Using Scientometrics to Accelerate Science

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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.
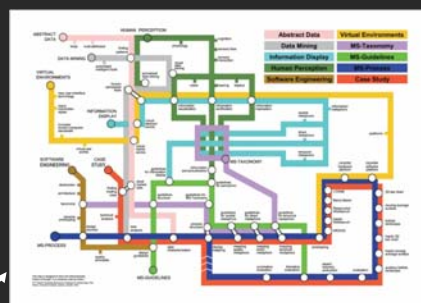Zoss, Ted Polley, and Sean Lind, and the VIVO consortium

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

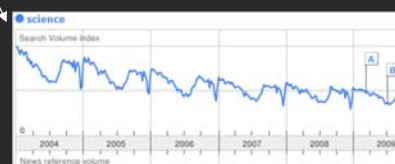*October 10, 2011*
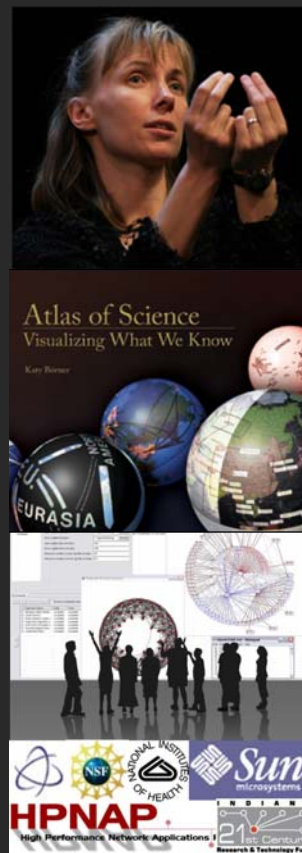
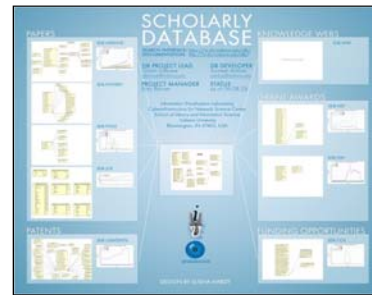Take terra bytes of data

Find your way

Find collaborators, friends

Identify trends

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Computational Scientometrics Cyberinfrastructures
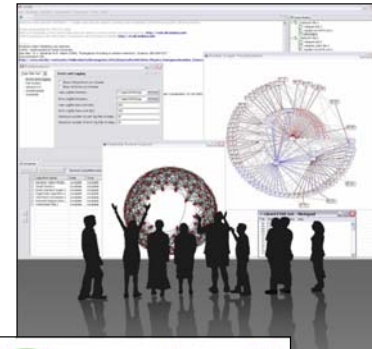

Scholarly Database: 25 million scholarly records
http://sdb.slis.indiana.edu

James S. McDonnell Foundation

VIVO Research Networking
http://vivoweb.org

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

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

Science of Science (Sci^2) Tool
http://sci2.cns.iu.edu

Epidemics Tool & Marketplace Forthcoming

OSGi Alliance **CIShell** cyberinfrastructure shell

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Enabling a National Network of Scientists

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

- Semantic web application and ontology editor originally developed at Cornell U.
- Integrates research and scholarship info from systems of record across institution(s).
- Facilitates research discovery and cross-disciplinary collaboration.
- Simplify reporting tasks, e.g., generate biosketch, department report.
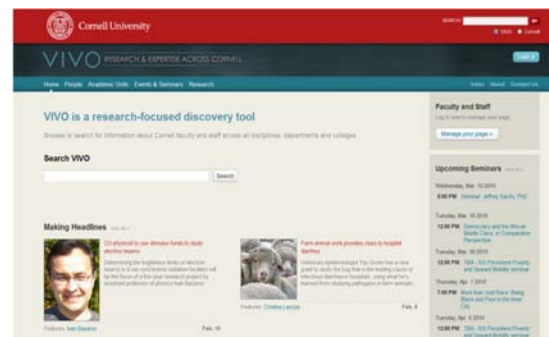
Funded by $12 million NIH award.

