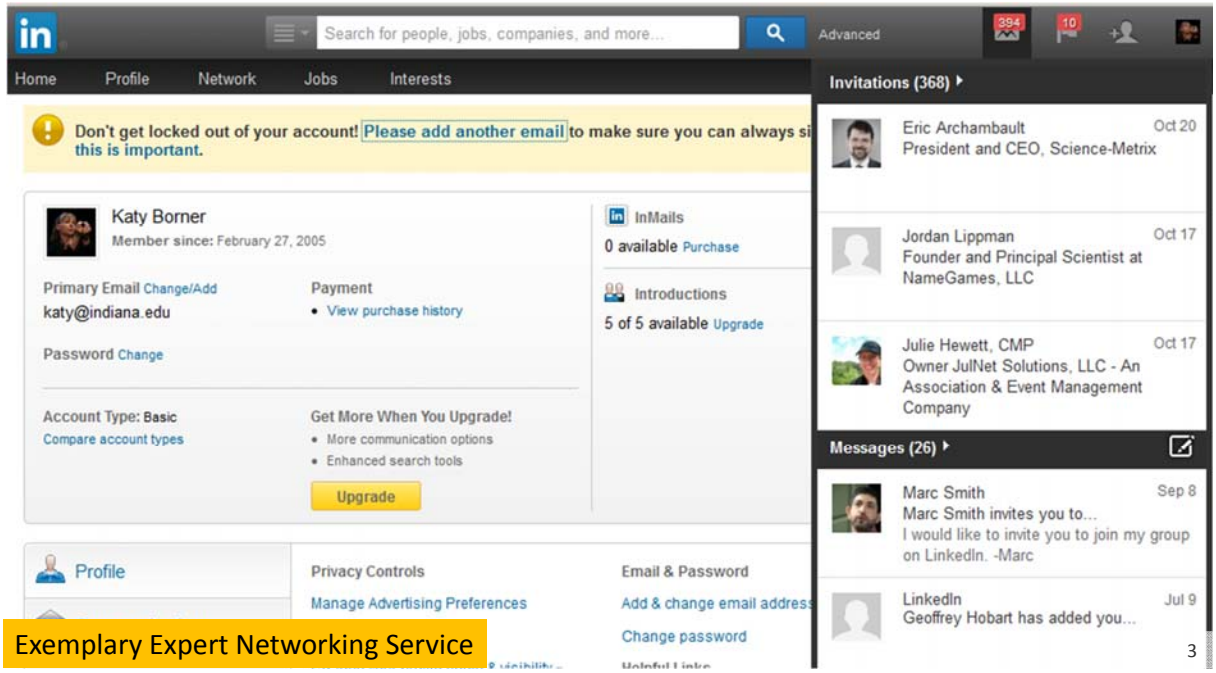
Computed Using Data from Elsevier's Scopus

Visit *Mapping Science* exhibit at http://scimaps.org to see 100 S&T maps.

LinkedIn: World's Largest Professional Network

https://www.linkedin.com

Launched in May 2003. More than 225 million users in June 2013.

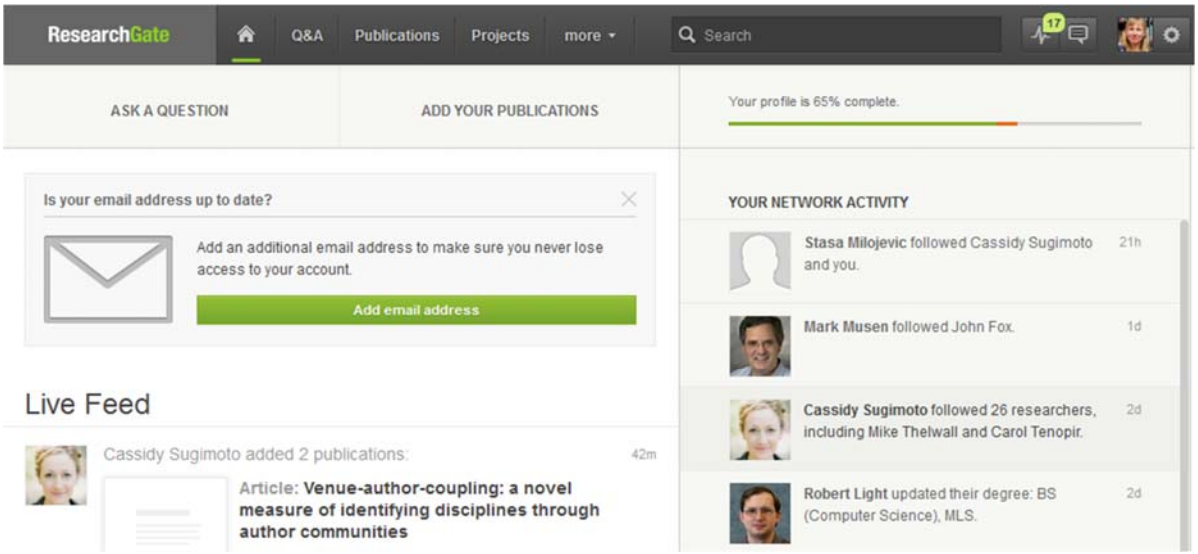


Exemplary Expert Networking Service

ResearchGate GmbH

https://www.researchgate.net

Launched in May 2008, has a user base of 2.3 million scientists worldwide in Aug .2013

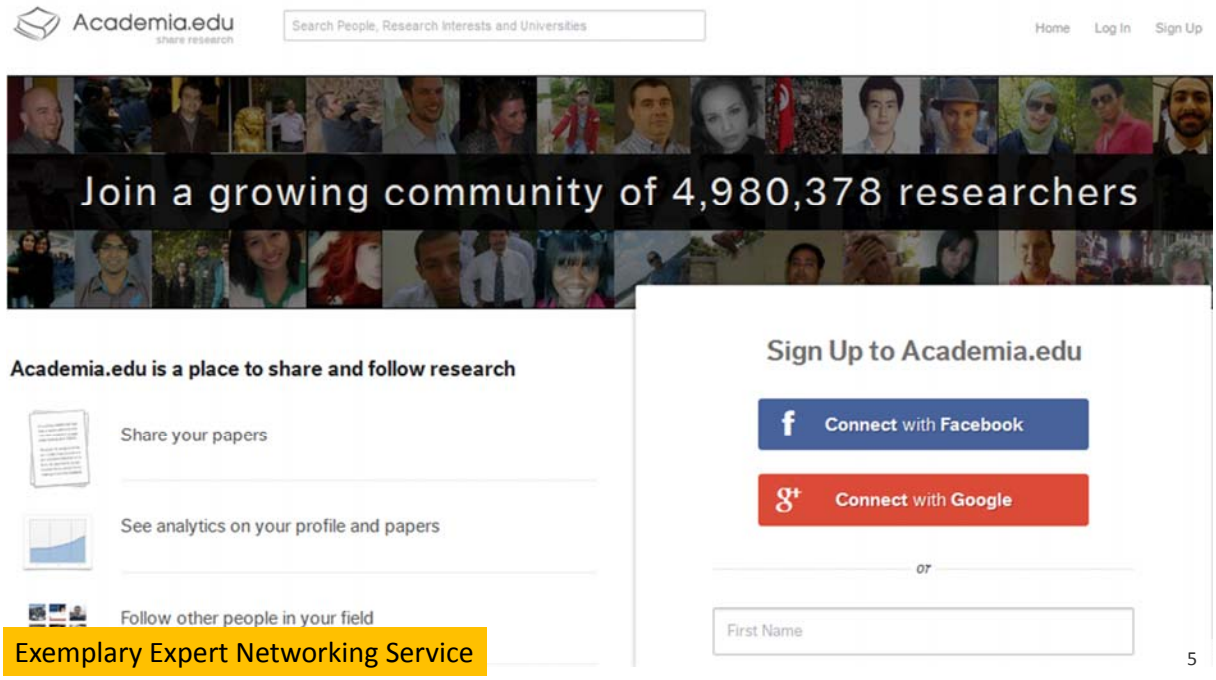


Exemplary Expert Networking Service

Academia.edu—Share Research

http://www.academia.edu

Launched in Nov 2010.



Exemplary Expert Networking Service

Google Scholar

http://scholar.google.com

Launched in Nov. 2011. Has “unknown” number of profiles.

Anurag Acharya

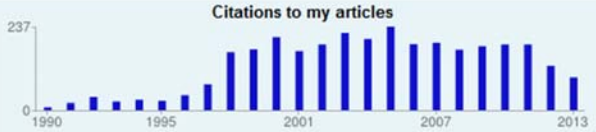
Google Inc

scholarly communication - search engines

Verified email at google.com

Citation indices

	All	Since 2008
Citations	3209	946
h-index	28	15
i10-index	41	20



Show: 20 1-20 Next >

Title / Author	Cited by	Year
Active disks: Programming model, algorithms and evaluation A Acharya, M Uysal, J Saltz ACM SIGPLAN Notices 33 (11), 81-91	361	1998
Sumatra: A language for resource-aware mobile programs A Acharya, M Ranganathan, J Saltz Mobile Object Systems Towards the Programmable Internet, 111-130	258	1997
History-based access control for mobile code G Edjlali, A Acharya, V Chaudhary Proceedings of the 5th ACM conference on Computer and communications ...	222	1998

Google scholar

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Bongki Moon
C.J. Paul (CJ)
Sanjay Ghemawat
Jeffrey Hollingsworth
Maximilian Ibel
Tao Yang

Exemplary Expert Networking Service

Expert Networking Services—60 More

This table provides general information for each tool: name, developing institution, external links to information, whether the code is Open Source and known adopters of the software.

