How can we communicate the beauty, structure, and dynamics of science to a general audience?

Debut of 5th Iteration of the Mapping Science Exhibit at MEDIA X was in 2009 at Wallenberg Hall, Stanford University.
Science Maps in "Expedition Zukunft" science train visited 62 cities in 7 months. Opening was on April 23rd, 2009 by German Chancellor Merkel

Ingo Gunther’s Worldprocessor globe design on display at the Museum of Emerging Science and Innovation in Tokyo, Japan
Places & Spaces Digital Display in North Carolina State's brand new Immersion Theater

Exhibit Advisors and Ambassadors
Places & Spaces at Duke University
January 12 - April 10, 2015

Places & Spaces at Northwestern University
May 14 - September 23, 2015
10 iterations over 10 years

equal

\[10 \times 10 = 100\] maps!
Cartographic maps of physical places have guided mankind’s explorations for centuries.

They enabled the discovery of new worlds while also marking territories inhabited by the unknown.

Without maps, we would be lost.
Science maps of abstract semantic spaces aim to serve today’s explorers navigating the world of science. They can be used to identify objectively major experts, institutions, collections. They allow us to track the emergence, evolution, and disappearance of topics and help to identify the most promising areas of research.
How would a reference system for all of science look?

What dimensions would it have?
HistCite™ Visualization of DNA Development - Eugene Garfield, Elisha Hardy, Katy Börner, Ludmila Pollock, Jan Witkowski - 2006

History Flow Visualization of the Wikipedia Entry on “Abortion” - Martin Wattenberg and Fernanda B. Viégas - 2006
The US Patent Hierarchy

Impact

Prior Art

A NEW MAP OF THE HISTORY OF SCIENCE

TexArc Visualization of "The History of Science" - W. Bradford Paley - 2006
The Oil Age: World Oil Production 1859-2050 - Rob Bracken, Dave Menninger, Michael Poremba, Richard Katz - 2005

Impact of Air Travel on Global Spread of Infectious Diseases - Vittoria Colizza, Alessandro Vespignani - 2007
Can one forecast science?

What ‘science forecast language’ will work to communicate results?
What insight needs to economic decision makers have?

What data views are most useful?

Europe Raw Cotton Imports in 1858, 1864 and 1865 - Charles Joseph Minard - 1866
Chemical Research & Development Powers the U.S. Innovation Engine
Macroeconomic Implications of Public and Private R&D Investments in Chemical Science

The Council for Chemical Research (CCR)

The design illustrates the impact of $8 billion (R&D) investment, leveraging $5 billion from industry, and $5 billion in government funding, resulting in $10 billion in product sales. This investment is estimated to contribute $40 billion to the U.S. economy, including 600,000 direct and indirect jobs. Additional details, including participation by the CCR are depicted in the map at the bottom of the infographic.
U.S. Job Market: Where are the Academic Jobs?

Science Maps as Visual Interfaces to Digital Libraries 2011
MONDOTHÈQUE
A MULTIMEDIA DESK IN A GLOBAL INTERNET

Paul Otlet (1868-1944), visionary Belgian lawyer fascinated by the problem of access to global knowledge, is often considered as a pioneer of modern information management technologies. He proposed a multimedia desk for home use, the Mondothèque, designed as a closed collection forum, including multimedia collections for traditional library and newspaper reading as well as new forms of visual encyclopedias, the Mundoteka. The Mundoteka is a network of global collections. Mundoteka, the Mundoteka web, and Mundoteka by Mail create a centralized and distributed knowledge.

MUNDOTEKA (Documentatio-Universalis-Mundaneum)

DESIGN VS. EMERGENCE: VISUALIZATION OF KNOWLEDGE ORDERS

WIKIPEDIA'S CATEGORY STRUCTURE

UNIVERSAL DECIMAL CLASSIFICATION

Design vs. Emergence: Visualization of Knowledge Orders
Akrim Amila Akdag Salah, Cheng Gao, Krzysztof Suchecki, and Andrea Scharnhorst - 2011
Map of Scientific Collaborations from 2005-2009

Stream of Scientific Collaborations between World Cities - Olivier H. Beauchesne - 2012

History of Science Fiction - Ward Shelley - 2011
Check out our **Zoom Maps** online!

Visit scimaps.org and check out all our maps in stunning detail!