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

VIVO ENABLING NATIONAL NETWORKING OF SCIEN 4

Temporal Analysis (When) Temporal visualizations of the number of papers/funding award at the institution, school, department, and people level
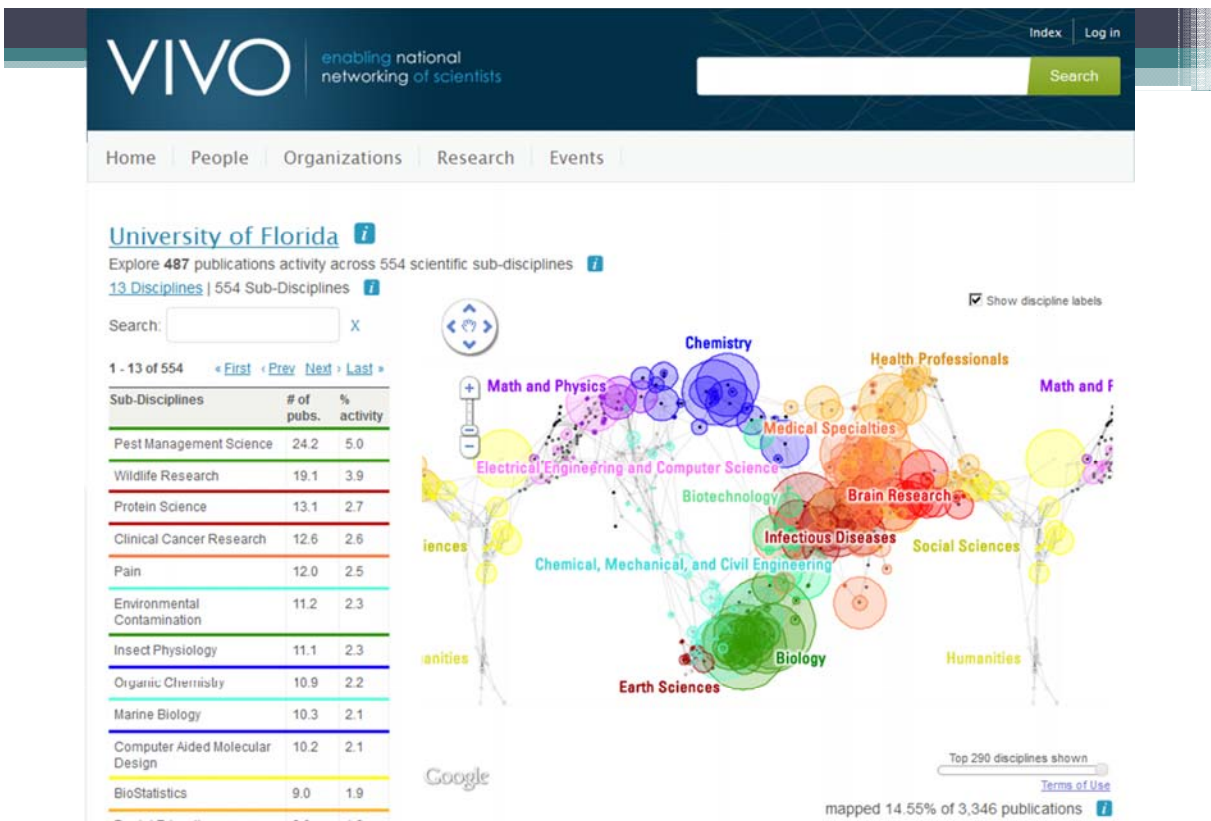
Topical Analysis (What) Science map overlays will show where a person, department, or university publishes most in the world of science. (in work)