Research Networking Tool	Link to Product Page	Developer/Owner	Open Source	Adopters
Activity Insight	Activity Insight	Digital Measures	No	USC Marshall School of Business
C-IKNOW[5][6]	C-IKNOW	Science of Networks in Communities (SONIC) - Northwestern University	Yes	National Cancer Institute, National Science Foundation
Collaborative Partnership / Profile System	Collaborative Partnership and Research Expertise at UT Arlington	University of Texas at Arlington	Yes	UT Arlington, UT Pan American, University of North Texas Health Science Center, UT El Paso, UT San Antonio, UT Tyler, UT Health Science Center, University of North Texas, UT Dallas, UT Health Center at Tyler, Texas Christian University, (plans to add Gulf Coast Consortia: Rice University, Baylor College of Medicine)
Community Academic Profiles - CAP	Community Academic Profiles	Stanford University	No	Stanford University
Curvita™ Profile Manager	Curvita Profile Manager	SciMed Solutions	No	University of North Carolina
CUSP - Columbia University Scientific Profiles	CUSP	Columbia University	No	Columbia University
Digital Vita	DigitalVita	Center for Dental Informatics - University of Pittsburgh	Yes	University of Pittsburgh, Pitt Health Sciences Center
Elsevier's SciVal Experts (formerly Collexis Expert Profiling)	SciVal Experts	Elsevier	No	45+ implementations worldwide containing profiles for researchers at 65+ institutions. Customers include Johns Hopkins University, Memorial Sloan-Kettering, Northwestern University, REACH NC, University of Michigan, University of Texas MD Anderson Cancer Center, and several institutions in Asia-Pacific, Europe and Latin America. See SciVal

http://en.wikipedia.org/wiki/Comparison_of_Research_Networking_Tools_and_Research_Profiling_Systems

Expert Networking Services

What insights needs decision makers really have:

- **Foresight + Context:** What areas are emerging, merging, dead? Where will I achieve highest return on investment of time, money, compassion?
- **LOCAL Strategic Decision Making:** What is the unique value proposition of my institution/region? What strengths and gaps exist and how can we overcome challenges and embrace opportunities?
- **GLOBAL Networks and Insight:** Who are the leading experts, institutions, regions? How are they connected and what R&D do they perform?

Colglazier & Lyons (2014) The United States Looks to the Global Science, Technology and Innovation (STI) Horizon. Science & Diplomacy on-line journal of the American Association for the Advancement of Science (AAAS).

Expert Networking Services

What insights needs decision makers really have:

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- **GLOBAL Networks and Insight:** Who are the leading experts, institutions, regions? How are they connected and what R&D do they perform?

Not addressed by **Match.com** or **Kickstarter**

Colglazier & Lyons (2014) The United States Looks to the Global Science, Technology and Innovation (STI) Horizon. Science & Diplomacy on-line journal of the American Association for the Advancement of Science (AAAS).

Expert Networking Services

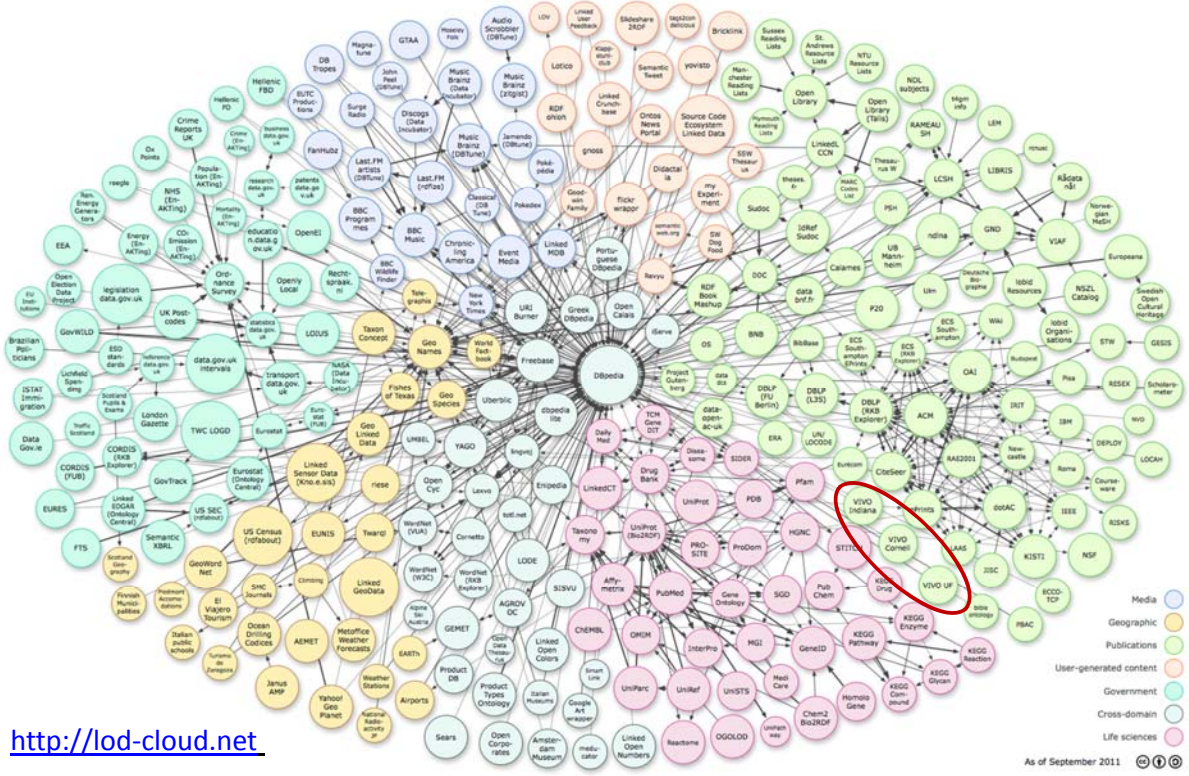
Desirable Properties

- Open data
- Open code
- Easy harvesting and ingest of major publication datasets, e.g., MEDLINE, Elsevier, Reuters, SciELO, others.
- Inter-platform compatibility—VIVO, Profiles, SciVal Experts, Loki, etc.
- Part of federated search tools, Direct2Experts, CTSAconnect, and SciVal Community, etc.
- Supports/uses DOIs, author identifiers, e.g., ORCID, SciENcv
- Sustainable

http://nrn.cns.iu.edu

Light, Robert, Chin Hua Kong, and Katy Börner. 2013. "An Automated System for Tracking the Growth of Expert Profiling Systems". Joint Conference on Digital Libraries (JCDL).

Open Data: Linked Data, 2011

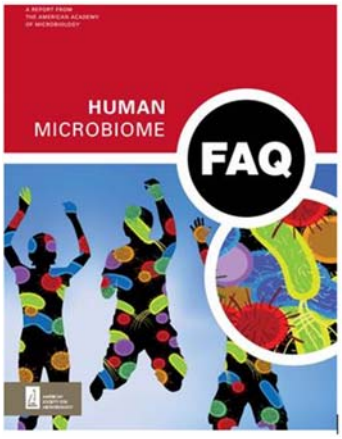


http://lod-cloud.net

Expert Networking Services—Example

Using existing systems to identify expertise on 'Microbiome'

- CTSA DIRECT2Experts a pilot national network to demonstrate interoperability among research-networking platforms: http://direct2experts.org
- NSF Award Search: http://www.nsf.gov/awardsearch
- NIH Reporter: http://projectreporter.nih.gov
- European Commission CORDIS FP7 data: http://cordis.europa.eu/fp7/projects_en.html



http://academy.asm.org/images/stories/documents/FAQ_Human_Microbiome.pdf

DIRECT2Experts

Distributed Interoperable Research Experts Collaboration Tool

A Federated Network of Biomedical R
DIRECT-ly Supported by Resear

Home | About | Phase 1 - Aggregate Search | Phase 2 - Linked Open Data | New! - Integrated Search | Participants | JAMIA

Phase 1 - Aggregate Search

Enter a search phrase, such as "informatics" in the form below to search for experts.

Find Experts: microbiome Search

Below are the number of matching people at participating institutions. Click an institution name to view the list of people. As you move your mouse over the different institution names, you will see important notes about that institution's data and a site preview on the right.

