

Using Scientometrics to Accelerate Science

Dr. Katy Börner

Cyberinfrastructure for Network Science Center

Information Visualization Laboratory

School of Library and Information Science

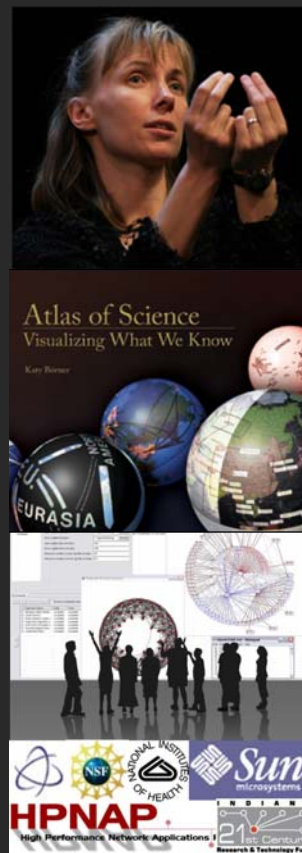
Indiana University, Bloomington, IN

<http://cns.iu.edu>

With special thanks to Kevin W. Boyack, Chin Hua Kong, Micah Linnemeier, Russell J. Duhon, Patrick Phillips, Joseph Biberstine, Chintan Tank Nianli Ma, Scott Weingart, Hanning Guo, Mark A. Price, Angela M. Zoss, Ted Polley, and Sean Lind, and the VIVO consortium

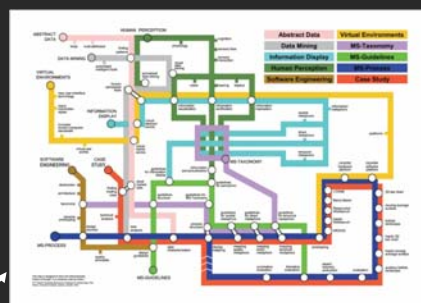
*Indiana CTSI Retreat at IUB
Alumni hall, IMU, IUB.*

October 10, 2011



Take terra bytes of data

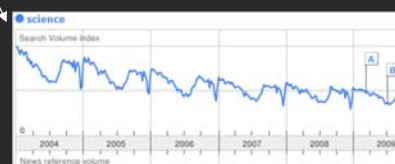
Black
Box



Find your way




Find collaborators, friends




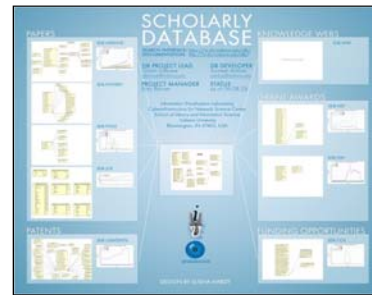
Identify trends


Computational Scientometrics Cyberinfrastructures

 Scholarly Database: 25 million scholarly records
<http://sdb.slis.indiana.edu>



 VIVO Research Networking
<http://vivoweb.org>

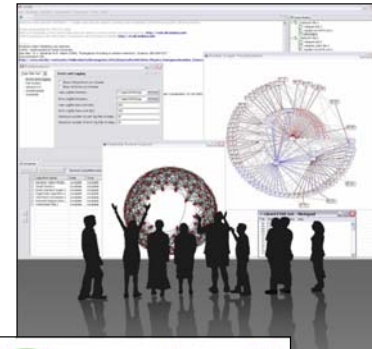


 Information Visualization Cyberinfrastructure
<http://iv.cns.iu.edu>

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

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

 Epidemics Tool & Marketplace
Forthcoming

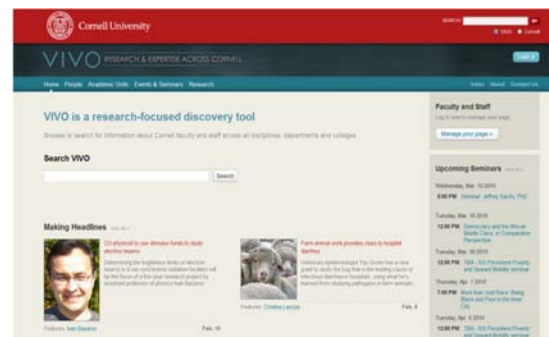


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VIVO: A Semantic Approach to Creating a National Network of Researchers (<http://vivoweb.org>)