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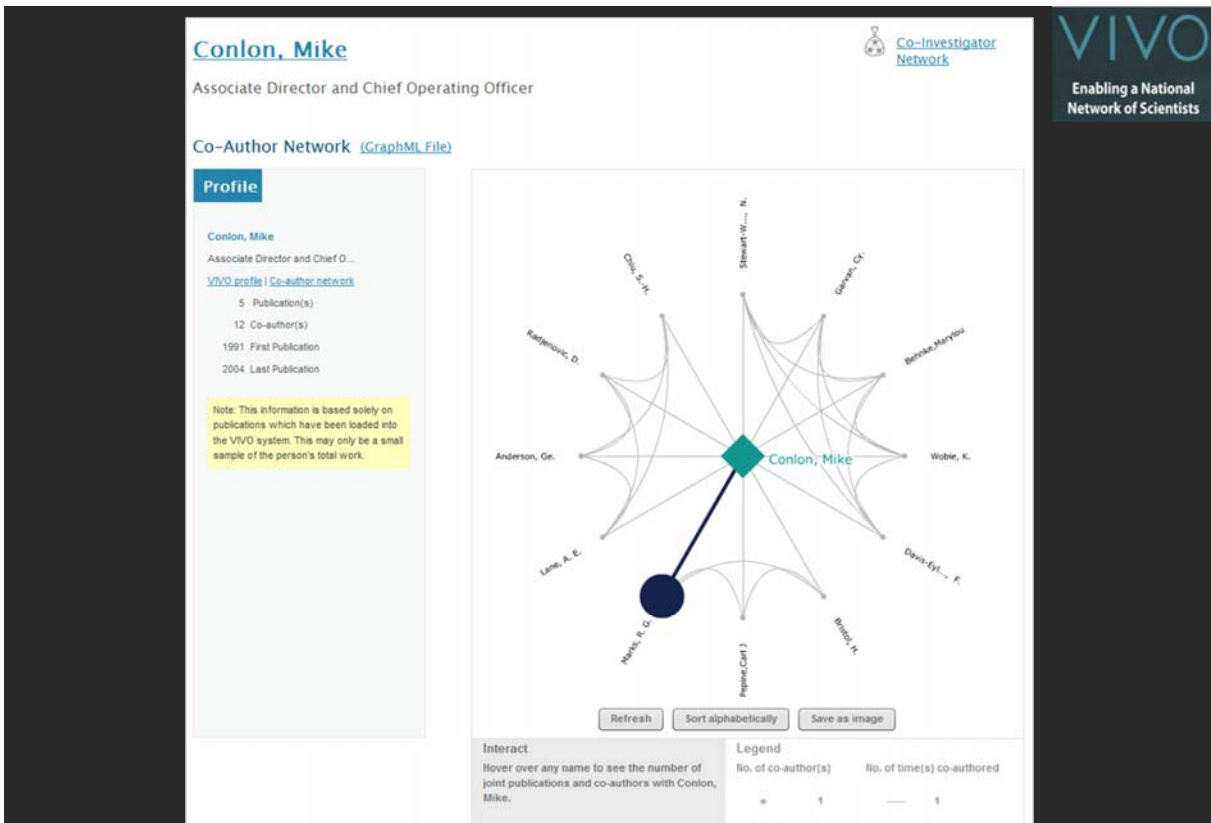
Network Analysis (With Whom?) Who is co-authoring, co-investigating, co-inventing with whom? What teams are most productive in what projects?

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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

Slide 11

IU INDIANA UNIVERSITY

Index | Log in

VIVO
research and expertise
across Indiana University

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

Slide 12
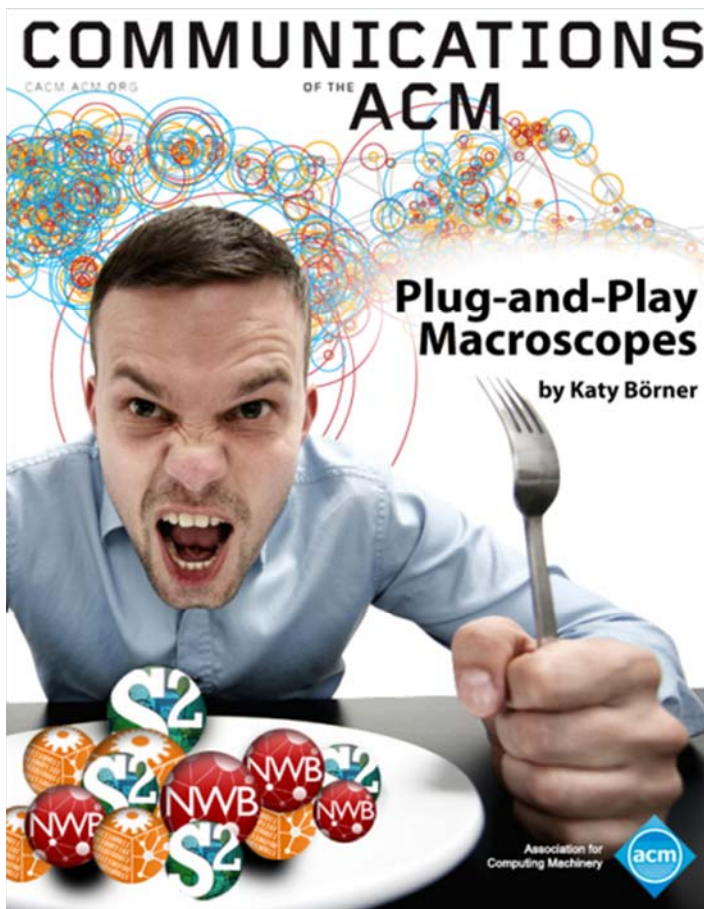
Börner, Katy. (March 2011).