Institution	Matches
Albert Einstein College of Medicine	13
Arizona State University	4
Arthritis Foundation	8
Baylor College of Medicine	X
Boston University	X
Case Western Reserve University	19
Cornell University	34
CTSI at Children's National	7
David Geffen School of Medicine at UCLA	0
Educatio Társadalmi Szolgáltató Nonprofit Kft.	2
Georgia Regents University	4
Harvard University	187
Indiana CTSI	0
Indiana University School of Medicine	6
Instituto Politecnico Nacional	0
John Hopkins University	24

Data Comments

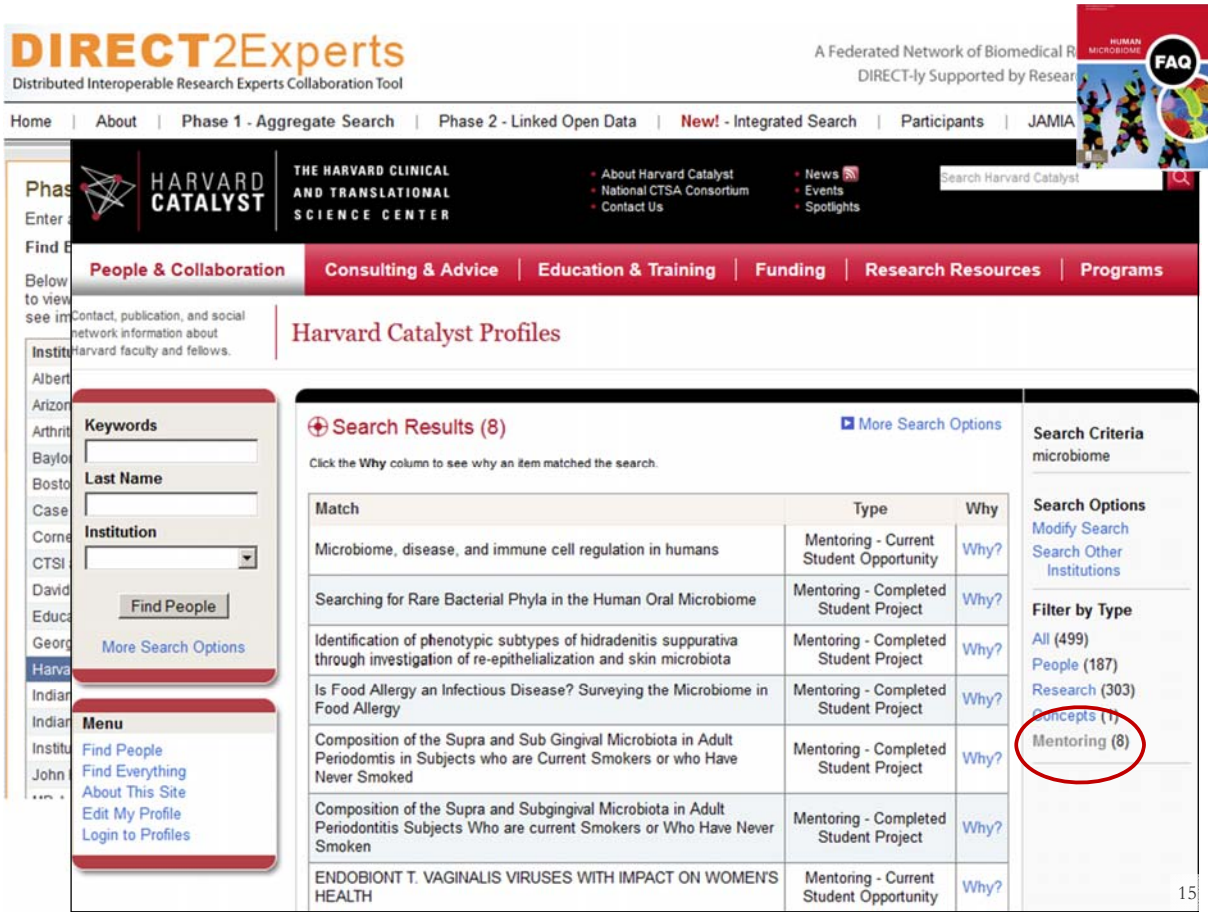
Harvard University

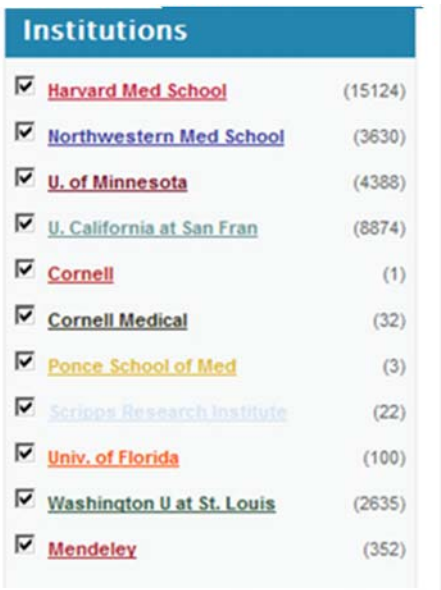
Site Preview

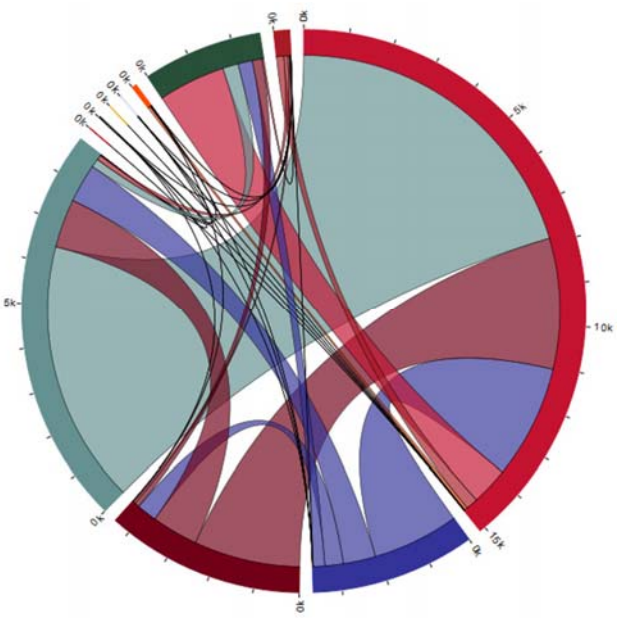
HARVARD CATALYST | THE HARVARD CLINICAL AND TRANSLATIONAL SCIENCE CENTER

Institution	Matches
Harvard University	187
University of Colorado Profiles	66
University of Florida	64
University of Michigan	44
Cornell University	34
University of Minnesota - Twin Cities Campus	33
University of Washington	27
John Hopkins University	24
UC Davis Health System	22
Case Western Reserve University	19
The University of Arizona	19
University of Maryland	17
University of Miami	17

808 experts found







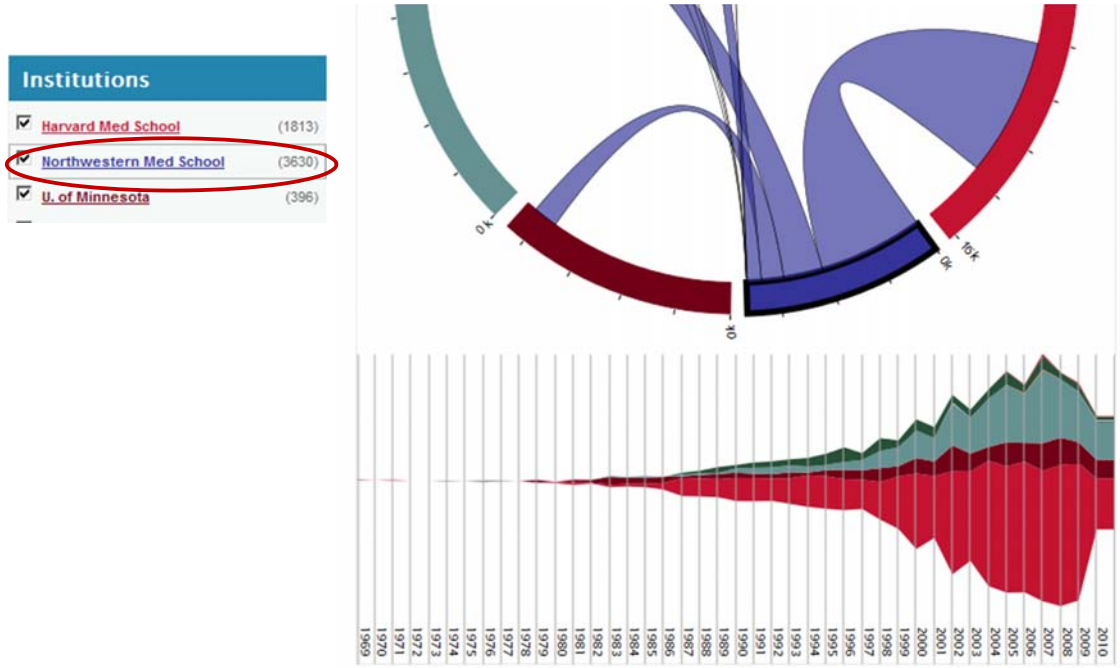
Inter-Institutional Collaboration Explorer

This visualization shows information about "collaborative publications" found at 2 or more Researcher Networking websites.

