

Inf@Vis!

The digital magazine of InfoVis.net

Interviewing Katy Börner	
<i>by Juan C. Dürsteler</i>	[message nº 170]

Katy Börner, one of the most active Information Visualisation gurus has been kind enough to accept being interviewed by InfoVis.net at the IV05 Conference held in Greenwich, UK.

Katy Börner is an Associate Professor of Information Science at the School of Library and Information Science, Adjunct Associate Professor of Informatics, Core Faculty of Cognitive Science, and Research Affiliate of the Biocomplexity Institute at Indiana University, Bloomington.

She has been working on numerous projects of Information Visualization, many of them related with the **analysis and visualization of user activity data, the mapping of knowledge domains, and the design of cyberinfrastructures**. One of her latest works is [Places and Spaces](#), a science exhibit created to demonstrate the power of maps for the navigation of physical places and semantic spaces.



Katy Börner.
Source: Photo by courtesy of Katy Börner.

Infovis.net:

You have presented recently the exhibition **Places and Spaces. Why did you decide to build an exhibition that has more to do with divulgation than with science itself?**

Katy Börner:

Humanity's knowledge and our means to share it are increasing at an accelerating rate. Yet, our perceptual and cognitive abilities stay nearly constant. We are expected to know more works than we could possibly read and understand in a hundred lifetimes. As a consequence, experts become highly specialized and isolated. Science continues to fragment, to duplicate, and to re-invent itself.

However, to survive as a species, we will need to preserve our planet or find means to sustain life as we know it by other means. Besides achieving survival, we should aim to enable all human beings to live a healthy, productive and fulfilling life.

Today, we use search engines to access all of humanity's knowledge and expertise. **Search engines retrieve facts from a growing sea of information.** However, how big is this sea? How can we efficiently navigate to the useful islands of knowledge? How is knowledge interlinked on a global scale? In which areas is it worth investing resources? We don't know.

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 unknown monsters. **Without maps, we would be lost.**

Domain maps of abstract semantic spaces **aim to serve today's explorers navigating and managing the world of science.** These maps are generated through a scientific analysis of large-scale scholarly datasets in an effort to connect and make sense of the bits and pieces of knowledge they contain. They can be used to objectively identify major research areas, experts, institutions, collections, grants, papers, journals, ideas, etc. in a domain of interest.

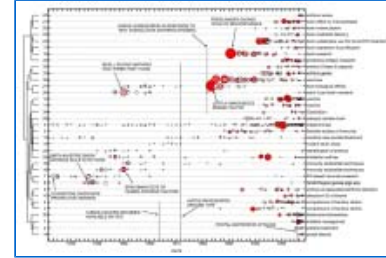
Local maps provide overviews of a specific area: its homogeneity, import-export factors, and relative speed. They allow one to track the emergence, evolution, and disappearance of topics and help to identify the most promising areas of research.



Treemap View of 2004 Usenet Returnees by Marc Smith, Danyel Fisher, Tony Capone
Source: Photo by courtesy of Places & Spaces exhibit.
 Click on the image to enlarge it
 See [this image](#) at Places&Spaces



Ph.D. Thesis Map (Tube like) by Keith V. Nesbitt
Source: Photo by courtesy of Places & Spaces exhibit.
 Click on the image to enlarge it
 See [this image](#) at Places&Spaces



Timeline of 60 years of anthrax research literature by Steven Morris
Source: Photo by courtesy of Places & Spaces exhibit.
 Click on the image to enlarge it
 See [this image](#) at Places&Spaces

Infovis.net:

InfoVis has not yet been very successful outside the academic world. Why do you think this is happening? What should we do about that?

Katy Börner:

There is a huge need for highly readable, effective visualizations that solve true user needs. I completely agree with Tufte (1983) that "The success of a visualization is based on deep knowledge and care about the substance, and the quality, relevance and integrity of the content." In almost any of our projects we spent about 80% of the total effort working very closely with our clients to identify their tasks and needs, preparing and cleaning data, etc.; 15% are spent on data analysis; and only about 5% on visualization and interactivity design.

We intensively employ knowledge of visual perception principles and human cognitive processing to **design visual interfaces that optimally distribute work among man and machine and that are highly readable/understandable.** We aim for high data density visualizations that carefully use the limited number of pixels available in today's display devices. In many projects, we deal with very large datasets and need to tightly couple data analysis and visualization to facilitate sense making.

