

Engineering Research Center Observatory

Gerhard Klimeck+, Michael Zentner+, Katy Börner*

+ Purdue University

*Victor H. Yngve Professor of Information Science
Director, Cyberinfrastructure for Network Science Center
School of Informatics and Computing and Indiana University Network Science Institute
Indiana University, USA

NSF ERC Kick-Off Meeting, Washington, DC
December 9, 2015

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

Computed Using Data from Elsevier's Scopus

Map of Scientific Collaborations from 2005-2009



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Computed Using Data from Elsevier's Scopus

Engineering Observatory

Project Type

NSF NCN CP Supplement 1553044

Project Duration

Started on Dec 1, 2015 and will run for 24 months.

Project Team

Gerhard Klimeck & Michael Zentner (NanoHub, HUBzero) at Purdue University and Katy Börner & Daniel Halsey (Cyberinfrastructure for Network Science Center) at Indiana University.

Engineering Observatory: Goals

Goal:

- Facilitate near real-time monitoring of Engineering Research Centers (ERCs) in support of better-informed resource allocation, priority setting, but also career decisions.

Main Use Cases:

- Day-to-day operations
- Strategic decision making
- Prepare for site visits

Engineering Observatory: Tasks

Tasks:

- User needs analysis.
- Federate data streams comprising course data, publications, patents, scientific datasets, code.
- Implement data mining and visualization web services for different stakeholders (NSF staff, researchers, students) to increase their understanding of temporal, geospatial, topical, and network patterns and trends in engineering.
- Perform user evaluations to validate and optimize new functionality.

Engineering Observatory: Initial Power Users, ERCs

- Mehmet Ozturk, Nanosystems ERC for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST),
- Roger Bonnacaze, Nanosystems ERC for Nanomanufacturing Systems for Mobile Computing and Mobile Energy Technologies (NASCENT),
- Paul Westerhoff, Nanotechnology Enabled Water Treatment Systems (NEWI)
- Greg Carman, Nanosystems ERC for Translational Applications of Nanoscale Multiferroic Systems (TANMS) <http://www.tanms-erc.org>

Detailed documentation will be provided with information on how any other ERC can be added to the Engineering Observatory.

Engineering Observatory: Data

- Number of publications that include a center member as an author.
- Number of patents produced by the center.
- Number of datasets produced by the center.
- Number and value of research grants awarded to participating researchers while working within the center.
- Others TBD.