- 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 - 2003)
- Michigan Science Library**, Stark Maintenance Supervisor (2001 - 2002)
- AST UNV LIBRARIAN

13 publications within the last 10 years (11 leads)

Affiliation

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"/> Whittaker College of Journalism and Communication	14	Agent, UF College, College
<input type="checkbox"/> Evelyn F. and William L. McKnight Brain Institute of the University of Florida	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: 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 (GEC) Program
- Evidence Based Decision Making in Geriatrics, Geriatrics, Disability

AMERICAN GERIATRICS SOCIETY

- Harford Geriatrics Leadership Scholar
- Geriatrics and Aging Research Institute on Aging (GRI)

ASST DIR GERIATRICS ACADEMIC PROGRAMS

- US OLTH RESOURCES AND SERV ADMIN
- Suflonin Study
- 2003 Scholar, Harford Institute of Geriatrics, Nursing Research, John A. Harford Institute for Geriatrics, Nursing, New York University
- Gene, Polysomnography and Prevention of Obstructive
- Insulinemia in the Sea Surface Eelium
- Cardiac Mitral Regurgitation, Biomechanics and Mechanisms
- AMES ACAD OF NURSING
- The Epidemiology of Stress and the Menopausal Syndrome
- Statement by a Sea Surface Eelium

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

Search

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 (12)
- Alumn (8972)
- Professor Emeritus (802)

UF Clinical and Translational Science Institute
UNIVERSITY of FLORIDA

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

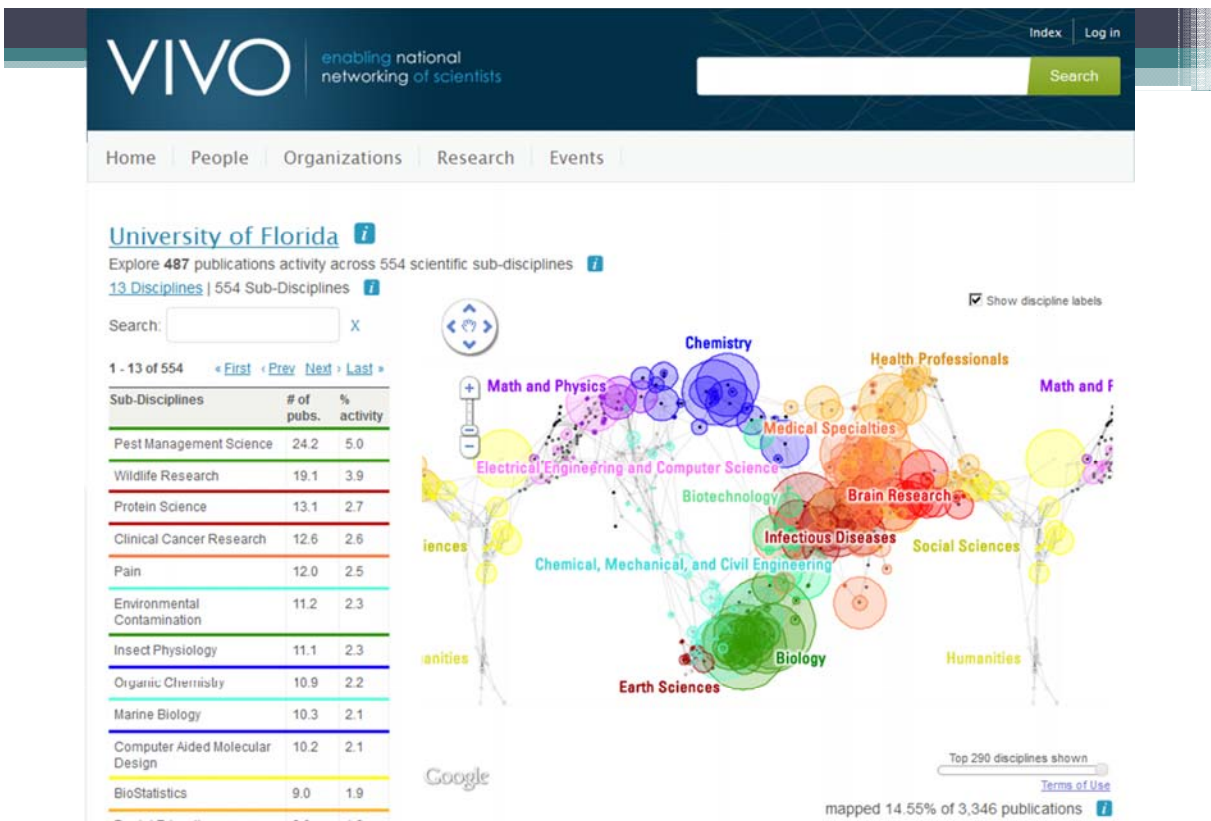
Comparing Grants of Organizations in University of Florida

