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Scientist at work: Katy Börner

Dr. Katy Börner's education and career have taken her across the map and through a web of disciplines. She was educated as an electrical engineer at the University of Technology Leipzig and received her Ph.D. in Computer Science from the University of Kaiserslautern in Germany. Today, Börner is an associate professor of information science in the Indiana University School of Library and Information Science. She is also an adjunct associate professor in the IU School of Informatics, core faculty in the Cognitive Science Program, research affiliate of the Biocomplexity Institute, fellow of the Center for Research on Learning and Technology, member of the Advanced Visualization Laboratory, and founding director of the new Cyberinfrastructure for Network Science Center at Indiana University.



Katy
Börner,
associate
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Her current work draws from scientometrics, network science, and information visualization. Together with her collaborators, she designs maps of science as a novel means to navigate, manage, and utilize scholars' collective knowledge. Börner is a curator of the *Places & Spaces: Mapping Science* exhibit, currently on display at the New York Hall of Science (see <http://scimaps.org>). "The exhibit introduces people to the power of maps to navigate physical spaces but also abstract spaces of our collective scholarly knowledge," said Börner.

Maps of science can show where the infrastructure of a specific research industry exists, along with where ideas, research, and innovations are created. In this way, it is possible to identify and track core competencies of potential collaborators or competitors or to discover emerging research frontiers. A map of Indiana can be created that shows "pockets of innovation," the pathways ideas take to become products, and the interplay of academia and industry.

The *Places and Spaces* exhibit also contains a map of all of science by Kevin Boyack and Dick Klavans. The map shows more than 1.3 million papers and their aggregation into major areas of scientific study. Areas are represented by nodes which are connected to other nodes through lines of varying thickness; the thicker the line, the stronger the citation connection between areas. The resulting map turns out to be somewhat circular. Using a clock metaphor, Börner says, you can see physics, at about 1:00 on the circle, is related to astronomy at 12:30, through Astrophysics. But physics also is close to chemistry, at 2:00.

The *Illuminated Diagram* display by W. Bradford Paley and collaborators adds interactive projections to the incredibly high data density of printed maps. It shows printouts of a map of the world next to a map of science. Using an interactive touch panel display, a user can select any place in the world map and the research areas covered by this place become highlighted in the map of science print. Selecting a scientific area on the science map highlights those places on the world map print that conduct this science. The map appeared on the cover of the 2006 Gallery: Brilliant Display gallery in the journal *Nature*, Vol 444, pp. 985-991, Dec. 21, 2006, and can be ordered as a poster via <http://scimaps.org/ordermaps>.

Methods for visualizing data don't stop at science, Börner said. Bruce Herr, software developer at IU's Cyberinfrastructure for Network Science Center visualized all 428,440 movies and their actors in the Internet Movie Database (www.imdb.com). For more information, please see http://scimaps.org/dev/map_detail.php?map_id=149.

Curious to know what cyberinfrastructure it takes to process terabytes of data and how to make results comprehensible visually? Check out Börner's research and teaching at <http://ella.slis.indiana.edu/~katy/>.

