

# VIVO and VIVO@IU

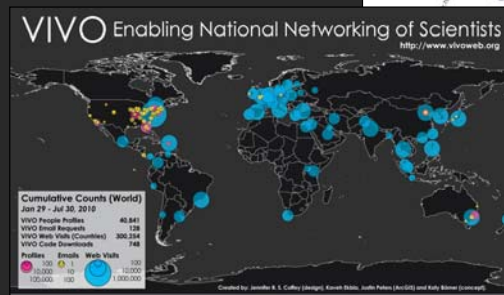
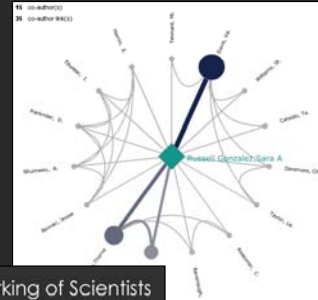
**Dr. Katy Börner**

Cyberinfrastructure for Network Science Center, Director  
Information Visualization Laboratory, Director  
School of Library and Information Science  
Indiana University, Bloomington, IN  
[katy@indiana.edu](mailto:katy@indiana.edu)



With special thanks to the members at the Cyberinfrastructure  
for Network Science Center and the VIVO team.

*UTS Presentation  
September 17, 2010*



Browser tabs: Epernicus: Where Science Meets - Mozilla Firefox, Alvaro Pascual-Leone | Profiles | Harvard Catalyst - Mozilla Firefox, Profile - Mozilla Firefox, Steven Pinker | Harvard University - Academia.edu - Mozilla Firefox, What is LinkedIn? | LinkedIn - Mozilla Firefox, Welcome to Facebook - Mozilla Firefox, Corson-Rikert, Jon - Mozilla Firefox

Address bar: <http://vivo.cornell.edu/individual/vivo/individual22972>

Search:

**Corson-Rikert, Jon**  
Head of Information Technology Services

**RESEARCH**  
research and scholarship focus

Navigation: Home, People, Academic Units, Events & Seminars, Research, Index, About

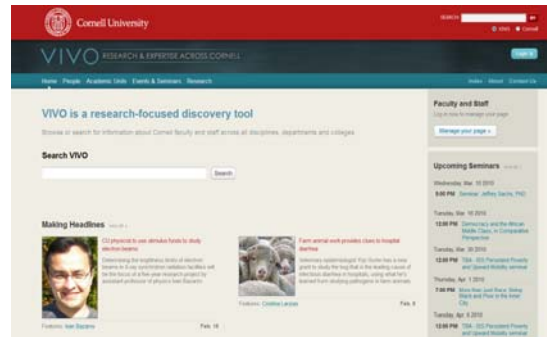
Menu: RESEARCH, AFFILIATIONS, BACKGROUND, PUBLICATIONS, current contact information

## 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.

Soon:

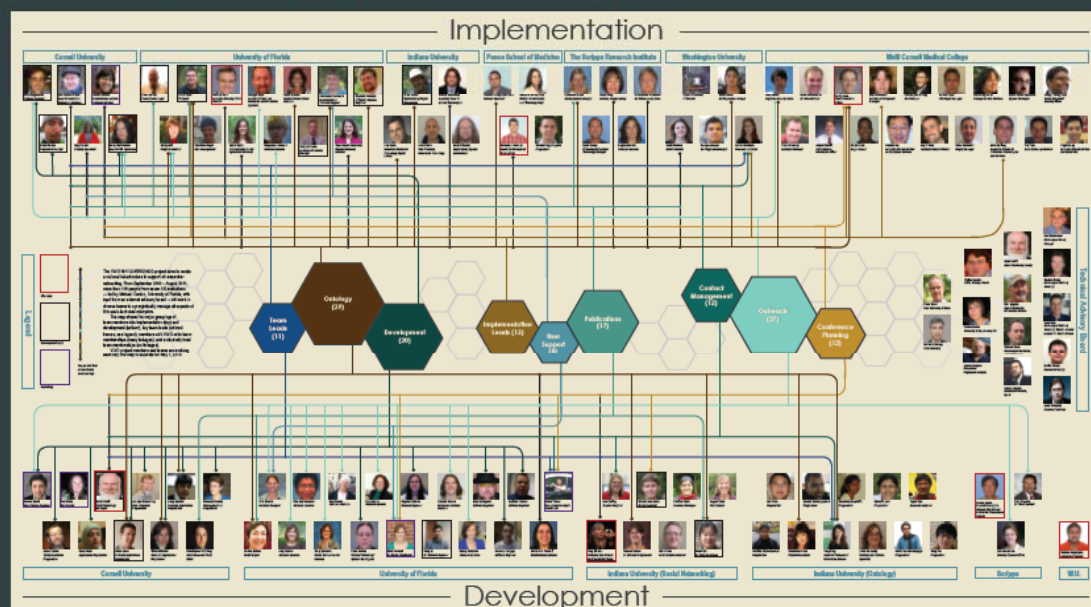
- Simplify reporting tasks, e.g., generate biosketch, department report.



**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 (VIVO and UF PI):** Cecilia Botero, Kerry Britt, Erin Brooks, Amy Buhler, Ellie Bushhausen, 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.

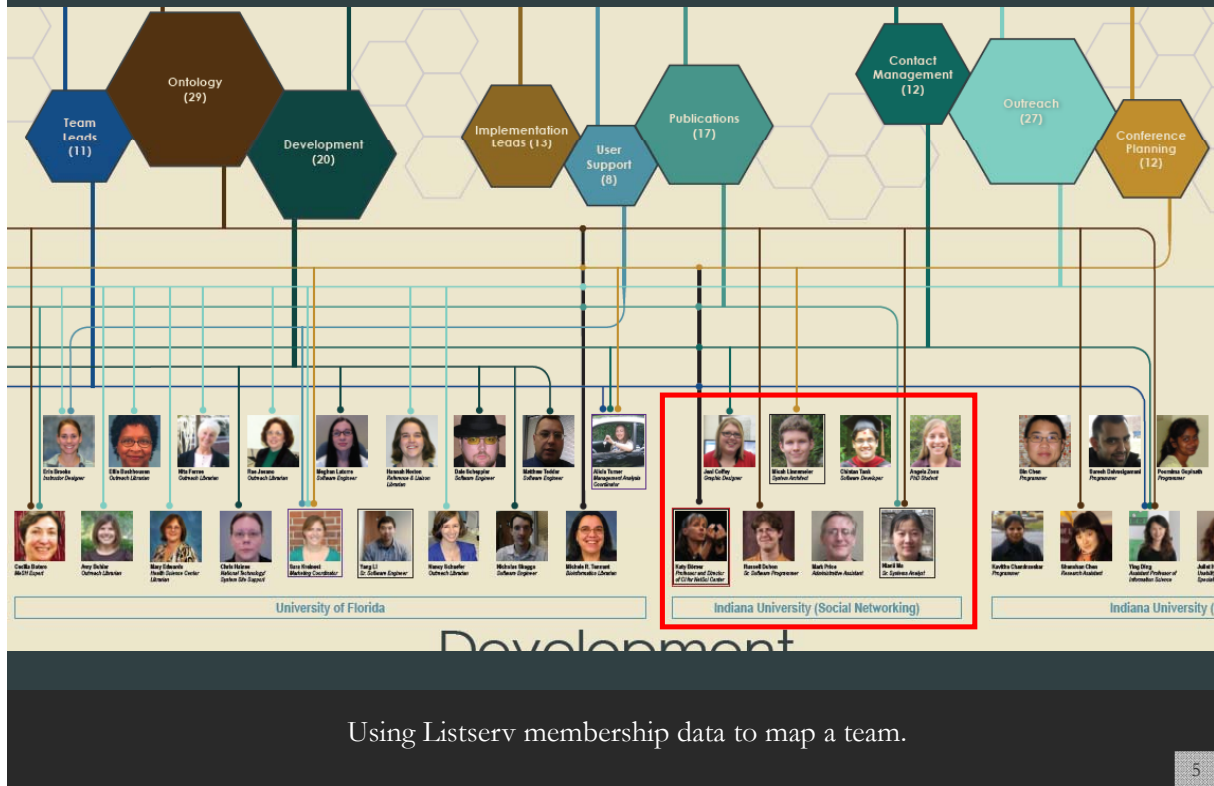
## VIVO Enabling National Networking of Scientists