The idea that institutions don't work together and that biomedical research is conducted in silos is not true. Researchers, even when separated by great distances, are in fact willing to work together, and this visualization demonstrates that they often do.

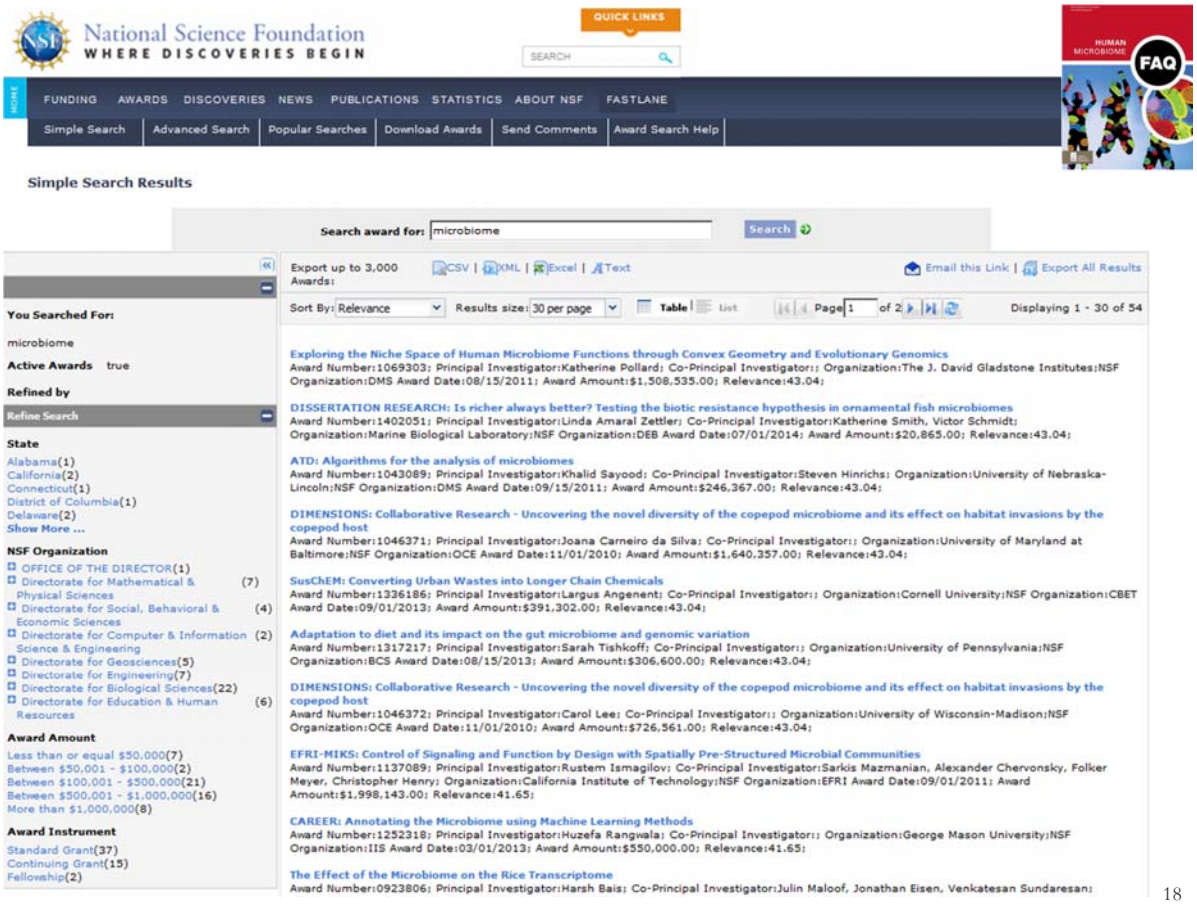
Contact: Nick Benik (nbenik@gmail.com), Harvard Medical School, Boston, MA.

URL: http://xcite.hackerceo.org/VIVOviz



Inter-Institutional Collaboration Explorer

The outer solid colored arcs represent the 11 institutions. The size of the arc is proportional to the number of collaborative publications found on the site. The inner colored bands represent the number of collaborative publications found between the two institutions that each band connects. Clicking an institution's arc will hide any bands not connected to that institution and will display a timeline of when that institution's collaborative publications were written.



National Science Foundation
WHERE DISCOVERIES BEGIN

69 NSF projects found.

They were awarded to 53 unique institutions.

Institution	#Awards
University of Illinois at Urbana-Champaign	3
University of Texas at Austin	3
University of Wisconsin-Madison	3
Cornell University	2
Duke University	2
Gordon Research Conferences	2
Marine Biological Laboratory	2
Michigan State University	2
SUNY at Stony Brook	2
University of Delaware	2
University of Maryland at Baltimore	2
University of Nebraska-Lincoln	2
University of Washington	2

Institution	Sum of Awarded AmountToDate
University of Illinois at Urbana-Champaign	3,263,277
University of North Carolina at Chapel Hill	2,496,169
University of Delaware	2,143,438
University of Connecticut	2,000,000
California Institute of Technology	1,998,143
University of Wisconsin-Madison	1,758,524
University of Maryland at Baltimore	1,734,624
University of Utah	1,700,000
The J. David Gladstone Institutes	1,508,535
Cornell University	1,342,609
University of Washington	1,019,366
Florida Agricultural and Mechanical University	997,214
Washington State University	950,000
Bigelow Laboratory for Ocean Sciences	900,000
University of Hawaii	842,000
TERC Inc	822,919
Michigan State University	779,220
University of Nebraska-Lincoln	741,685
University of Texas at Austin	726,806
Marine Biological Laboratory	723,528
University of Miami School of Medicine	708,360

National Science Foundation
WHERE DISCOVERIES BEGIN

69 NSF projects found.

They were awarded to 53 unique institutions.

NIH Research Portfolio Online Reporting Tools (RePORT)

Search microbiome

HOME | ABOUT RePORT | FAQs | GLOSSARY |

QUICK LINKS | RESEARCH | ORGANIZATIONS | WORKFORCE | FUNDING | REPORTS | LINKS

Home > RePORTER > Search Results

MyRePORTER Login | Register System Health: GREEN

Search Results

Back to Query Form | Save Query | Share Query

Export All Projects GO

PROJECTS | PUBLICATIONS | PATENTS | CLINICAL STUDIES | DATA & VISUALIZE | MAP | LINKS | NEWS & MORE

There were 537 results matching your search criteria. Records per page 25 Show/Hide Search Criteria

Click on the column header to sort the results 1 2 3 4 ... 20 21 22 Page 1 of 22 Next Last

T: Application Type; Act: Activity Code; Project: Admin IC,Serial No.; Year: Support Year/Supplement/Amendment

T	Act	Project	Year	Sub #	Project Title	Contact PI/ Project Leader	Organization	FY	Admin IC	Funding IC	FY Total Cost by IC	Similar Projects
5	R01	NR014792	02		A MULTIOMICS APPROACH TOWARDS DECIPHERING THE INFLUENCE OF THE MICROBIOME ON PRE	AAGAARD-TILLERY, KJERSTI MARIE	BAYLOR COLLEGE OF MEDICINE	2014	NINR	NINR	$539,616	
4	UH2	HG007008	02		IHVN H3 AFRICA BIOREPOSITORY INITIATIVE	ABIMIKU, ALASH'LE G.	INSTITUTE OF HUMAN VIROLOGY	2013	NHGRI	NICHD OD	$19,400 $97,000	
1	U19	AI110819	01	6908	GENOMICS OF ANTIBIOTIC RESISTANCE IN BACTERIAL PATHOGENS	ADAMS, MARK D	J. CRAIG VENTER INSTITUTE, INC.	2014	NIAID		$310,095	
1	U19	AI110819	01	6912	TECHNOLOGY CORE	ADAMS, MARK D	J. CRAIG VENTER INSTITUTE, INC.	2014	NIAID		$1,239,523	