Via CNS Scholarly Database

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

PubMed/Medline Publications

- Author
- Chemicals
- Citations
- Basic grant info, Topic, Type

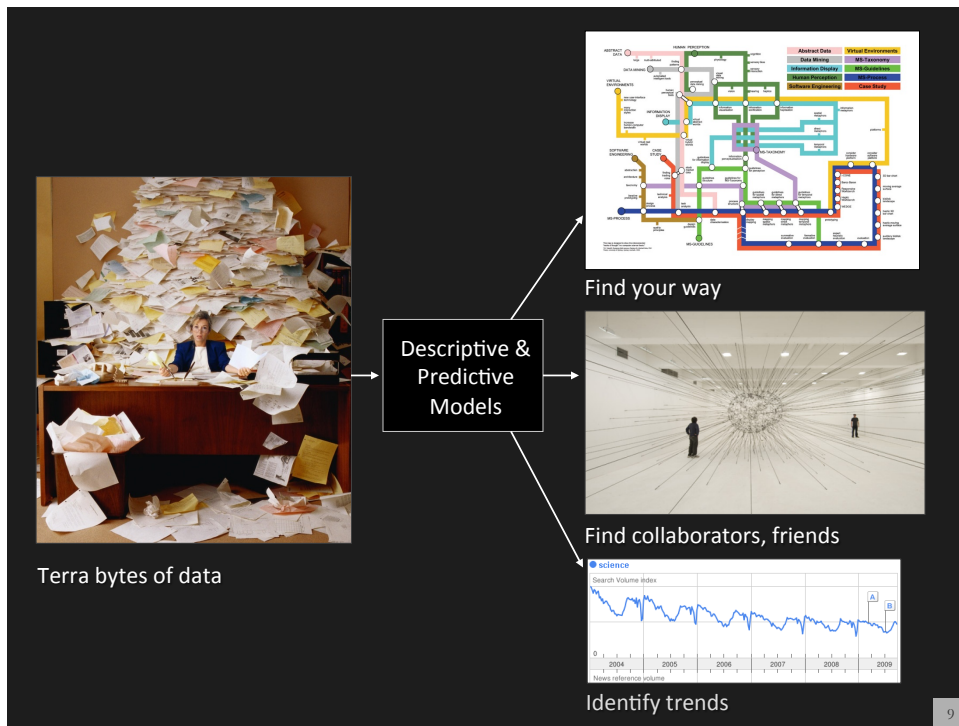
NSF/NIH Awards

- Grant info (application, ICs, Activity type, PIs)
- Project info
- Abstracts
- Patents
- Publication info

USPTO Patents

Engineering Observatory: Visualizations

- Overlay **evolving collaboration networks** obtained from co-authorship networks onto geographic maps, showing changes in interaction over time.
- Map **career paths over time** onto the UCSD map of science, with interactive time control (or animation) to show progression/ evolution of a researcher within their area of expertise.
- Visualize **collaborations among multiple researchers and engineers**, viewed as cohorts, over time. Collaborations may come from co-authorship networks, connections on grants, and/or detailed interactions that happen within project areas on nanoHUB.
- Others TBD.



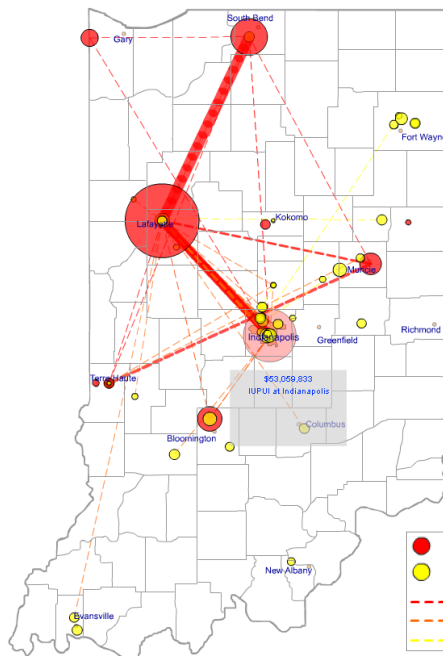
Type of Analysis vs. Level of Analysis

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

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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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Research Collaborations by the Chinese Academy of Sciences

Huang, Duhon, Hardy & Börner

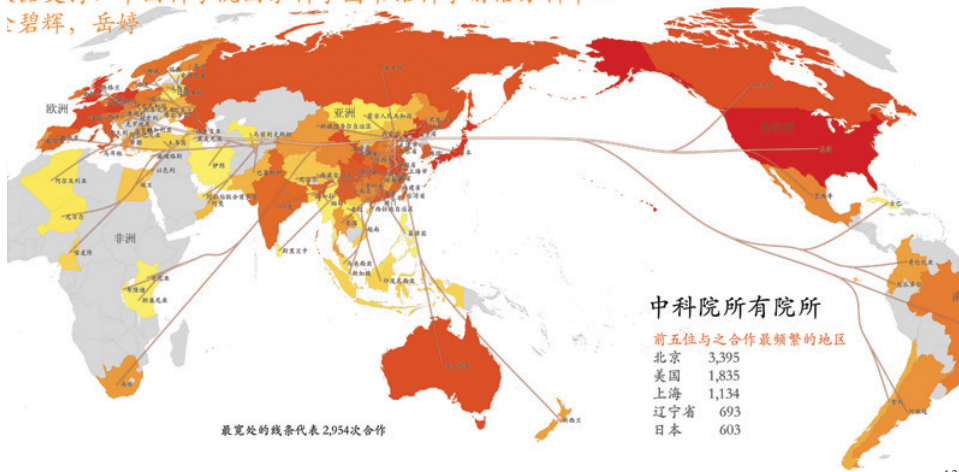
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中科院与世界各地的研究合作关系