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

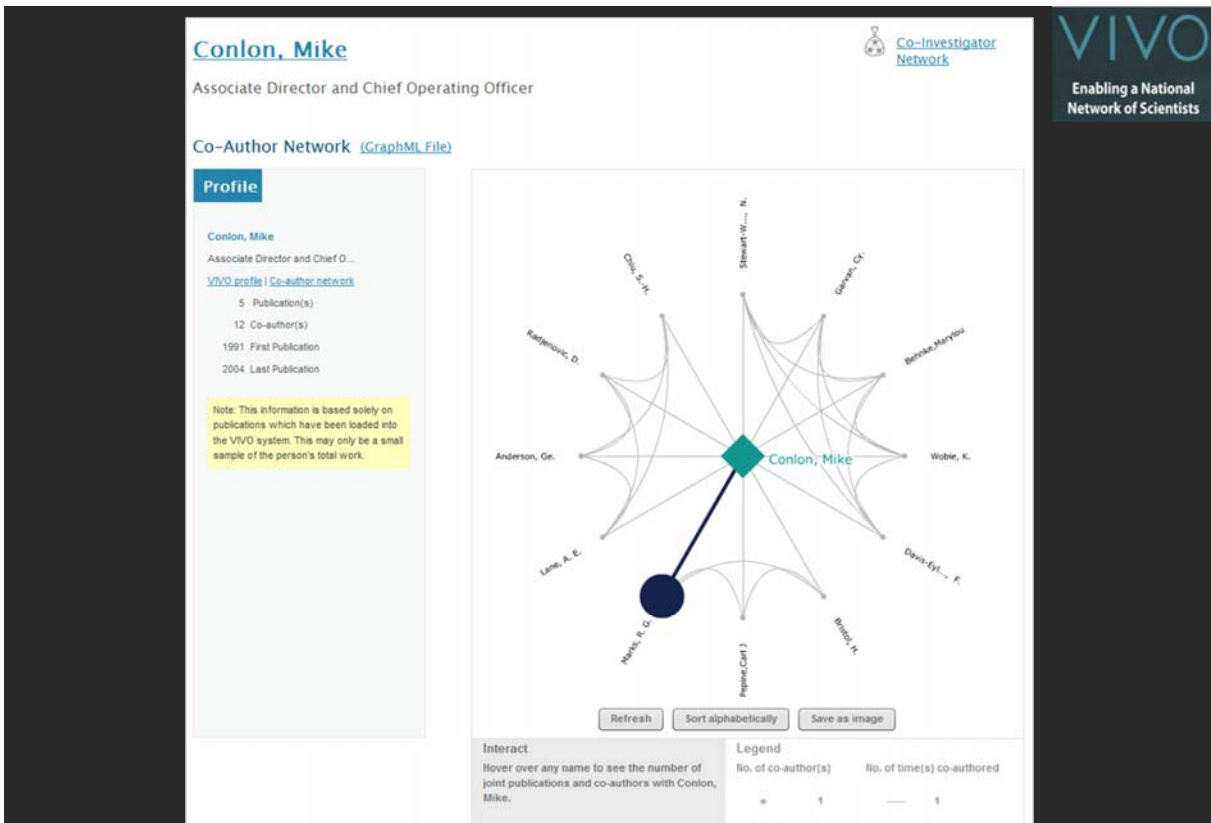
- Florida Sea Grant: 44
- International Center: 54
- Evelyn F. and William L. McKnight Brain Institute of the University of Florida: 64
- College of Engineering: 103
- College of Agricultural and Life Sciences: 166
- Florida Museum of Natural History: 203
- Continuing Education: 562

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)



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

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



INDIANA UNIVERSITY

VIVO research and expertise across Indiana University

Index Log in

Search

Home People Organizations Research Events

VIVO is a research-focused discovery tool

This site currently contains basic faculty profiles across all disciplines, departments and schools at Indiana University Bloomington. Additional data and campuses will be added over time.