537 NIH awards found on 7/19/2014.

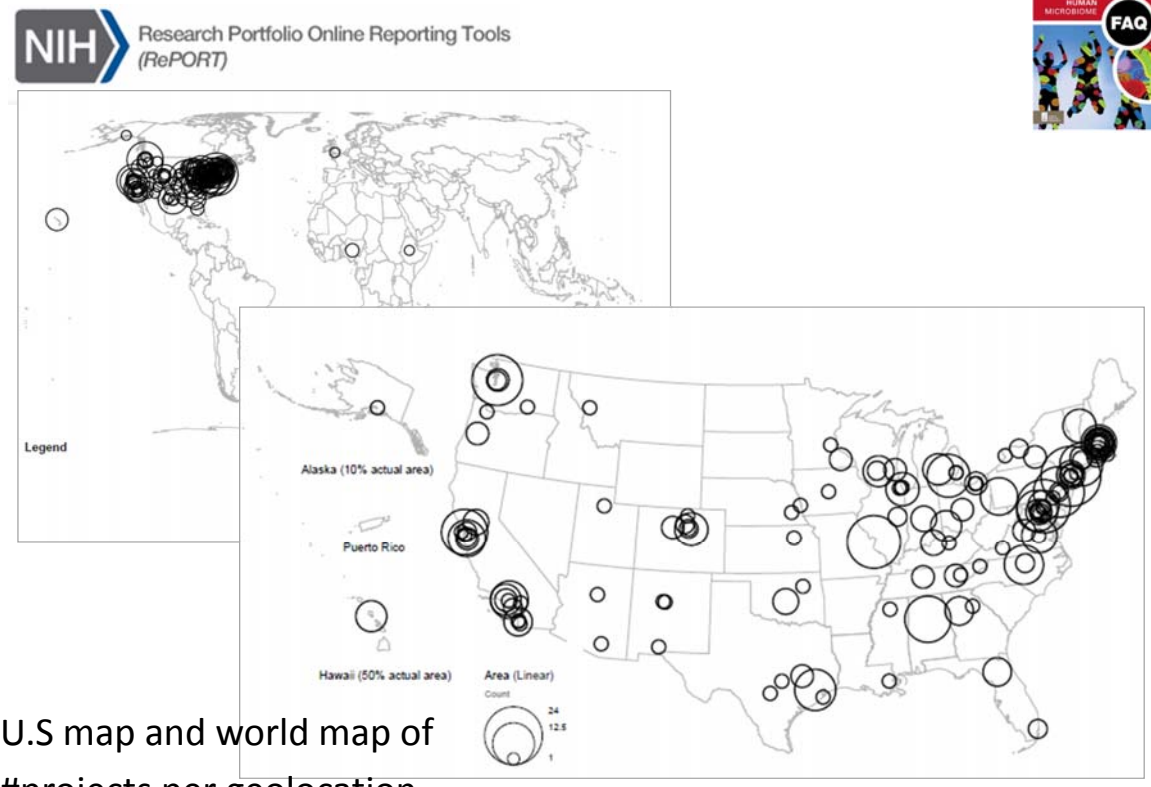
544 NIH awards found on 7/20/2014. Omitted 34 records with missing values.

NIH Research Portfolio Online Reporting Tools (RePORT)

Institution	#Awards
NEW YORK UNIVERSITY SCHOOL OF MEDICINE	24
UNIVERSITY OF MARYLAND BALTIMORE	19
WASHINGTON UNIVERSITY	18
UNIVERSITY OF PENNSYLVANIA	17
UNIVERSITY OF WASHINGTON	17
UNIVERSITY OF ALABAMA AT BIRMINGHAM	14
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO	14
UNIVERSITY OF MICHIGAN	12
BAYLOR COLLEGE OF MEDICINE	11
J. CRAIG VENTER INSTITUTE, INC.	11
YALE UNIVERSITY	11
UNIV OF NORTH CAROLINA CHAPEL HILL	10
CALIFORNIA INSTITUTE OF TECHNOLOGY	9
UNIVERSITY OF PITTSBURGH	9
BROAD INSTITUTE, INC.	8
STANFORD UNIVERSITY	8
VIRGINIA COMMONWEALTH UNIVERSITY	8
DARTMOUTH COLLEGE	7
UNIVERSITY OF CHICAGO	7

Year	#Awards
2009	1
2010	3
2011	7
2012	36
2013	166
2014	324

Country	#Awards
UNITED STATES	503
CANADA	2
NIGERIA	2
ETHIOPIA	1
SOUTH AFRICA	1
UNITED KINGDOM	1



U.S map and world map of #projects per geolocation.

1,406 projects with 4,326 participating countries (96 unique) found

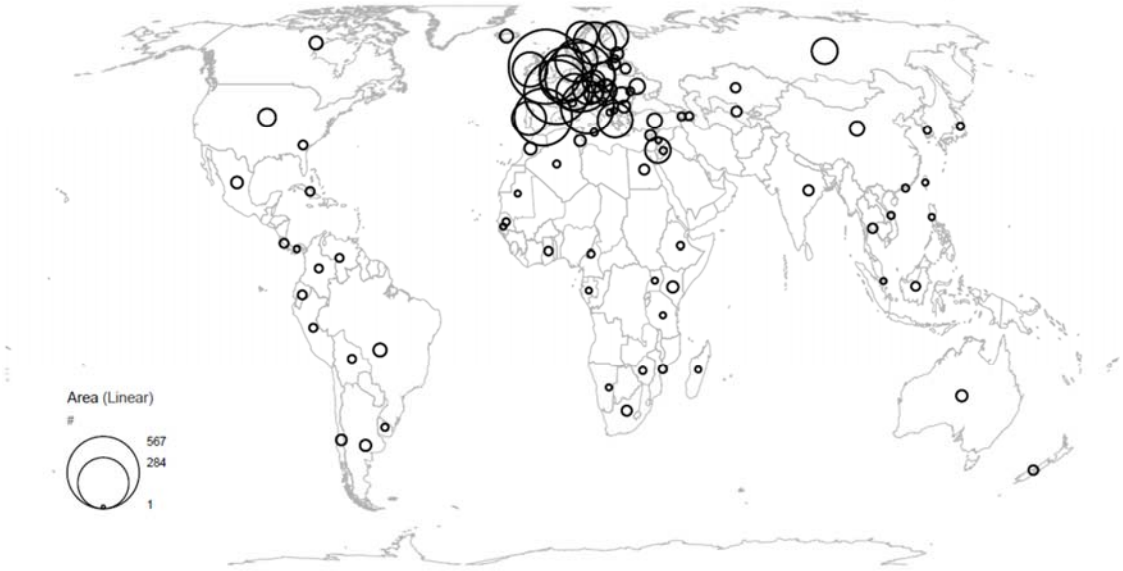
CORDIS

Geospatial Visualization (Proportional Symbol Map)

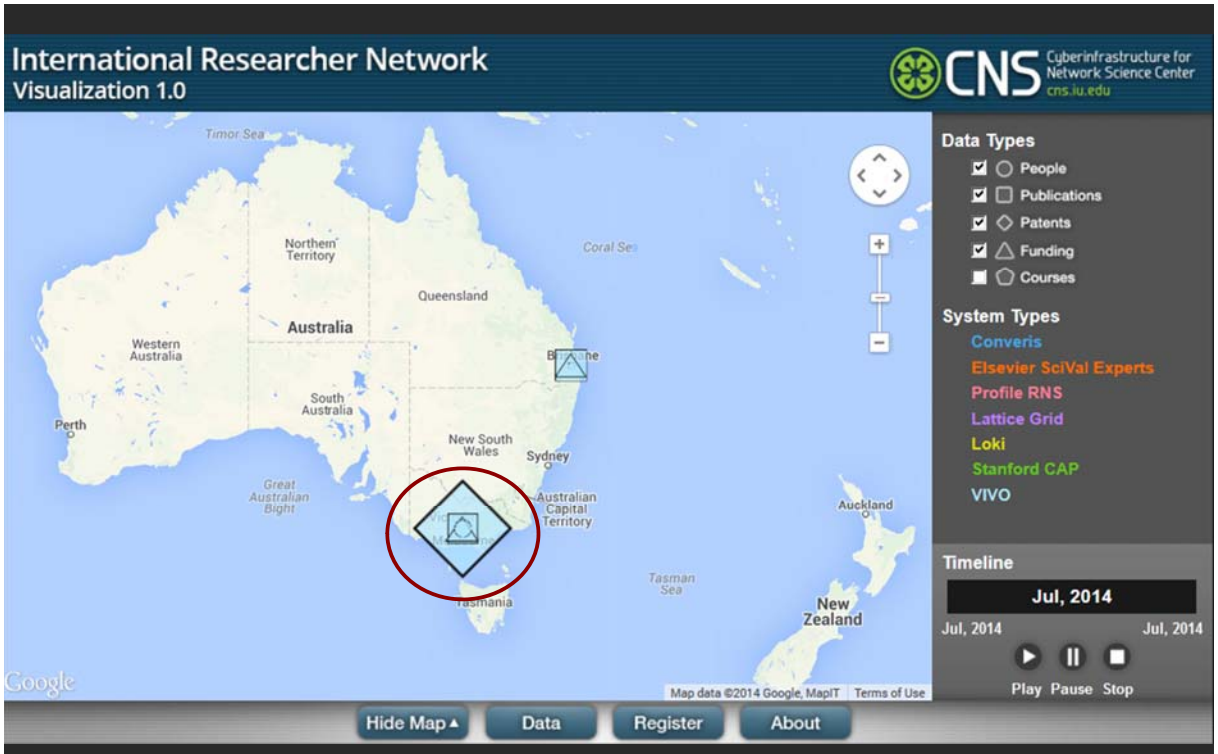
Generated from With Latitude & Longitude from 'Country-corrected'
Jul 18, 2014 | 01:33:07 PM EDT

How to Read this Map

This *proportional symbol map* shows 209 countries of the world using the equal-area Eckert IV projection. 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.