Project Members and Teams



# VIVO Enabling National Networking of Scientists

## Project Members and Teams



## VIVO Users and Needs



- Faculty/Researchers
  - Customize profile created via feeds; find potential collaborators, “people like me”; discovery via high search rankings; info on activity of colleagues...
- Students
  - Create profiles; easily find mentors + collaborators; locate facilities, events, funding opportunities...
- Administrators
  - Quickly find cross-disciplinary expertise (research area; geography); centralize public data from diverse sources; easily repurpose information for consumers; improve faculty collaboration within or across departments and institutions...
- Funding, donor, legislative agencies
  - Discover projects, grants, expertise (e.g. for review panels; targets for funding)...
- General public
  - Find expertise, learn about research in a region/institution...

# VIVO Web Pages

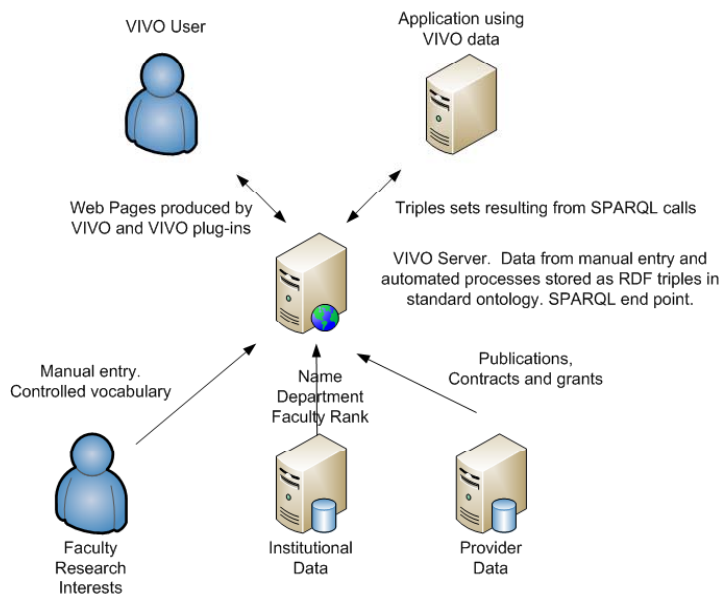
The screenshot shows the Cornell University CALS Research website. At the top, there is a search bar and navigation links. The main content area includes a 'Welcome to CALS Research' section with a sub-header 'A portal to all CALS Research activities. Select the individual academic priority areas in the banner above for a more filtered view.' Below this, there is a 'CALS Research News' section with several news items, each featuring a small image and a brief description. The URL <http://research.cals.cornell.edu> is displayed at the bottom of the page.

# VIVO Data Providers & Users

- Eagle-i (“enabling resource discovery” U24 award)
- Federal agencies – NIH (NIH RePORTER), NSF, USDA, ...
- Search Providers – Google, Bing, Yahoo, ...
- Professional Societies – AAAS, ...
- Publishers/vendors – PubMed, Elsevier, Collexis, ISI...
- Semantic Web community – DERI, ...
- Consortia of schools – SURA, CTSA...
- Producers, consumers of semantic web-compliant data

## Institutional Architecture

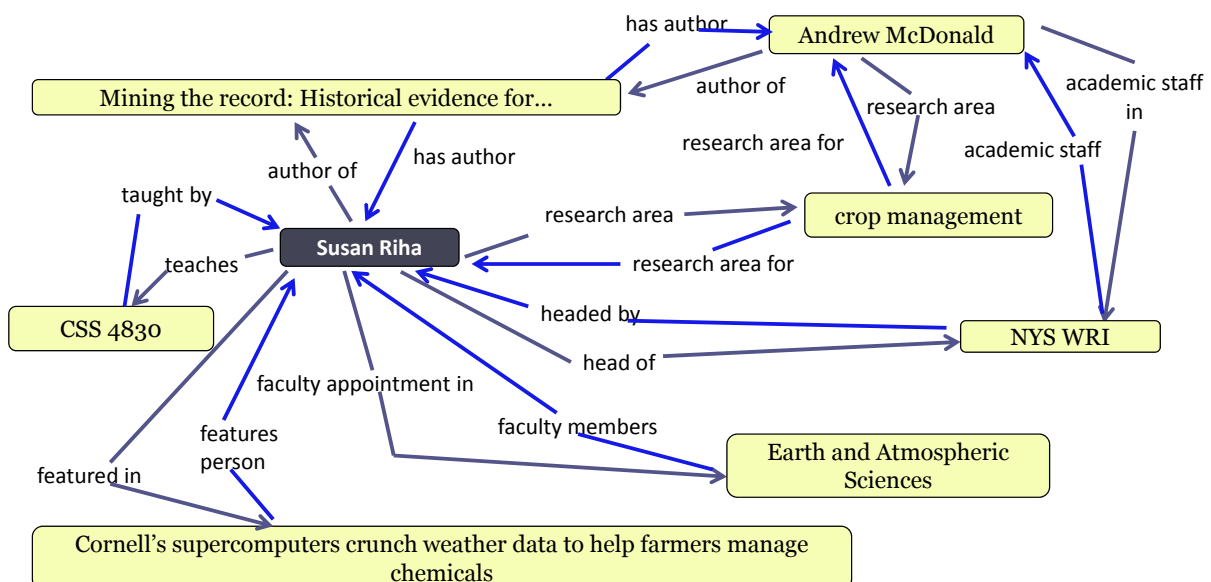
- Three sources of VIVO information
  - User data
  - Institutional data
  - Provider data
- Two formats for output
  - Web Pages for users
  - Resource Description Framework for applications



## Data Representation using RDF Triples

Detailed relationships for a researcher at Cornell U.

Open source code (BSD) and ontology available at <http://vivoweb.org>.