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

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

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

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Evolving collaboration networks

Legend

Nodes ~ Authors
Node area size ~ Number of papers published
Node color ~ Number of citations

Edges ~ Co-authorship relations
Edge color ~ Year of first co-authorship

Node Color Code
0 - 9
10 - 19
20 - 29
30 - 39
40 - 49
50 -

Edge Color Code
86 - 90
91 - 95
96 - 00
01 -

Displayed Year: **1988**

Mapping the Evolution of Co-Authorship Networks
Weimao Ke, Lalitha Visvanath & Katy Börner
InfoVis Lab @ Indiana University
2004

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Coauthor Network

Project Timeline
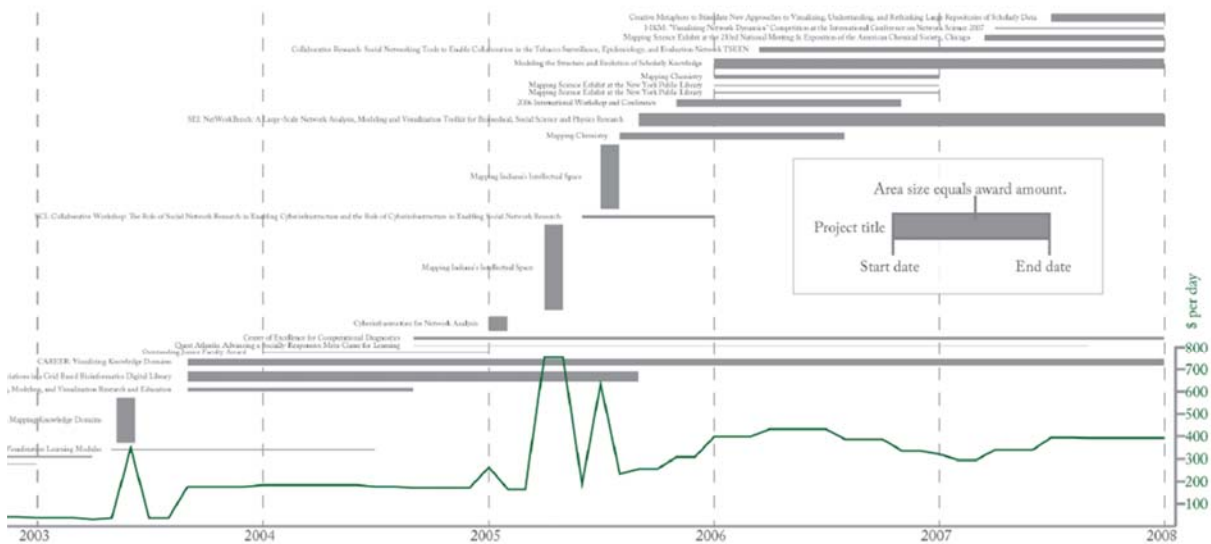
Investigator–Project Network