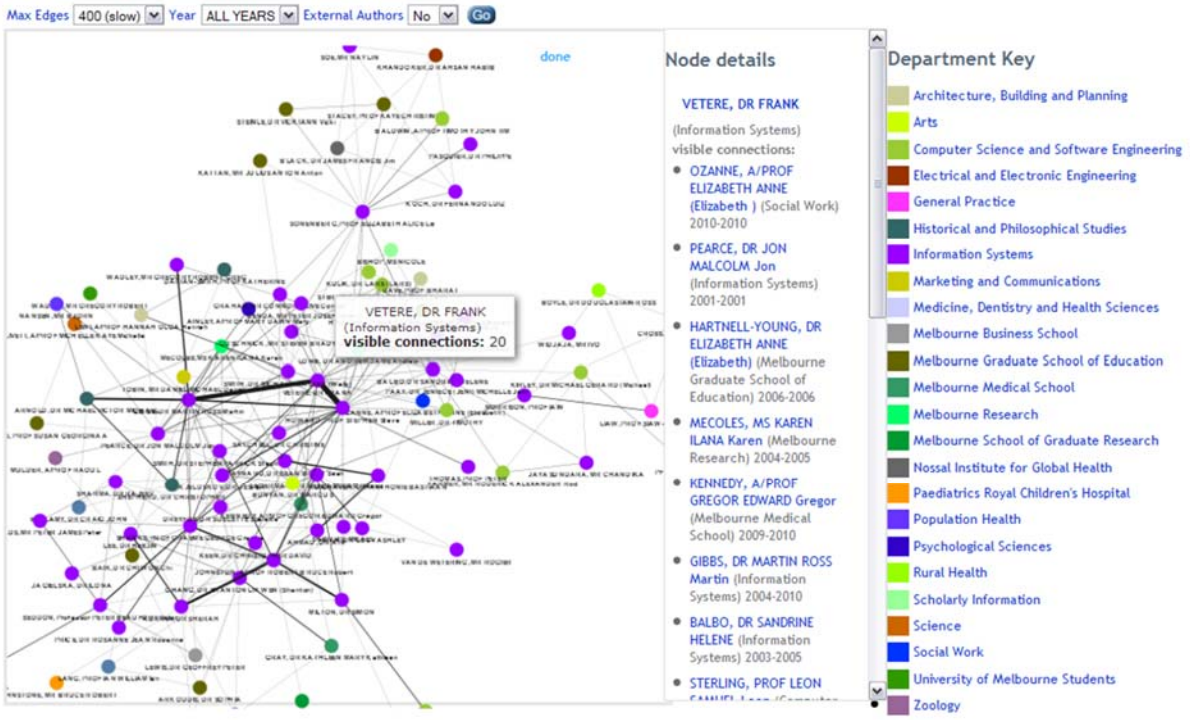


CNS (cns.iu.edu)



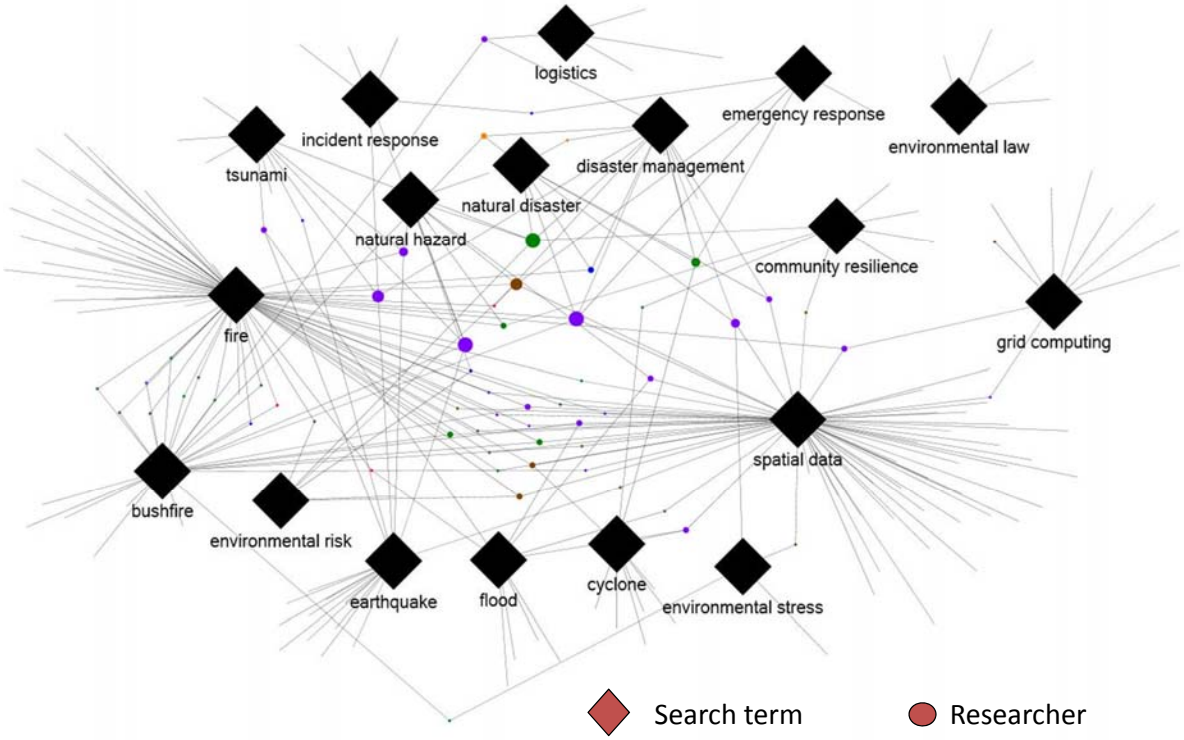
http://nrn.cns.iu.edu

Light, Robert, Chin Hua Kong, and Katy Börner. 2013. "An Automated System for Tracking the Growth of Expert Profiling Systems". Joint Conference on Digital Libraries (JCDL).



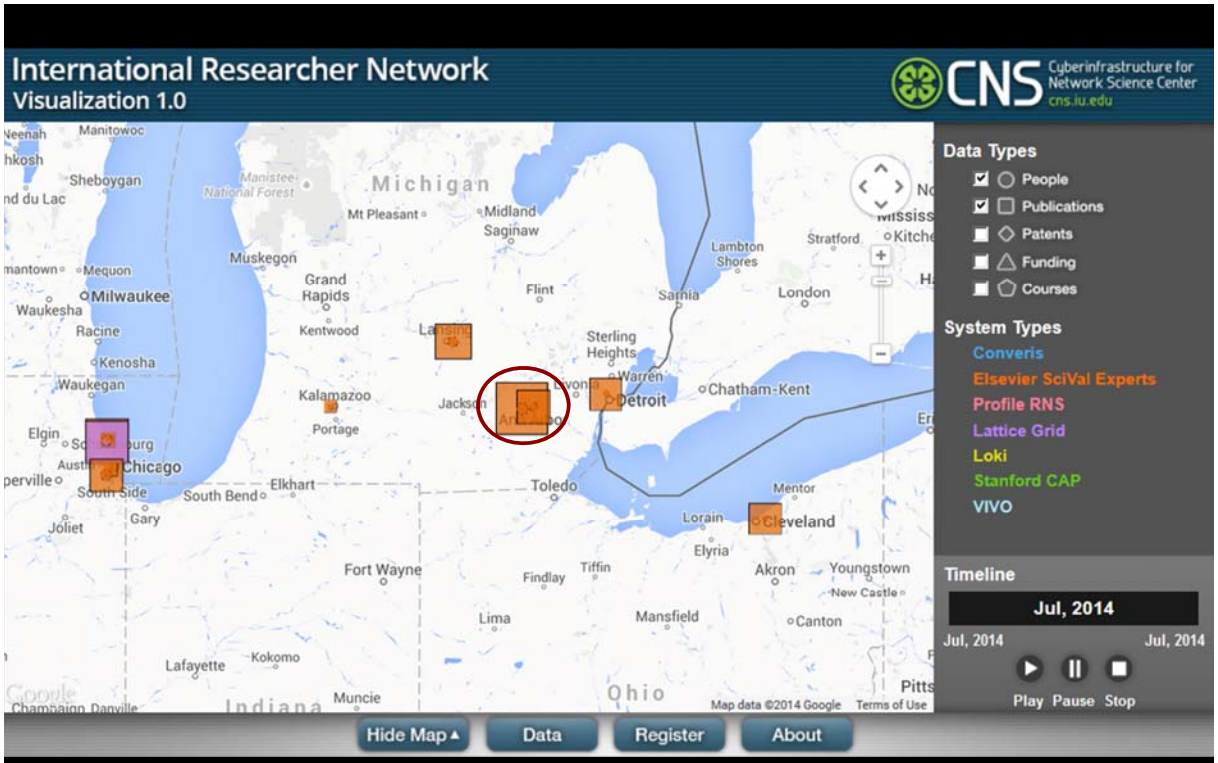
Co-authorship network for the department of Information Systems

Source: Melbourne Research Windows. Contact Simon Porter simon.porter@unimelb.edu.au



Bimodal network of search terms and researchers extracted from research profile search results to show the **University's capability in Disaster Management** to the Government

Contact: simon.porter@unimelb.edu.au



http://nrn.cns.iu.edu

Light, Robert, Chin Hua Kong, and Katy Börner. 2013. "An Automated System for Tracking the Growth of Expert Profiling Systems". Joint Conference on Digital Libraries (JCDL).