Science Maps for Kids 2012
These charts show movie character interactions. The horizontal axis is time, the vertical grouping of the lines indicates which characters are together at a given time.

Lord of the Rings

Knowledge Web

Movie Narrative Charts (Comic #657) - Randall Munroe - 2009

Knowledge Web - James Burke, Patrick Mckercher, and Michael J. Stamper - 2012
The Future of Science Mapping 2014

Map of the Internet - Martin Vargic - 2014
Exploring the Relationships Between a Map of Altruism and a Map of Science

Explore the maps and background information at http://scimaps.org
Contact the map makers or the exhibit curators

Visit us on Facebook!

Become a fan and see many great photos of the exhibit—plus find out when it's coming to a venue near you!

facebook.com/mappingscience
The IVMOOC Companion Textbook

This textbook offers a gentle introduction to the design of insightful visualizations. It seamlessly blends theory and practice, giving readers both the theoretical foundation and the practical skills necessary to render data into insights.

The book accompanies the Information Visualization MOOC that attracted students, scholars, and practitioners from many fields of science and more than 100 different countries.

cns.iu.edu/ivmoocbook14.html

Information Visualization MOOC 2015

Overview

This course provides an overview about the state of the art in information visualization. It teaches the process of producing effective visualizations that take the needs of users into account.

The course can be taken for three Indiana University credits as part of the Online Data Science Program, as part of the Information and Library Science M.S. program, and as part of the online Data Science M.S. Program offered by the School of Informatics and Computing. Students seeking enrollment information should contact Rhonda Spencer at 812-855-2078, rskim@indiana.edu or datasci@indiana.edu.

Among other topics, the course covers:

- Data analysis algorithms that enable extraction of patterns and trends in data
- Major temporal, geospatial, topical, and network visualization techniques
- Discussions of systems that drive research and development.

Just like in past years, students will have the opportunity to collaborate on real-world projects for a variety of clients. Click here to see the current list of clients and projects. You can also see the detailed results of the 2013 client projects from the Visual Insights book here.

Everyone who registers gains free access to the Scholarly Database (46 million papers, patents, and grant records), the So2r Tool (100+ Algorithms and tools), and free PDF access to Part 2 of Katy Borner’s Atlas of Knowledge (due out March 2015).

Please watch the introduction video to learn more.

The Information Visualization MOOC
ivmooc.cns.iu.edu

Students from more than 100 countries
350+ faculty members
#ivmooc

Load **One** File and Run **Many** Analyses and Visualizations

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![Statistical Analysis—p. 44](image1)

![Temporal Burst Analysis—p. 45](image2)

![Geospatial Analysis—p. 52](image3)
Load **One** File and Run **Many** Analyses and Visualizations

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</tr>
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Co-author and many other bi-modal networks.

**References**


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


Themes for the upcoming iterations/years are:
- 11th iteration (2015): Macrosopes for Interacting With Science
- 12th iteration (2016): Macrosopes for Making Sense of Science
- 13th iteration (2017): Macrosopes for Forecasting Science
- 14th iteration (2018): Macrosopes for Economic Decision Makers
- 16th iteration (2020): Macrosopes for Scholars

http://scimaps.org/call

15th INTERNATIONAL CONFERENCE ON
SCIENTOMETRICS & INFORMETRICS
29 June - 3 July 2015
BOGAZICI UNIVERSITY • ISTANBUL, TURKEY

3. Forecasting science: Models of science and technology dynamics for innovation policy

Organized by

- Katy Börner (Indiana University, USA)
- Andrea Schumehorst (KNKH, The Netherlands)
- Stasa Milojivic (Indiana University, USA)
- Petra Ahrweiler (Director and CEO, EA European Academy of Technology and Innovation Assessment GmbH, Bad Neuenahr-Ahrweiler, Germany)
- David Chavallarias (Centre d’Analyses de Mathématiques Sociales (CAMS), Ecole des Hautes Etudes en Sciences Sociales (EHESS), Director of the Complex Systems Institute of Paris Ile-de-France, Paris, France)

Here is an extended abstract of the workshop
All papers, maps, tools, talks, press are linked from [http://cns.iu.edu](http://cns.iu.edu)
These slides will soon be at [http://cns.iu.edu/docs/presentations](http://cns.iu.edu/docs/presentations)

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