# VIVO & Linked Open Data

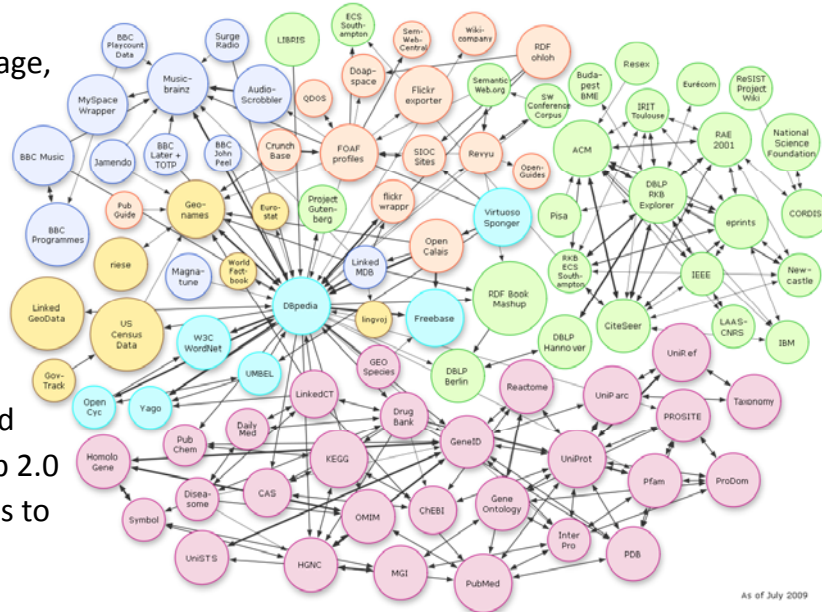
2010 National VIVO Conference August 12&13, NYC

<http://conferences.dce.ufl.edu/vivo>

VIVO makes high coverage, high quality data from systems of record

- available online
- for free, and
- in machine readable format.

VIVO ontology is aligned with many existing Web 2.0 and scholarly ontologies to ease interoperability.



As of July 2009

[http://www4.wiwiw.fu-berlin.de/bizer/pub/lod-datasets\\_2009-07-14\\_colored.png](http://www4.wiwiw.fu-berlin.de/bizer/pub/lod-datasets_2009-07-14_colored.png)

## VIVO Release 1 v. 1.1: Individual Level Co-Author Visualization

VIVO Research & Expertise Across the University of Florida

Home People Academic Units Research Events & Seminars Index

Log into VIVO

Login

Latest from VIVO

VIVO Conference: Updates

Release 1 v. 1.1 Announcement

VIVO on SourceForge.net: First Step to Community Development

Reminder: early registration ends July 15!

National VIVO Conference: Late breaking submissions announcement

More from the VIVO blog

Conlon, Michael

Associate Director and Chief Operating Officer

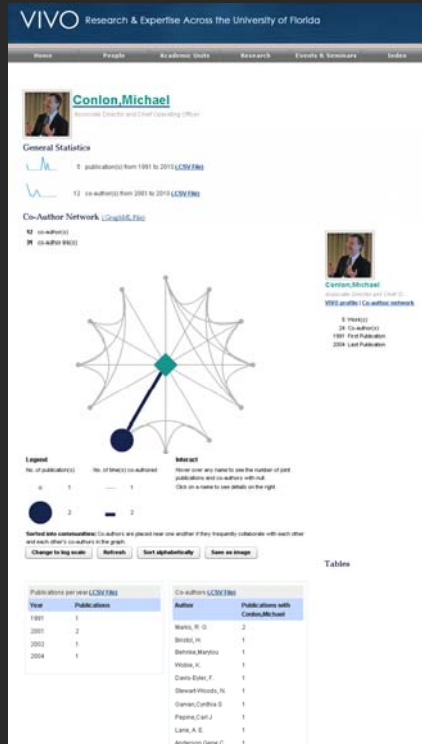
4 publication(s) within the last 10 years

[View all VIVO publications and corresponding co-author network](#)

Select

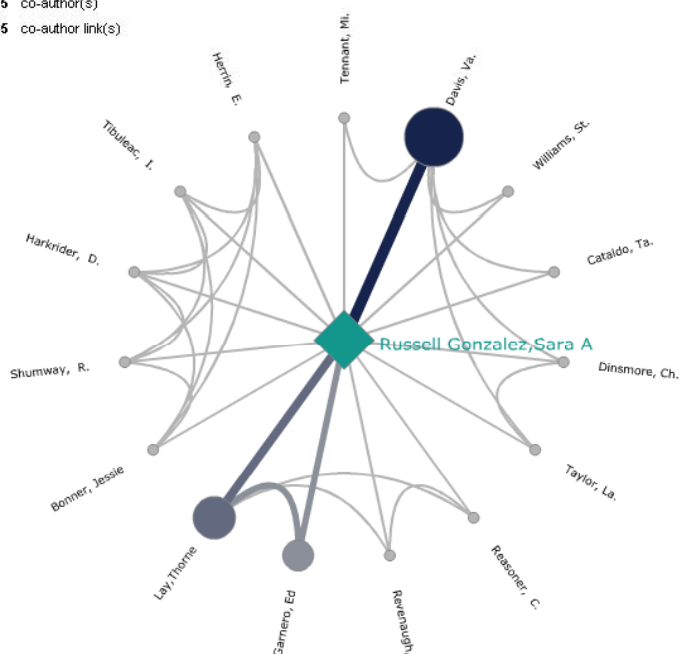
<http://vivo.ufl.edu/display/n2556>

# VIVO Release 1 v. 1.1: Individual Level Co-Author Visualization



## Co-Author Network (GraphML File)

15 co-author(s)  
 36 co-author link(s)

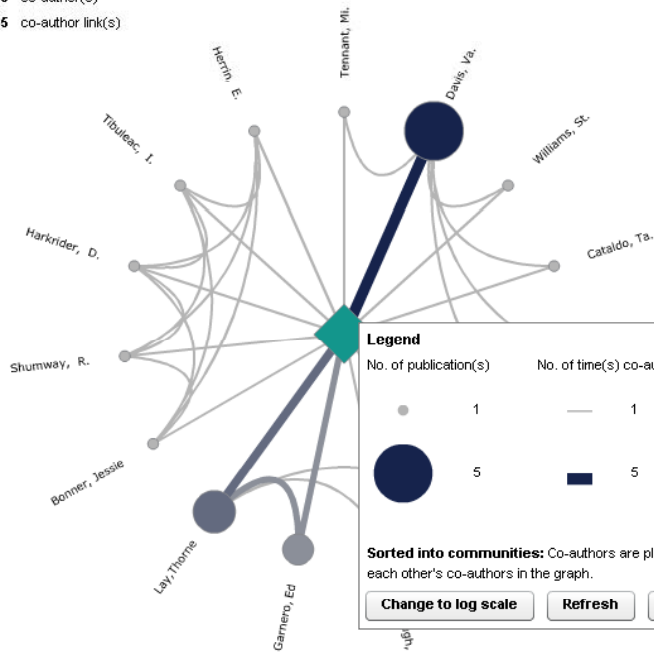


**Russell Gonzalez, Sara A**  
 Physical Sciences Librarian  
[VIVO profile](#) | [Co-author network](#)

9 Publication(s)  
 15 Co-author(s)  
 1998 First Publication  
 2010 Last Publication

## Co-Author Network [\(GraphML File\)](#)

15 co-author(s)  
35 co-author link(s)



**Russell Gonzalez, Sara A**

Physical Sciences Librarian  
[VIVO profile](#) | [Co-author network](#)

9 Publication(s)  
15 Co-author(s)  
1998 First Publication  
2010 Last Publication

### Legend

No. of publication(s)	No. of time(s) co-authored

### Interact

Hover over any name to see the number of joint publications and co-authors with Russell Gonzalez, Sara A.  
Click on a name to see details on the right.

### Thresholding

Only people that co-authored more than 0 paper(s) with Russell Gonzalez, Sara A are shown.  
0 out of 0 co-author(s) are shown.