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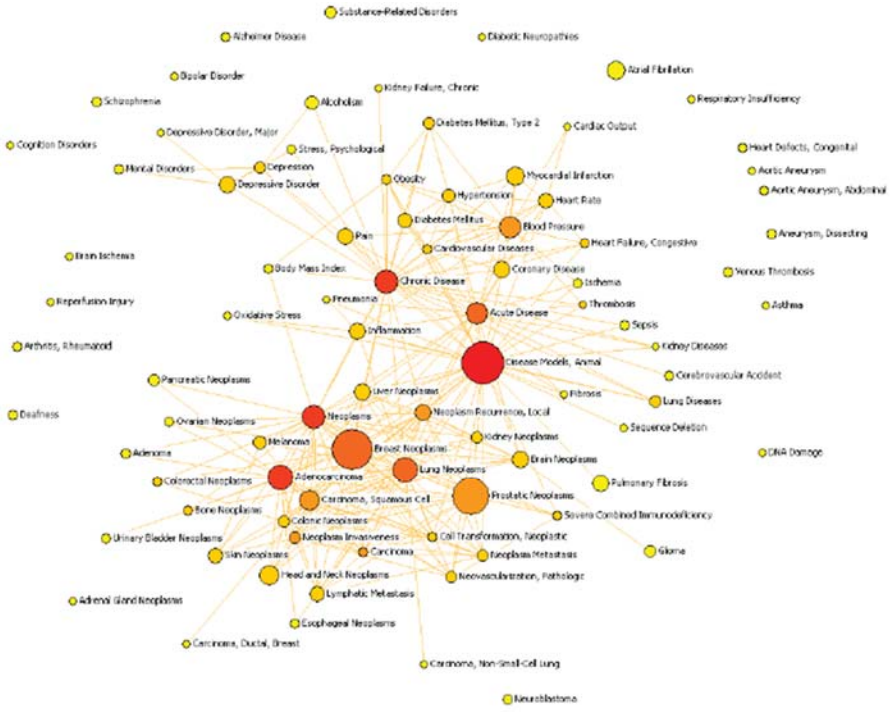
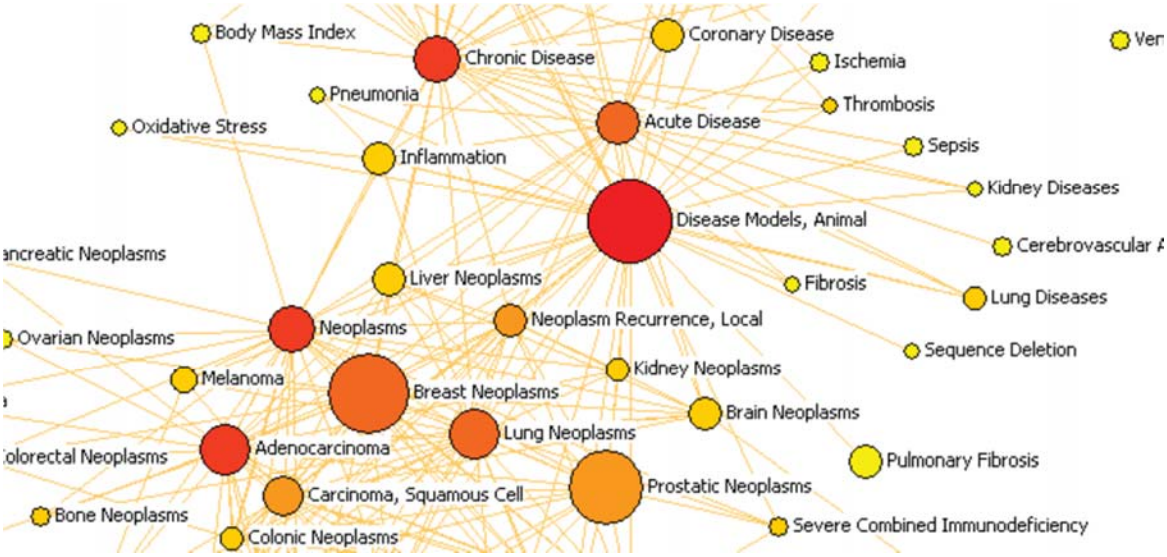


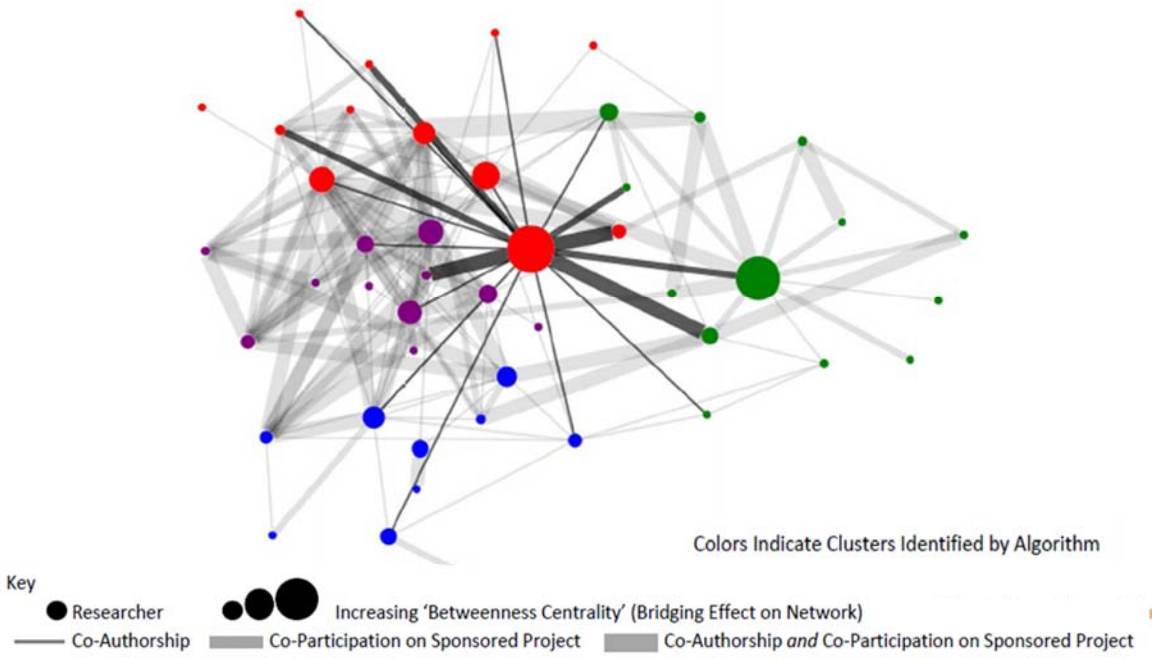
Top MeSH Disease Concepts Appearing in PubMed Publications by the University of Michigan Medical School. Links connect concepts where 100+ authors published about both concepts within the span of their careers.

Contact: Jeffrey Horon, J.Horon@elsevier.com

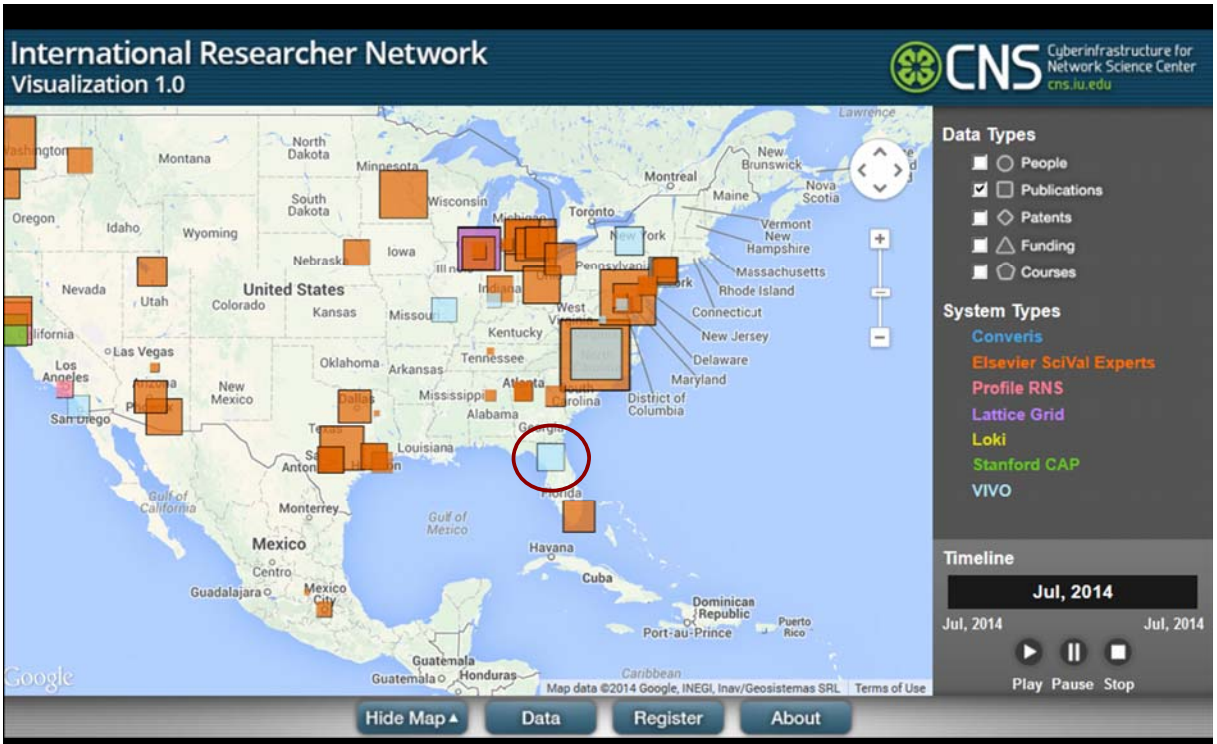
30



Top MeSH Disease Concepts Appearing in PubMed Publications by the University of Michigan Medical School. Links connect concepts where 100+ authors published about both concepts within the span of their careers.
This visualization revealed that **animal disease models** were central to disease research at U-M which encouraged additional thought and attention to animal husbandry, animal expenses, and core/shared services overall.
Contact: Jeffrey Horon, J.Horon@elsevier.com