For more information about this site, see [About VIVO @ IU](#).

Log in with IU Network ID

OR (in special cases)

Email

Password

Log in with VIVO account

Recent Research News at IU

[NCSA, Indiana University co-sponsoring workshop on security needs of computational science](#) Oct 05, 2011 Indiana University

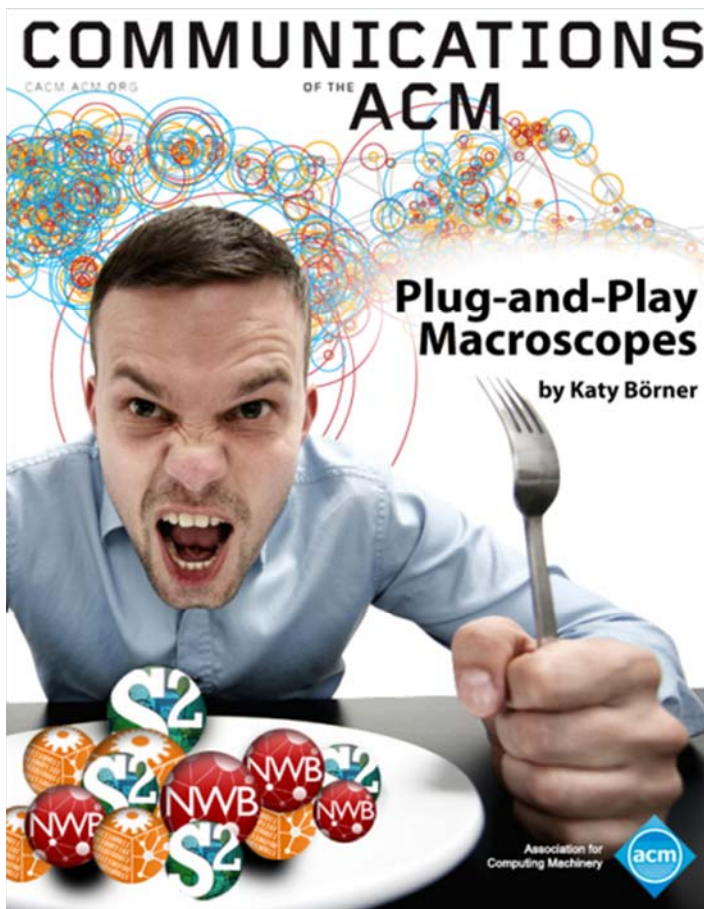
The University of Illinois' National Center for Supercomputing Applications (NCSA) and Indiana University's Center for Applied Cybersecurity Research (CACR) are teaming up to help large National Science Foundation projects address their cybersecurity needs.

[Lecture honoring legacy of IU endocrinologist Holland draws leading butterfly geneticist](#) Oct 04, 2011 Indiana University

In order to understand how human color vision evolved, scientists often first try to figure out how useful such a trait is in nature. For Indiana University 2011 James P. Holland Memorial guest lecturer Adriana Briscoe, new clues to human color vision lie in the photoreceptors of butterflies. The University of California Irvine associate professor of ecology and environmental biology, noted in 2008 as one of 30 "Young Investigators to Watch" by Genome Technology Magazine, will