**Sorted into communities:** Co-authors are placed near one another if they frequently collaborate with each other and each other's co-authors in the graph.

[Change to log scale](#)

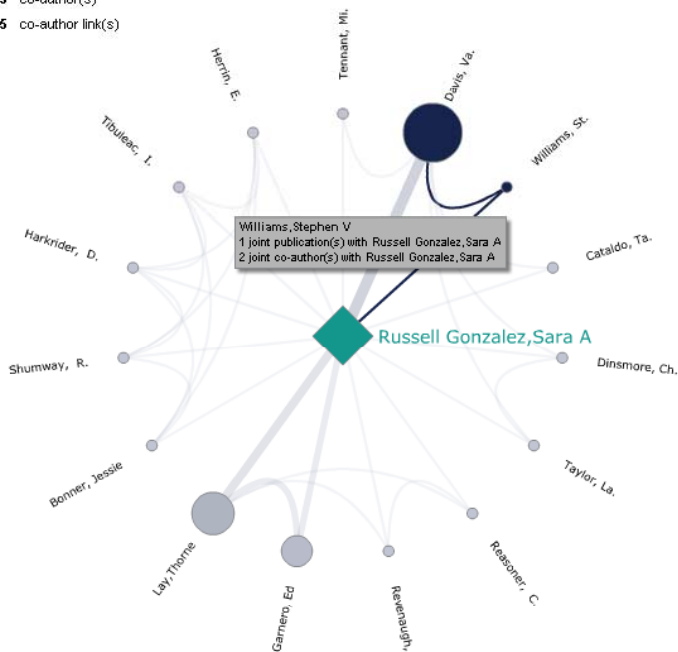
[Refresh](#)

[Sort alphabetically](#)

[Save as image](#)

## Co-Author Network [\(GraphML File\)](#)

15 co-author(s)  
35 co-author link(s)



**Williams, Stephen V**

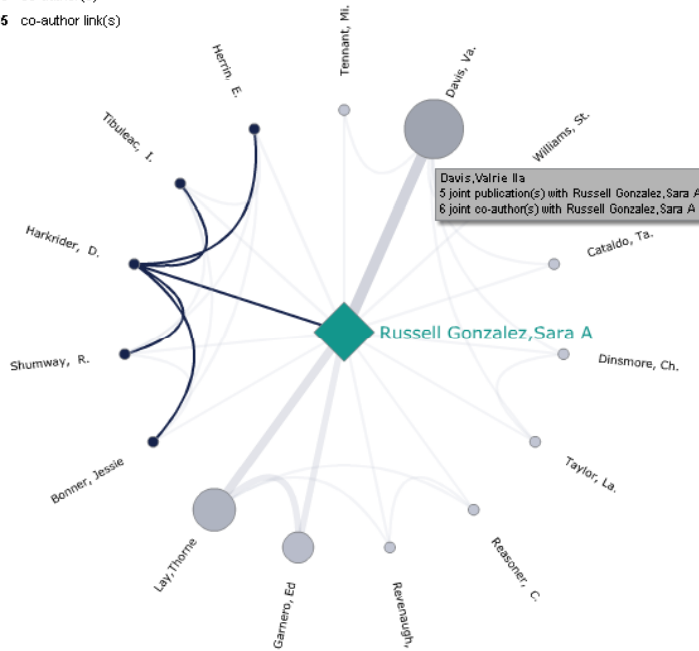
Software Engineer  
[VIVO profile](#) | [Co-author network](#)

1 Joint Publication(s)  
2 Joint Co-author(s)  
2010 First Publication  
2010 Last Publication



### Co-Author Network (GraphML File)

15 co-author(s)  
35 co-author link(s)



### Harkrider, David G.

[VIVO profile](#) | [Co-author network](#)

1 Joint Publication(s)  
5 Joint Co-author(s)  
2003 First Publication  
2003 Last Publication

### Borner, Katy

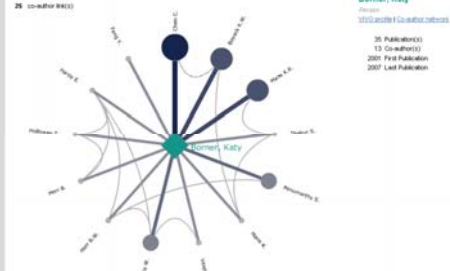
This information is based solely on publications which have been loaded into the VIVO system. This may only be a small sample of the person's total work.

#### General Statistics

36 publication(s) from 2001 to 2010  
80 co-author(s) from 2001 to 2010

#### Co-Author Network

13 co-author(s)  
26 co-author link(s)



**Legend**  
No. of publications  
No. of links (co-author(s))

**Select**  
Hover over any name to see the number of past publications and co-authors with Borner, Katy. Click on a name to see details on the right.

**The thresholding**  
Only people that co-authored more than 1 paper(s) with Borner, Katy are shown.  
13 out of 80 co-author(s) are shown.  
Only those people who co-authored with each other and each other's co-author(s) in the graph.

Buttons: Change to log scale, Refresh, Sort alphabetically, Save as image

#### Tables

Year	Publications per year	Co-author(s)
2001	2	
2002	4	
2003	2	
2004	7	
2005	7	
2006	3	
2007	10	

Author	Publications with Borner, Katy
Chen, C.	5
Slovic, M.	4
Mann, K.K.	4
Ha, W.	3
Parnumathy, S.	3
Veppaganti, Alessandro	2
Han, B.	2
Hardy, E.	2
Holloway, T.	2
Har, D.P.	2
Thayer, S.	2
Feng, Y.	2
Mann, K.	2

### Download Data

#### General Statistics

- 36 publication(s) from 2001 to 2010 ([.CSV File](#))
- 80 co-author(s) from 2001 to 2010 ([.CSV File](#))

#### Co-Author Network

([GraphML File](#))

Save as Image (.PNG file)

#### Tables

- Publications per year ([.CSV File](#))
- Co-authors ([.CSV File](#))

[http://vivo-vis.slis.indiana.edu/vivo1/visualization?uri=http%3A%2F%2Fvivo.veb.org%2Ffontology%2Fcore%2Fperson72&vis=person\\_level&render\\_mode=standalone](http://vivo-vis.slis.indiana.edu/vivo1/visualization?uri=http%3A%2F%2Fvivo.veb.org%2Ffontology%2Fcore%2Fperson72&vis=person_level&render_mode=standalone)

36 publication(s) from 2001 to 2010 ([.CSV File](#))

Year	Publications
2001	2
2002	4
2003	2
2004	7
2005	7
2006	3
2007	10
2010	1

80 co-author(s) from 2001 to 2010 ([.CSV File](#))

Year	Count	Co-Author(s)
2001	1	Chen C.
2002	3	Chen C.; McMahon T.; Feng Y.
2003	2	Chen C.; Boyack K.W.
2004	17	Sengupta A.; Penumarthi S.; Thakur S.; Sooriamurthi R.; Maru J.T.; Shiffrin R.M.; Mane K.; Moor K.A.;