P30 Member Collaborations – Sponsored Project Co-Participation and Co-Authorship Network. Used in **successful! P30** funding application. Shows the PI's relationships with various P30 members, conveying that the PI was not only the formal center of the group but also the informal center and the person who exhibited the highest betweenness centrality. *Contact: Jeffrey Horon, J.Horon@elsevier.com*



http://nrn.cns.iu.edu

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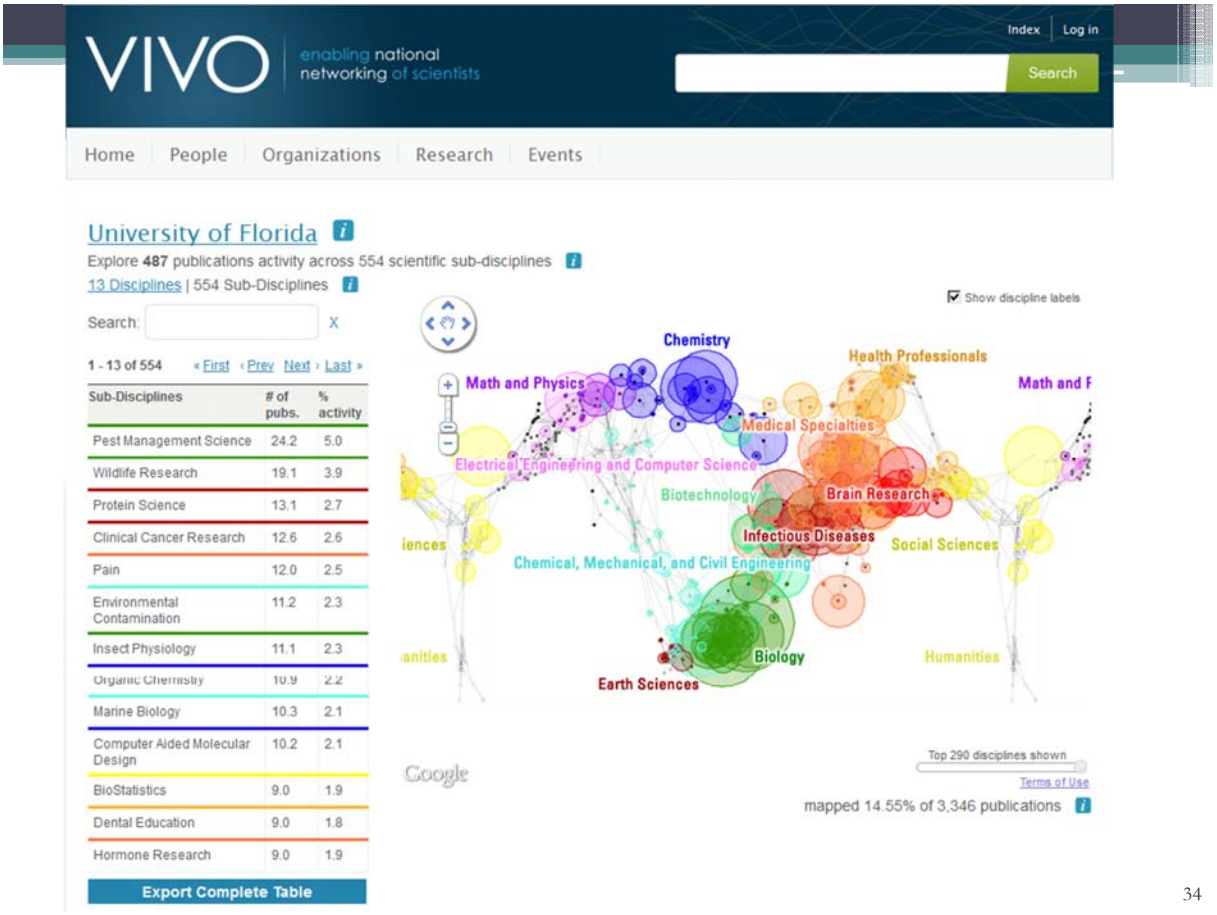

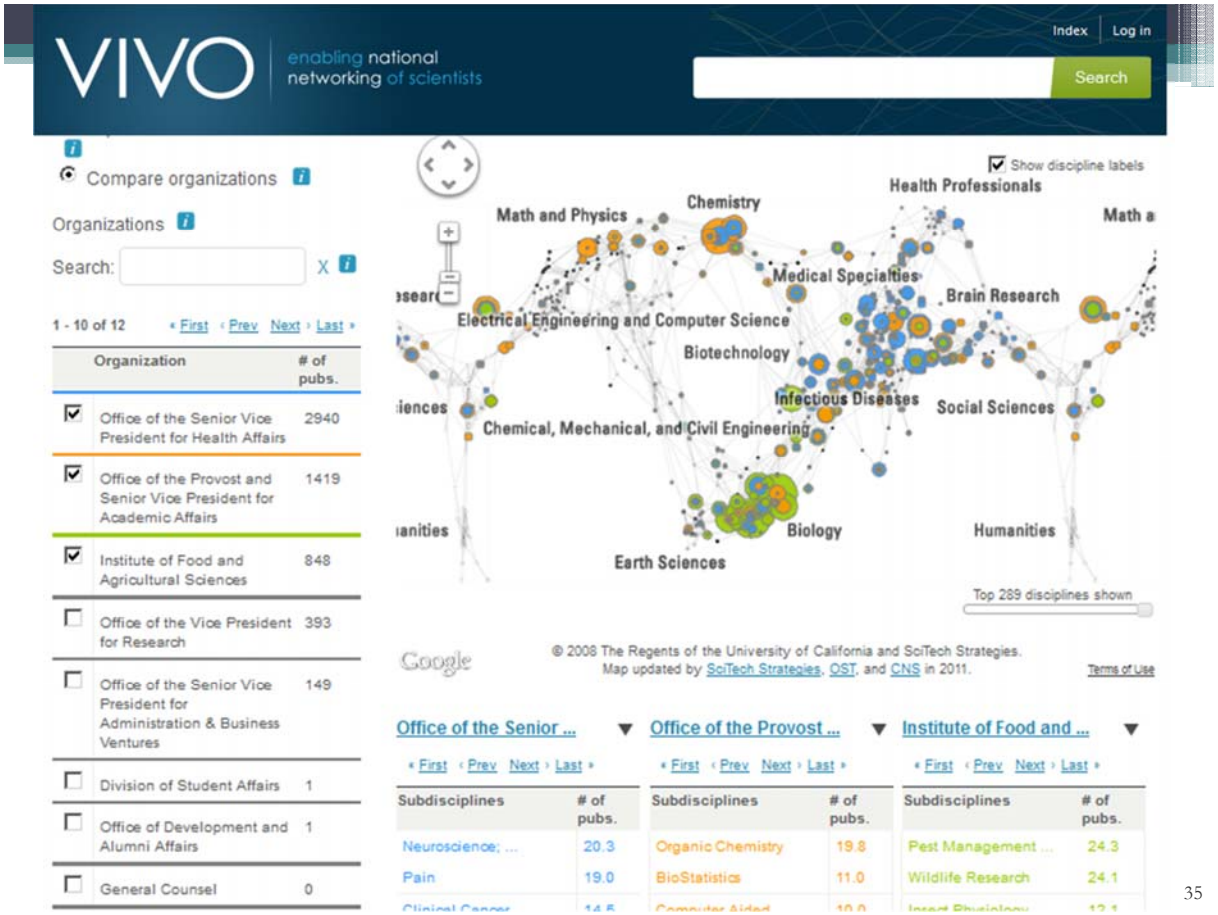

Please register your institution's researcher networking system at http://nrn.cns.iu.edu

All papers, maps, tools, talks, press are linked from http://cns.iu.edu
These slides will soon be at http://cns.iu.edu/docs/presentations

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