董维霞, Russell J. Duhon, Elisha F. Hardy, Katy Börner, Indiana University, USA

数据支持: 中国科学院国家科学图书馆科学前沿分析中心

董碧辉, 岳婷



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VIVO Researcher Networking System

<http://vivo-netsci.cns.iu.edu/vivo12/vis/map-of-science/Person74>

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VIVO connect • share • discover

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Börner, Katy | Faculty Member

Positions

- Victor H. Yngve Professor of Information Science, [LIBRARY & INFORMATION SCIENCE](#) 2007 -
- Graduate Faculty Member w/Endorsement, [GRADUATE SCHOOL, EXECUTIVE MANAGEMENT/ACADEMIC SUPPORT](#) 2007 -
- Adjunct Professor, [INFORMATICS](#) 2009 -
- Professor Tenured/Tenure-Track, [LIBRARY & INFORMATION SCIENCE](#) 2009 -
- Adjunct Professor, [STATISTICS, Arts & Sciences](#) 2009 - 2012

Contact Info

katy@indiana.edu
812/855-3256

Publications in VIVO

- [Co-author Network](#)
- [Map of Science](#)
- [Co-investigator Network](#)

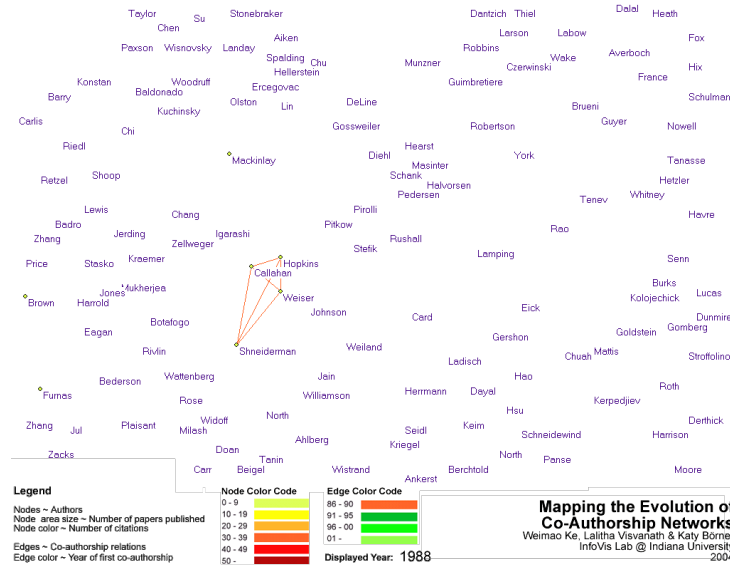
Publications | Research | Teaching | Contact | View All

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Mapping the Evolution of Co-Authorship Networks

Ke, Visvanath & Börner. 2004. Won 1st prize at the IEEE InfoVis Contest.

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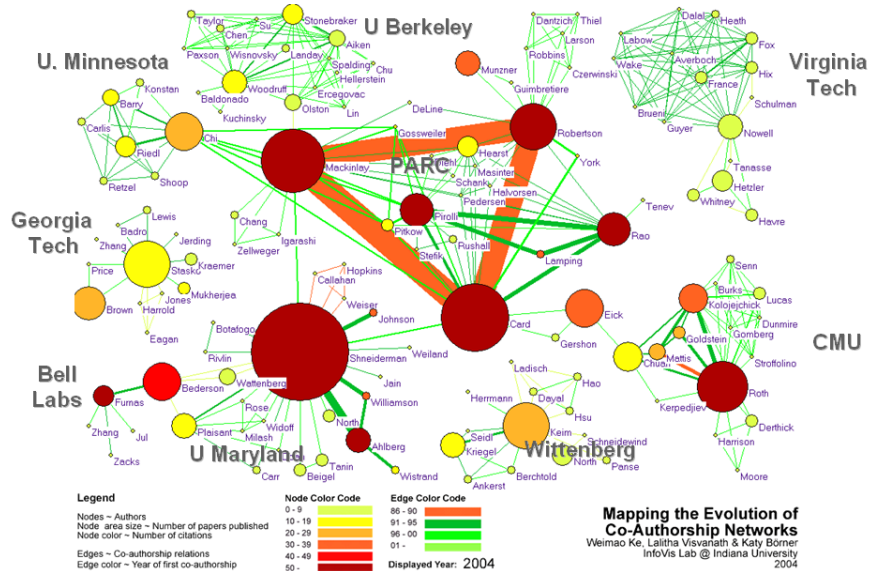