Co-author network ([GraphML File](#))

```

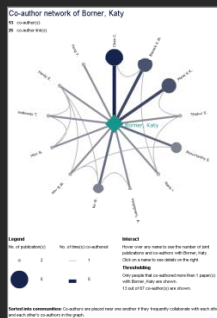
1 <?xml version="1.0" encoding="UTF-8"?>
2 <graphml xmlns="http://graphml.graphdrawing.org/xmlns"
3 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4 xsi:schemaLocation="http://graphml.graphdrawing.org/xmlns
5 http://graphml.graphdrawing.org/xmlns/1.0/graphml.xsd">
6 <key id="label" for="node" attr.name="label" attr.type="string" />
7 <key id="number_of_authored_works" for="node" attr.name="number_of_authored_works" attr.type="int" />
8 <key id="num_unknown_publication" for="node" attr.name="num_unknown_publication" attr.type="int" />
9 <key id="num_latest_publication" for="node" attr.name="num_latest_publication" attr.type="int" />
10 <key id="latest_publication" for="node" attr.name="latest_publication" attr.type="int" />
11 <key id="profile_url" for="node" attr.name="profile_url" attr.type="string" />
    
```

Save as Image (.PNG file)

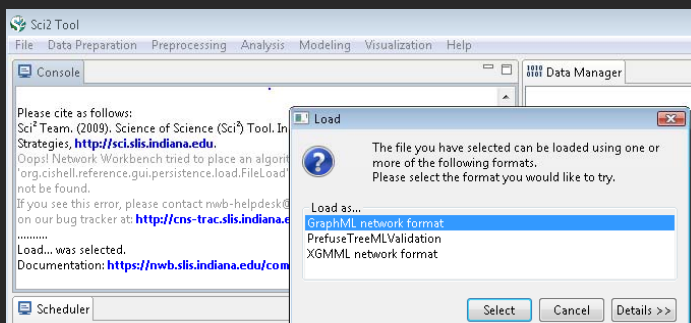
Publications per year ([.CSV File](#)), see top file.

Co-authors ([.CSV File](#))

Co-Author	Count
Andrienko G.	1
Andrienko N.	1
Ben-Miled Z.	1
Blackwell A.	1
Boyack K.W.	4
Bozicevic M.	1
Brodbeck D.	1
Burkhard R.A.	1
Chen C.	5

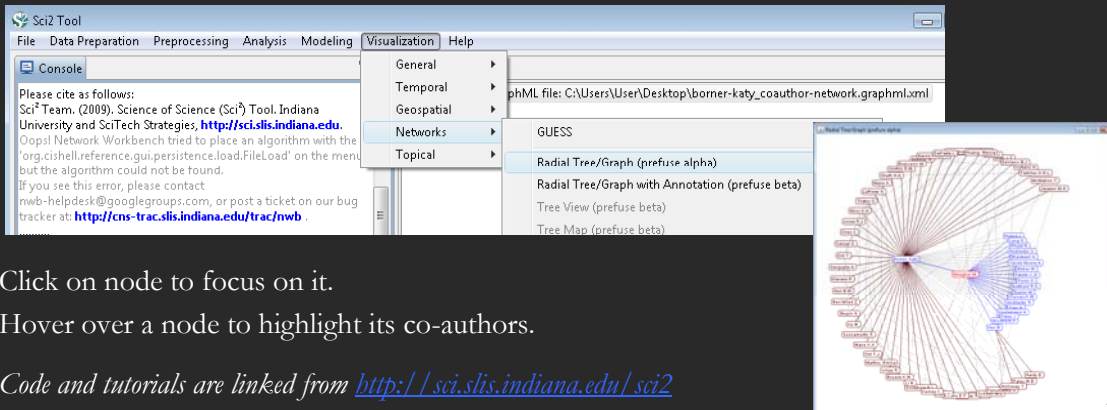


Run Sci2 Tool and Load Co-Author Network ([GraphML File](#))



Network Analysis Toolkit  
Nodes: 81  
Edges: 390

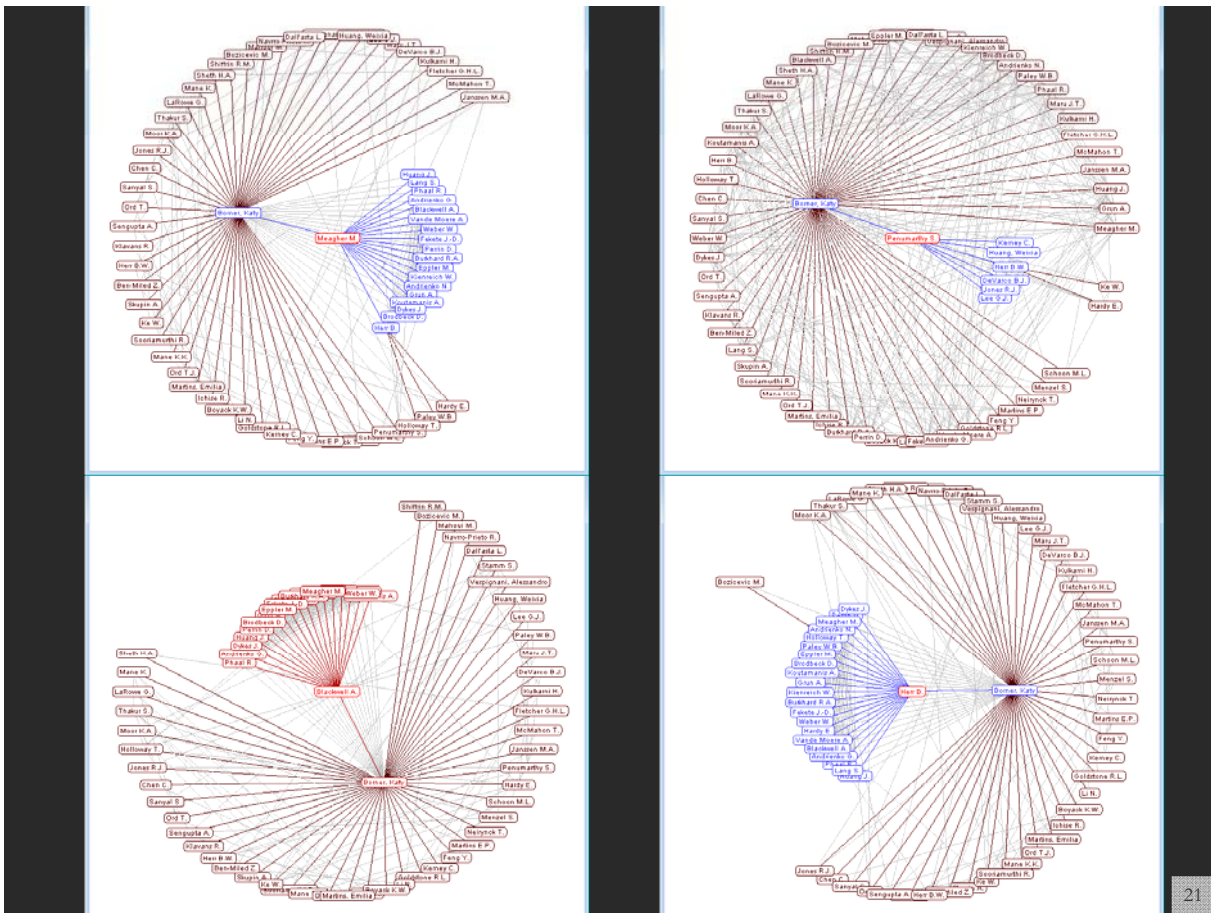
Visualize the file using Radial Graph layout.



Click on node to focus on it.

Hover over a node to highlight its co-authors.