PI Node Size
Number of Grants

1   29

PI Node & Label Color
% Times Main PI

0   100

Project Node Size
Amount of Grant

$7,200 $2,000,000

Project Node Color
Starting Date

9.1.2000 8.1.2007

Edge Color
Starting Date
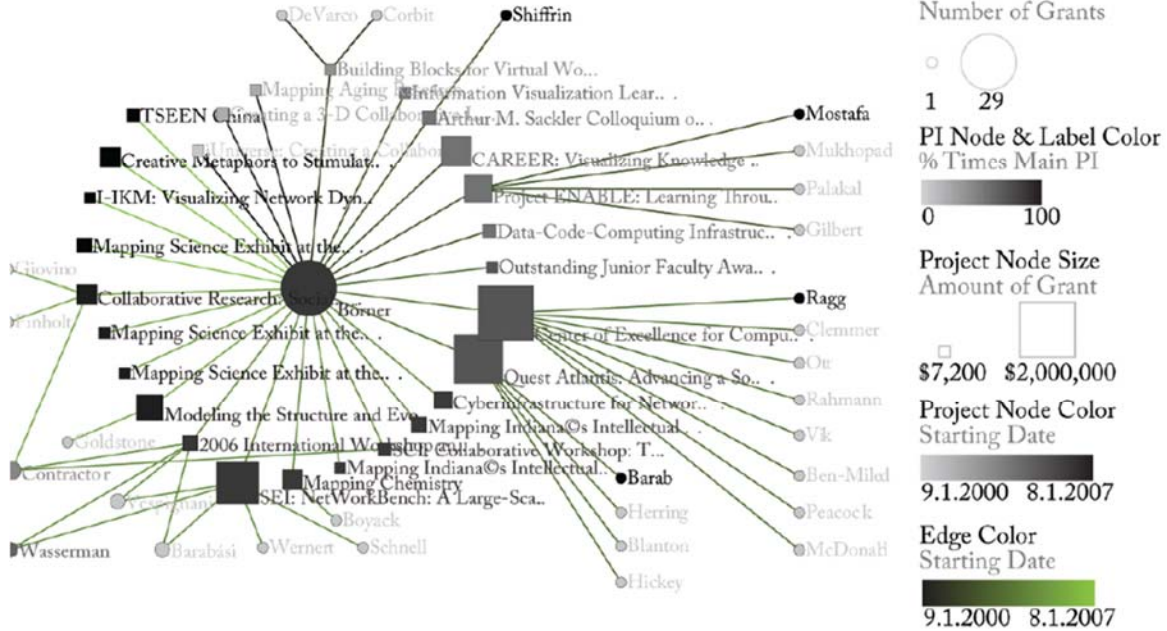
9.1.2000 8.1.2007

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/

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http://ivl.slis.indiana.edu/km/pub/2007-borner-arist.pdf

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

Scharnhorst, Andrea, Börner, Katy, van den Besselaar, Peter (2011) **Models of Science Dynamics**. Springer Verlag.
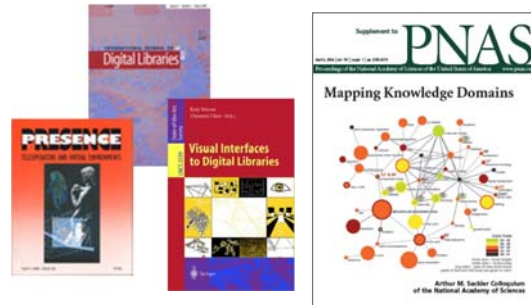
Debut of 5th Iteration of Mapping Science Exhibit at MEDIA X was on May 18, 2009 at Wallenberg Hall, Stanford University, *http://mediax.stanford.edu, http://scaleindependentthought.typepad.com/photos/scimaps*

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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

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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.

Accelerating Science Core—Services Offered

Evaluation & Monitoring: Impact and/or strength analysis for a lab, center (e.g., NSF STCs or NIH CTSAs), 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*

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).
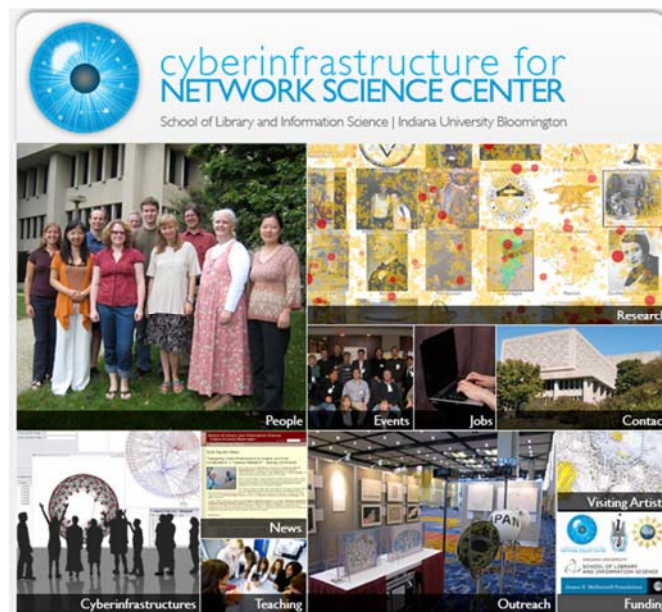**$5000***

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

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