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Mapping the Evolution of Co-Authorship Networks

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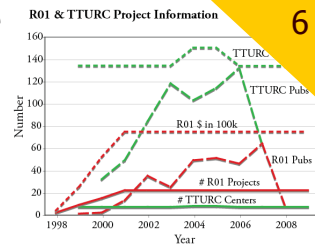
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Mapping Transdisciplinary Tobacco Use Research Centers Publications

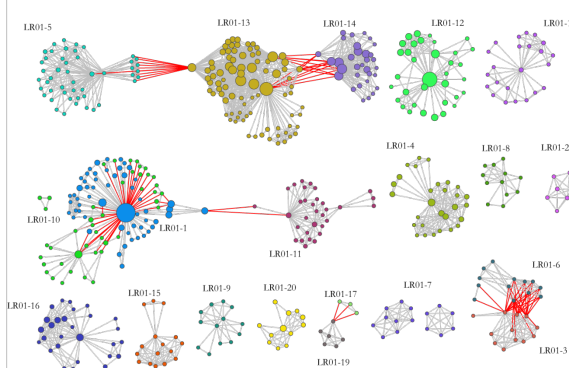
Compare R01 investigator-based funding with TTURC Center awards in terms of number of publications and evolving co-author networks.

Stipelman, Hall, Zoss, Okamoto, Stokols, Börner, 2014.
 Supported by NIH/NCI Contract HHSN261200800812