Code and tutorials are linked from <http://sci.slis.indiana.edu/sci2>



## VIVO Institution Level Visualizations

**VIVO** RESEARCH & EXPERTISE ACROSS CORNELL

Home People Academic Units Events & Seminars Research Index About Contact Us

**people**

- Academic Staff (2331)
- Cornell Academic Appointee (7386)
- Cornell Academic Staff (2333)
- Cornell Alumni (88)
- Cornell Assistant (2)
- Cornell Emerita Professor (287)
- Cornell Faculty Member (4790)
- Cornell Graduate Student (2)
- Cornell Librarian (27)
- Cornell Non-Academic Staff (2903)
- Former Cornell employee (23)
- Former Cornell faculty member (21)
- Non-Cornell faculty member (41)

**courses**

- Cornell Semester Class (18724)

**activities**

- Academic Degree Granting Agent (238)
- Academic Initiative (46)
- Academic Theme Project Initiative (5)
- Administrative Service (2)
- Area of concentration (244)
- Business Related Service (12)
- Consultation Service (2)
- Contract, Grant, or Sponsored Research Response (8)
- Departmental Open Program (3)
- Exhibiting Practicing or Performing (24)
- External Research Service (5)
- Federal Formula Fund Grant (1)
- Funding Opportunity Service (3)
- Graduate Fellowship Program (17)
- Graduate Field Training (8)

[Click here for simple statistics and trends.](#)

[Click here for neotomo.](#)

[Click here for trend analyses.](#)

[Click here for all analyses and visualizations.](#)

**Institution Level VIVO Visualization**  
 Available from the VIVO Index page are statistics such as publications/funding/courses, # of linkages, e.g., co-author, paper-citation, paper-author, etc., # downloads over time are plotted, geo and science map overlays are generated, network layouts with well defined base maps, e.g., bump charts or two lists of nodes in a bimodal network are written into a .ps file, converted into a .pdf file and are available for print. Temporal animation of growth corresponds to multiple pages (one per year) with identical reference system.  
 Only local data, here Cornell, is considered. We would like to know what vis users request.

Institution level visualization will be available from the VIVO Index page and comprise statistics such as

- publications/funding/courses,
- # of linkages, e.g., co-author,
- paper-citation, paper-author, etc.,
- # downloads over time are plotted.

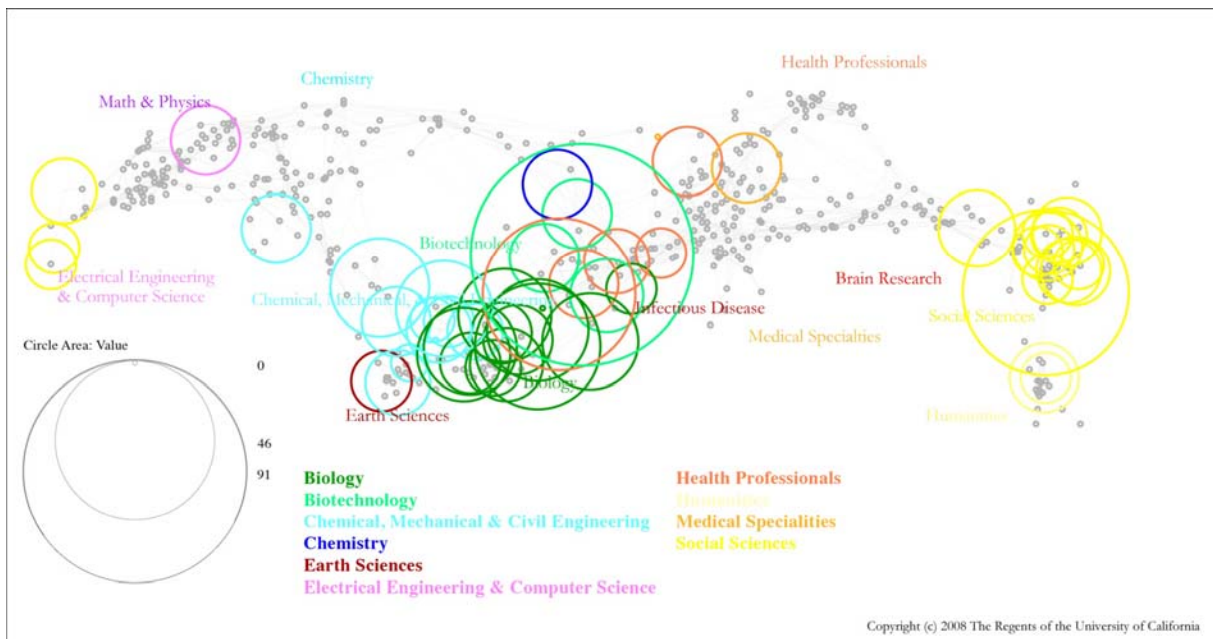
Geospatial and science map overlays as well as network layouts with well defined base maps, e.g., two lists of nodes in a bimodal network will be written into a PDF file for viewing and printing.

Temporal animation of growth corresponds to multiple pages (one per year) with identical reference system.



(Generated using dummy data. The values shown here are not real).