<http://vivo.iu.edu>

VIVO ENABLING NATIONAL NETWORKING OF SCIENTISTS 11



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>



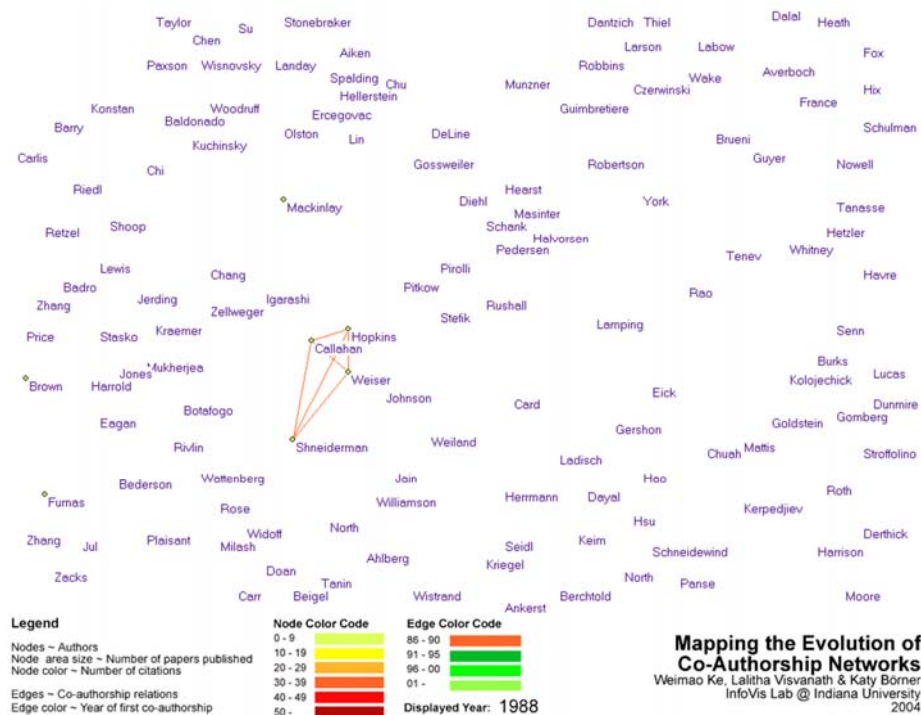
Type of Analysis vs. Level of Analysis

	<i>Micro/Individual</i> (1-100 records)	<i>Meso/Local</i> (101-10,000 records)	<i>Macro/Global</i> (10,000 < records)
Statistical Analysis/Profiling	Individual person and their expertise profiles	Larger labs, centers, universities, research domains, or states	All of NSI, all of science in USA, all of science
Temporal Analysis (When)	Funding portfolio of one individual	Research bursts of one individual	113 Years of PNAS Research
Geospatial Analysis (Where)	Career trajectory of one individual	Mapping a scientist's intellectual landscape	PNAS
Topical Analysis (What)	Research topics of one individual	Research topics of one individual	VxOrd/Topic research, NIH funding
Network Analysis (With Whom?)	NSI network of one individual	NSI network of one individual	NIH's network of one individual

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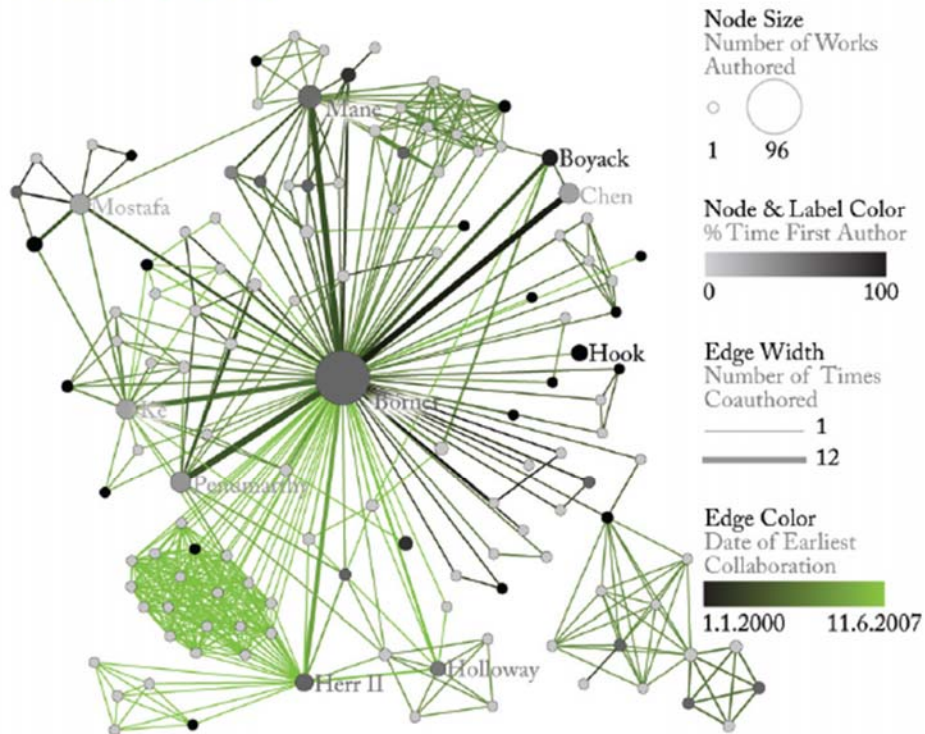