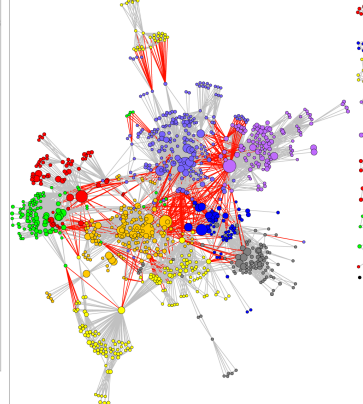
R01 & TTURC Project Information 6



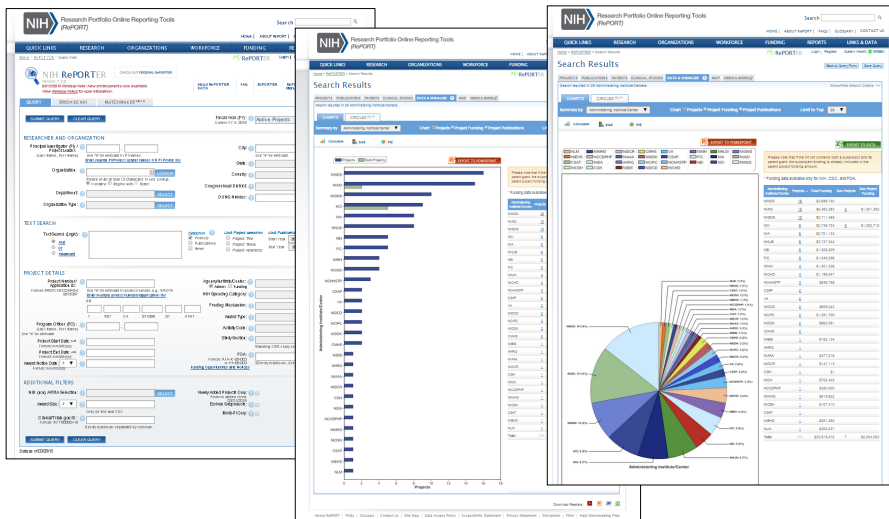
Longitudinal R01 Co-Authorship Network



TTURC Co-Authorship Network



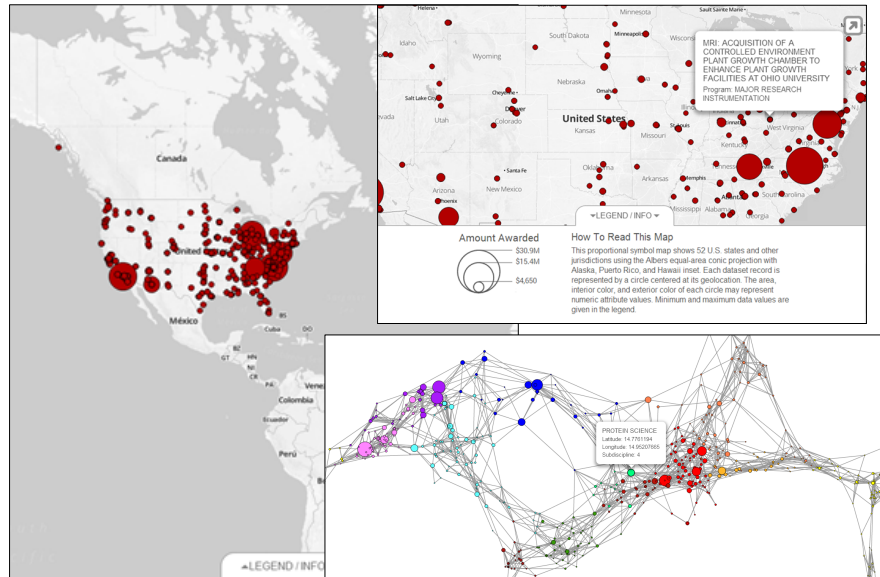
NIH RePORTER: Existing Interface 7



<http://projectreporter.nih.gov>

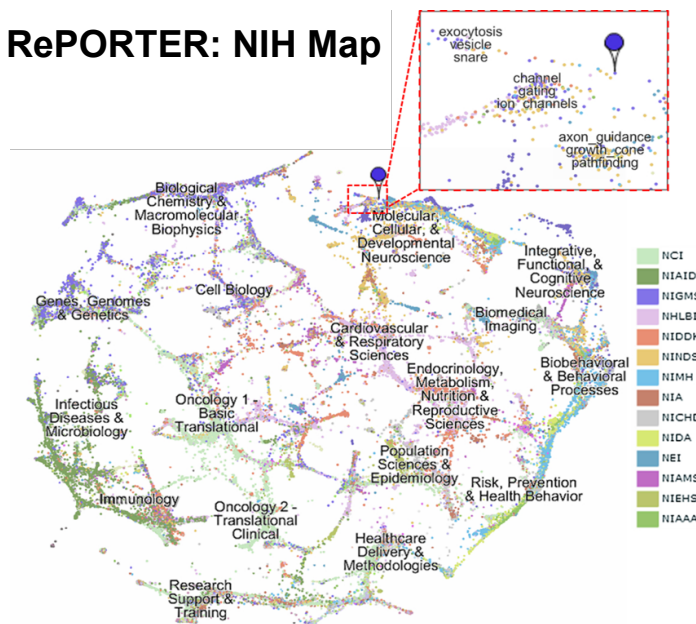
CIShell/Sci2 World and Science Visualizations of NIH RePORTER Data