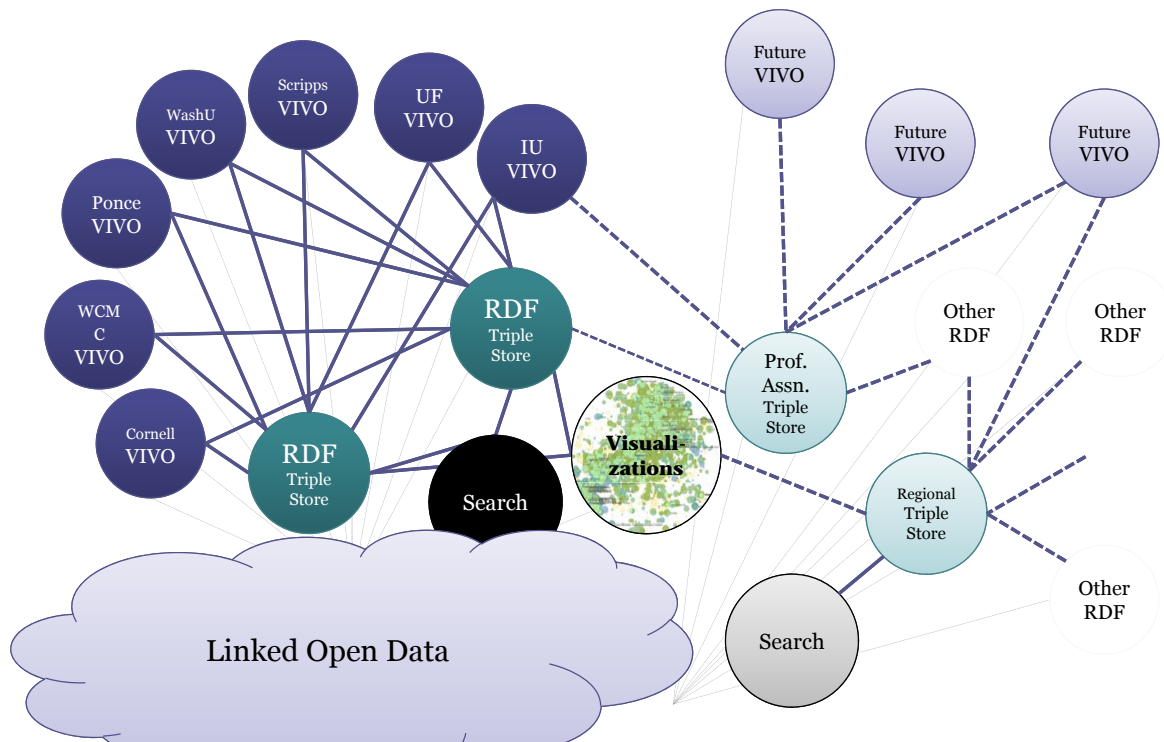
23



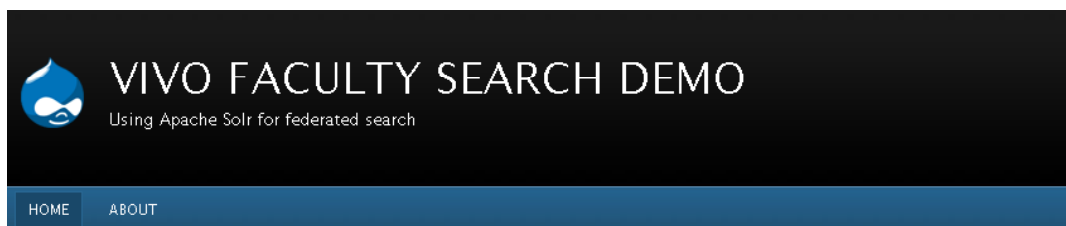
Science Map – shows where a person, department, or university publishes most in the world of science. (generated using dummy data)

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# VIVO National Level Visualizations



# VIVO National Level Search



HOME

SEARCH FACULTY ACROSS INSTITUTIONS

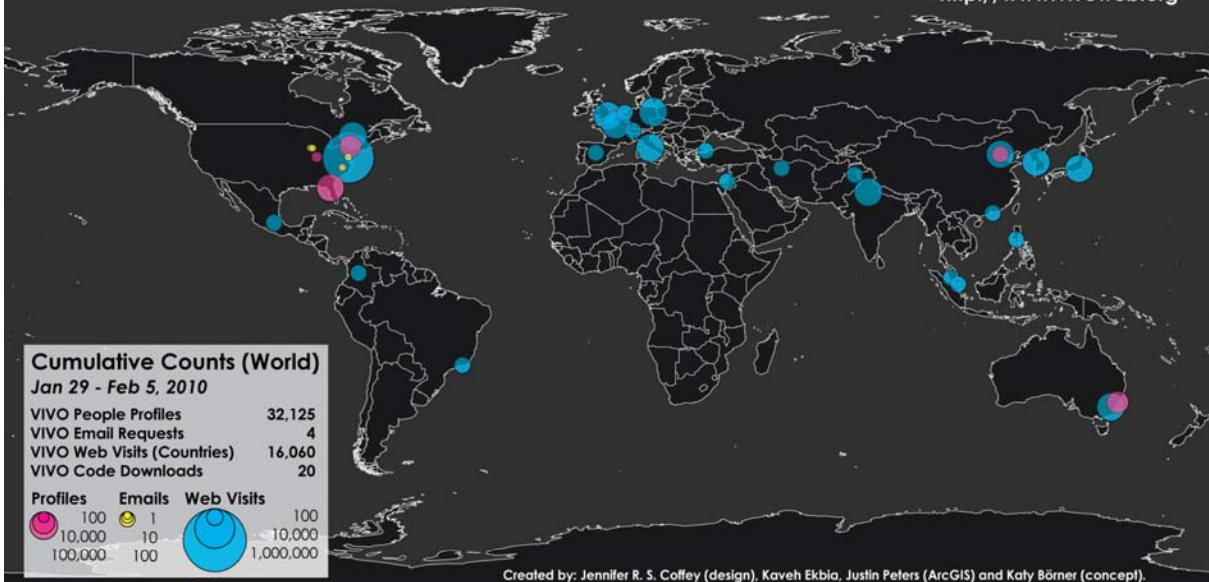
Examples: *drosophila*, *conference japan*, *Washington*

This site demonstrates the distributed search capabilities of Apache Solr, using Drupal 6 as a front end. Distributed search and search part of Solr itself, so this is also possible with other platforms.

<http://milesworthington.com/vivosearch>

# VIVO Enabling National Networking of Scientists

<http://www.vivoweb.org>

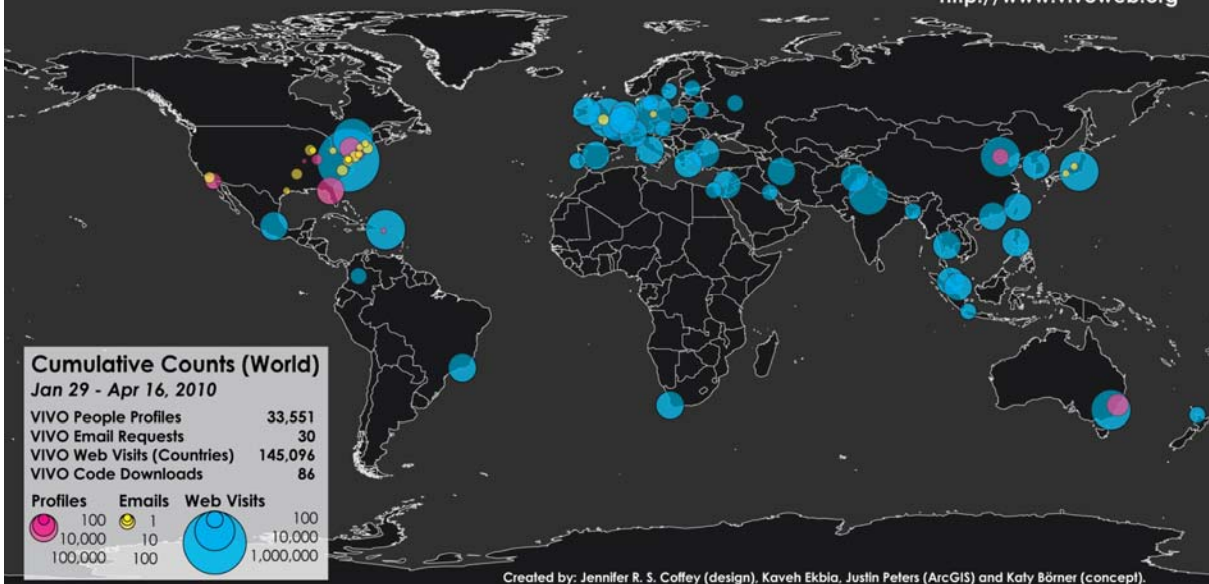


Science is global. World view of VIVO activity.  
Web site visits are aggregated at the country level.