Evolving collaboration networks

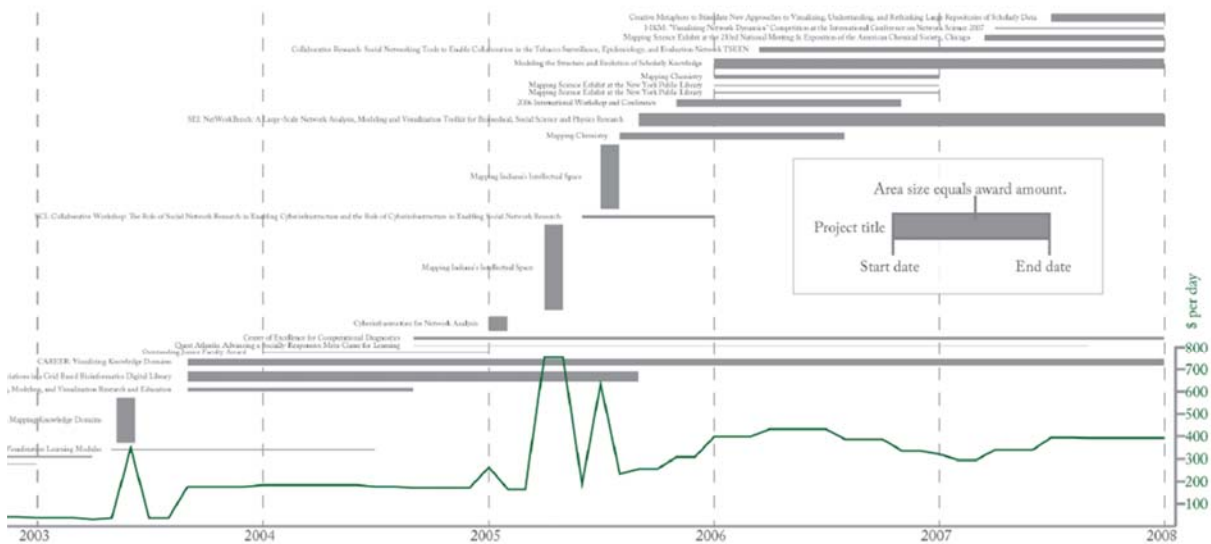


14

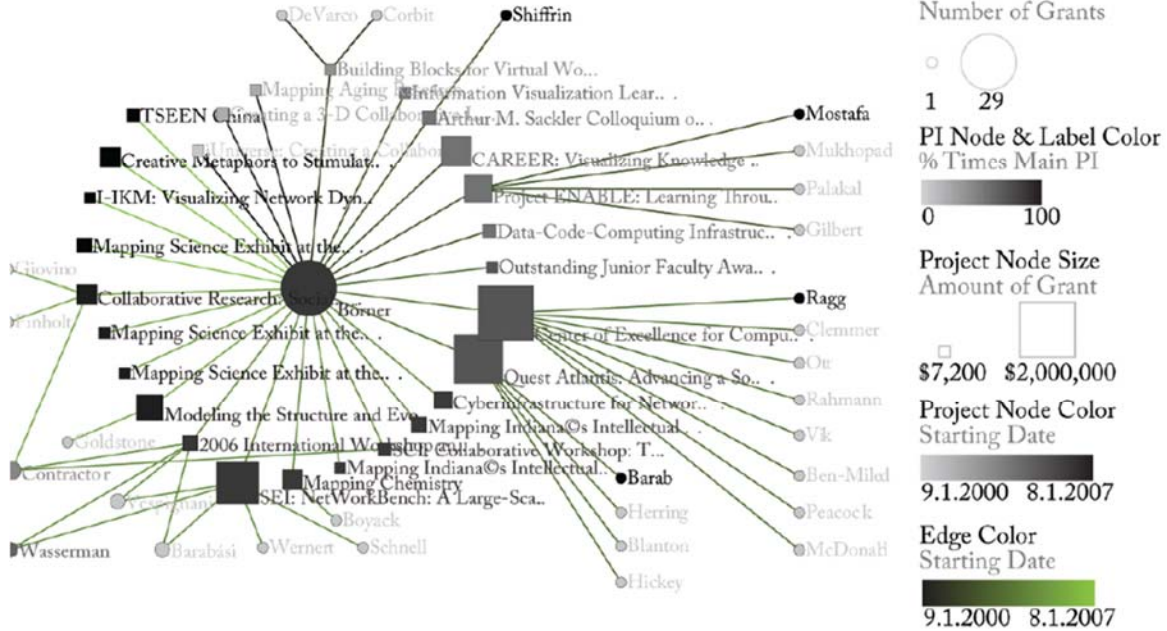
Coauthor Network



Project Timeline



Investigator-Project Network



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References

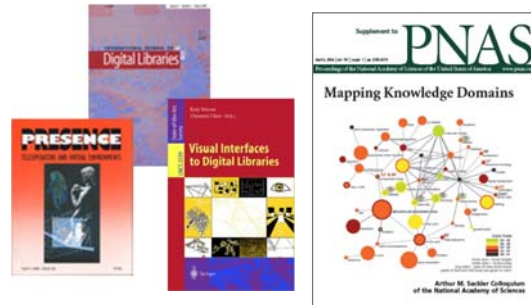
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Debut of 5th Iteration of Mapping Science Exhibit at MEDIA X was on May 18, 2009 at Wallenberg Hall, Stanford University, <http://mediax.stanford.edu>, <http://scaleindependentthought.typepad.com/photos/scimaps>



Science Maps in “Expedition Zukunft” science train visiting 62 cities in 7 months 12 coaches, 300 m long Opening was on April 23rd, 2009 by German Chancellor Merkel
<http://www.expedition-zukunft.de>

CTSI Accelerating Science Core

The core provides consulting, data mining, and visualization of information on the current practice of science to accelerate science and competitive research using a network science and science mapping approach.

Findings from theory-based research on the formation of productive teams, the identification of trends and emerging ideas, and the effective communication of complex results to diverse stakeholders are used to optimize science itself.

The Accelerating Science Core provides integrative analyses of relationships in support of institutes, programs, and projects, interested to accelerate the translation of scientific results to the improvement of human health.

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Accelerating Science Core—Services Offered