Browsing through the information visualizations printed in the proceedings of the Visualization and Data Analysis Conference, the International Conference on Information Visualisation, or the IEEE Symposium on Information Visualization, **it is shocking to see how few of these visualizations are designed with a precise definition of a user group and their tasks.**

Many of the depicted visualizations could be very easily improved by applying the basics of visual perception principles and human cognitive processing. Last but not least, many visualization projects would greatly benefit from a collaboration with graphic designers or artists. Ideally, the InfoVis community can bring insight and beauty to peoples' lives.

Infovis.net:

During the IV05 conference we have seen **many examples of interesting projects that have not been tested against reality** or that have undergone very simple usability testing. What is your impression about that and what implications do you think it has?

Katy Börner:

I highly suggest to test any visualization with real users. You might be surprised to learn how little your users understand your visualization, how hard it is for them to use it, and how they try to abuse it. In fact, **it appears to be very beneficial to involve users in the design process from day one.**

It takes major effort to design visualizations that work. However, it is also very rewarding: personally as your visualizations are widely used; financially as people ask you to do more projects and give you more money than you can possibly take on/spend; and societal as you contribute to a better understanding of an increasingly complex world.

Infovis.net:

How do you envisage **the future of InfoVis in the next few years?** What will we see in the field?

Katy Börner:

There is an increasing interest in the analysis and **visualization of streaming data collected via sensors**, instruments, etc. Many of the commonly used analysis and visualization algorithms are not applicable to incrementally growing, **dynamic data sets**. Sense making of very large scale datasets requires a tight coupling and fine tuning of database architectures and data analysis and visualization techniques. Information **visualization researchers will have to work very closely with database design, data integration, and data mining experts**.

The InfoVis community will need to find better ways to deploy, compare, and make available existing layout, distortion, interactivity algorithms and techniques for research, practice, and education. My lab has been working on the [IVC Software Framework](#) that aims to bridge the gap between algorithm developers and those who would benefit from using the existing algorithms.

The framework **provides a set of interfaces so that third party algorithms can be incorporated** into the framework as plug-ins and run in parallel or in series. It makes it easy for developers to deploy and disseminate their new algorithms, supports algorithm tests and comparisons, and enables people with minimal knowledge of programming to use various algorithms in a menu driven way. An extensive set of algorithm descriptions and a growing set of learning modules are provided as well. The framework will be extended with the support of a recent \$1.1 Mio NSF award to serve the data analysis, modeling, and visualization needs of network science researchers in the biomedical, social science, information science, and physics domains. It is our hope that the InfoVis community will adopt this framework as well.

InfoVis.net wants to warmly thank the kindness of Katy Börner, not only for answering our questions in person and by e-mail, but for finding the best images and sending all of them formatted in such a way that our work has been extremely simple. Katy turned to be a sensitive and very human researcher combining scientific rigor with kindness and availability. It was a pleasure speaking with her.

Some Interesting links:

Shiffrin, Richard M. and Börner, Katy (Eds). (2004) [Mapping Knowledge Domains](#) PNAS 101 (Suppl. 1)

Börner, Katy, Chen, Chaomei, and Boyack, Kevin. (2003). [Visualizing Knowledge Domains](#). In Blaise Cronin (Ed.), Annual Review of Information Science & Technology, Volume 37, Medford, NJ: Information Today, Inc./American Society for Information Science and Technology, chapter 5, pp. 179-255.

InfoVis Lab @ IU: [Gallery](#)

[InfoVis Cyberinfrastructure](#)

Links of this issue:

<http://vw.indiana.edu/places&spaces/>
http://vw.indiana.edu/places&spaces/dev/map_detail.php?map_id=12
http://vw.indiana.edu/places&spaces/dev/map_detail.php?map_id=30
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<http://iv.slis.indiana.edu/sw>
http://www.pnas.org/content/vol101/suppl_1/
<http://ella.slis.indiana.edu/~katy/paper/arist02.pdf>
<http://ella.slis.indiana.edu/~katy/gallery/>

Online exhibit **Places & Spaces**

The 1996 map of science by Henry Small

In Terms of Geography by André Skupin

The Structure of Science by Kevin Boyack and Richard Klavans

Treemap View of 2004 Usenet Returnees by Marc Smith, Danyel Fisher and Tony Capone

Ph.D. Thesis Map (Tube like) by Keith V. Nesbitt

Timeline of 60 years of anthrax research literature by Steven Morris

IVC Software Framework

Mapping Knowledge Domains by Richard Shiffrin and Katy Börner (Eds)

Visualizing Knowledge Domains by Katy Börner, Chaomei Chen and Kevin Boyack (Eds)

InfoVis Lab @ IU: **image gallery**

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

InfoVis Cyberinfrastructure

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