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# VIVO Enabling National Networking of Scientists

<http://www.vivoweb.org>



Shown are the

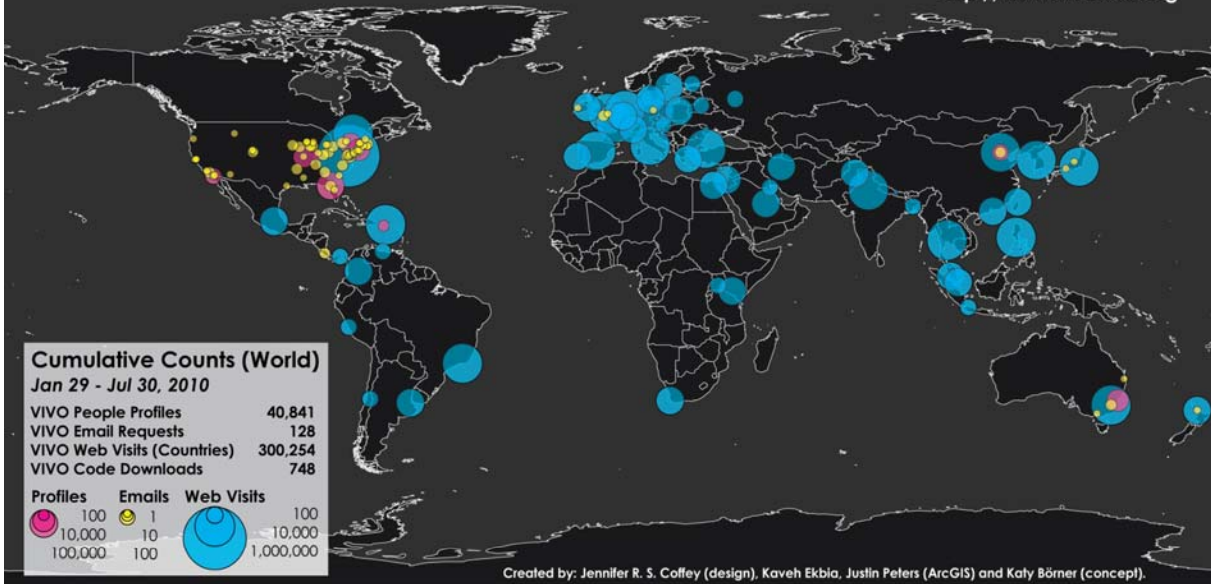
- Number of people profiles in the 7 different VIVO installation sites plus CAS and U Melbourne.
- Email contacts by data and service providers as well as institutions interested to adopt VIVO.
- The number of visitors on <http://vivoweb.org>

Circles are area size coded using a logarithmic scale.

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# VIVO Enabling National Networking of Scientists

<http://www.vivoweb.org>



VIVO 1.0 source code was publicly released on April 14, 2010

87 downloads by June 11, 2010.

The more institutions adopt VIVO, the more high quality data will be available to understand, navigate, manage, utilize, and communicate progress in science and technology.

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## Computational Scientometrics Cyberinfrastructures



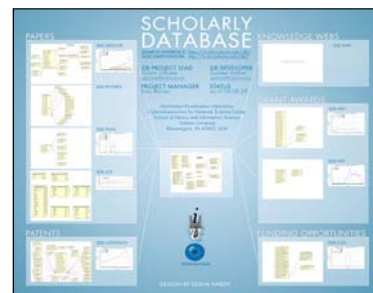
Scholarly Database: 23 million scholarly records

<http://sdb.slis.indiana.edu>



VIVO Research Networking

<http://vivoweb.org>



Information Visualization Cyberinfrastructure

<http://iv.slis.indiana.edu>



Network Workbench Tool & Community Wiki

<http://nwb.slis.indiana.edu>



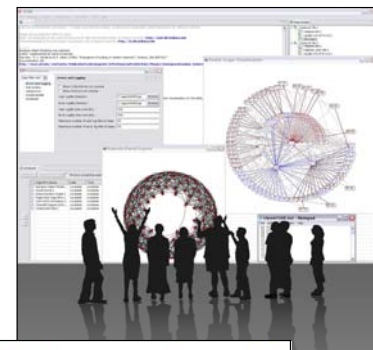
Science of Science (Sci<sup>2</sup>) Tool and CI Portal

<http://sci.slis.indiana.edu>



Epidemics Cyberinfrastructure

<http://epic.slis.indiana.edu/>



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## Computational Scientometrics References

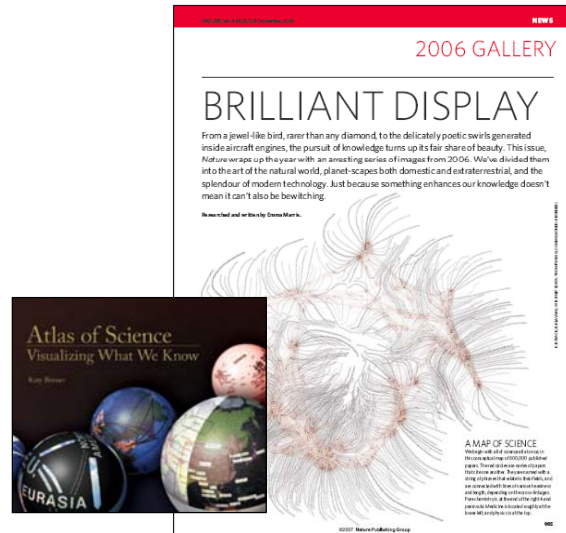
Börner, Katy, Chen, Chaomei, and Boyack, Kevin. (2003). **Visualizing Knowledge Domains**. In Blaise Cronin (Ed.), *ARIST*, Medford, NJ: Information Today, Inc./American Society for Information Science and Technology, Volume 37, Chapter 5, pp. 179-255.  
<http://ivl.slis.indiana.edu/km/pub/2003-borner-arist.pdf>



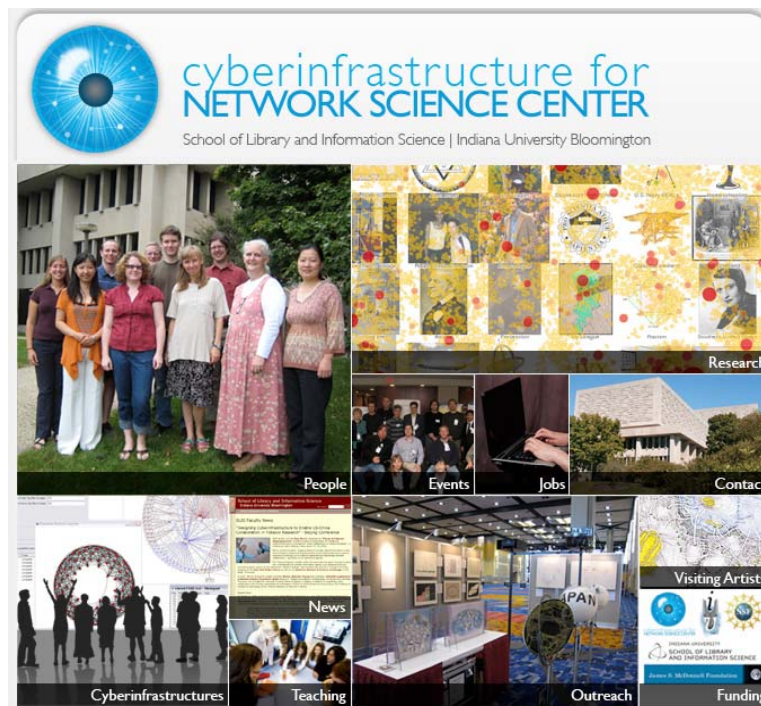
Shiffrin, Richard M. and Börner, Katy (Eds.) (2004). **Mapping Knowledge Domains**. *Proceedings of the National Academy of Sciences of the United States of America*, 101(Suppl\_1).  
[http://www.pnas.org/content/vol101/suppl\\_1/](http://www.pnas.org/content/vol101/suppl_1/)

Börner, Katy, Sanyal, Soma and Vespignani, Alessandro (2007). **Network Science**. In Blaise Cronin (Ed.), *ARIST*, Information Today, Inc./American Society for Information Science and Technology, Medford, NJ, 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>



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All papers, maps, cyberinfrastructures, talks, press are linked from <http://cns.slis.indiana.edu>