Evaluation & Monitoring: Impact and/or strength analysis for a lab, center (e.g., NSF STCs or NIH CTSA), institution, or region in order to evaluate, plan, or implement research efforts. Relevant data must be provided.

\$2000-\$6000*

Data Compilation: The construction of a custom data set (e.g., all papers, patents, grants for a certain institution or area of research) using the Scholarly Database (<http://sdb.cns.iu.edu>).

\$3000*

Visual Interface to Community Data: Setting up an online interactive interface similar to <http://mapsustain.cns.iu.edu> (relevant data must be provided to the Core).

\$6000*

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Accelerating Science Core—Services Offered

VIVO Researcher Networking: Design and implementation of interactive custom VIVO visualizations (see <http://vivoweb.org> for more info on VIVO and <http://vivo.iu.edu/vis/map-of-science/BL-ARSC> for a map of science visualization).

\$5000*

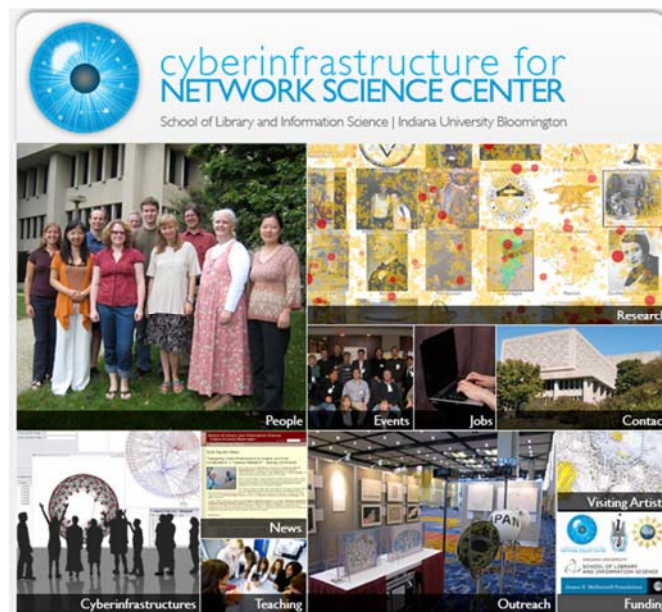
Training and Consulting in Data Mining and Visualization:

Introduction of advanced data mining and visualization tools: 2-hour tutorials or 4-hour tutorials that also feature exemplary analyses of client data. See <http://sci2.cns.iu.edu/user/documentation.php> for sample slides.

\$2000-\$5000*

**Prices vary according to scope of work. Please contact us to request an estimate.*

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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>