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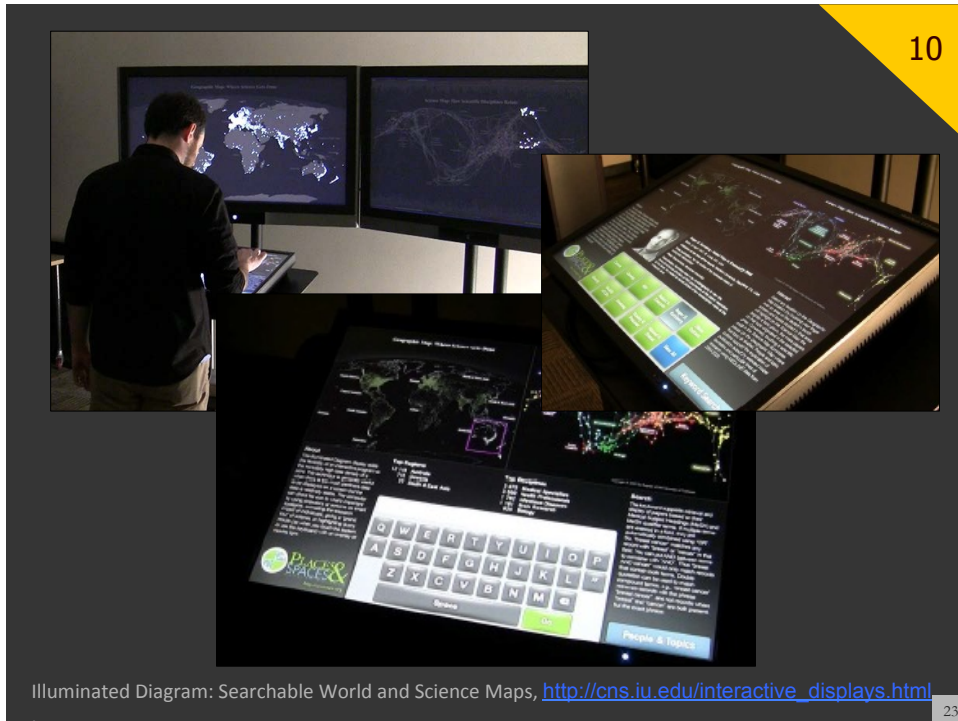


NIH RePORTER: NIH Map

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<http://nihmaps.org>



Please complete the remainder of the questionnaire now.

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/

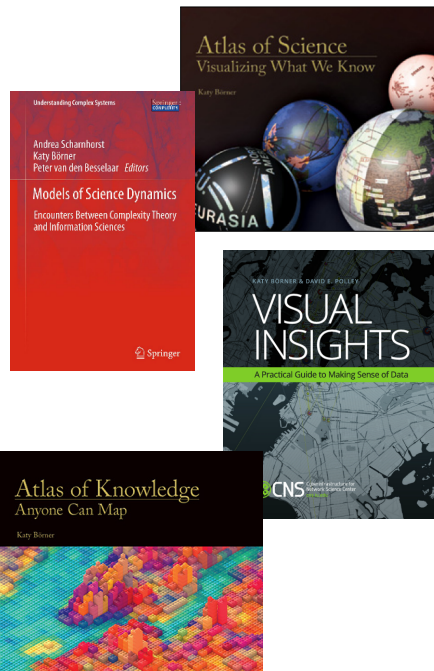
Börner, Katy (2010) **Atlas of Science: Visualizing What We Know**. The MIT Press. <http://scimaps.org/atlas>

Scharnhorst, Andrea, Börner, Katy, van den Besselaar, Peter (2012) **Models of Science Dynamics**. Springer Verlag.

Katy Börner, Michael Conlon, Jon Corson-Rikert, Cornell, Ying Ding (2012) **VIVO: A Semantic Approach to Scholarly Networking and Discovery**. Morgan & Claypool.

Katy Börner and David E Polley (2014) **Visual Insights: A Practical Guide to Making Sense of Data**. The MIT Press.

Börner, Katy (2015) **Atlas of Knowledge: Anyone Can Map**. The MIT Press. <http://scimaps.org/atlas2>



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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>

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

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