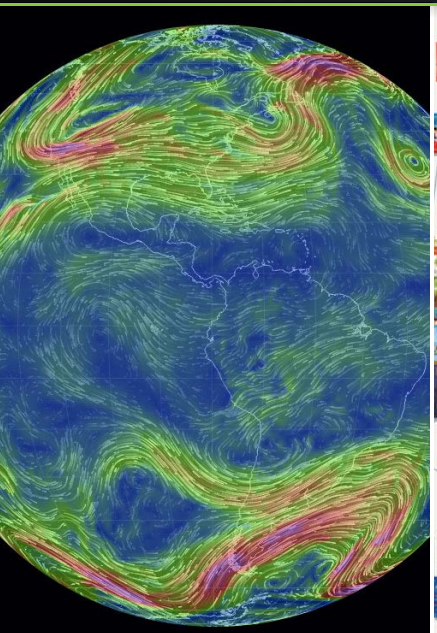
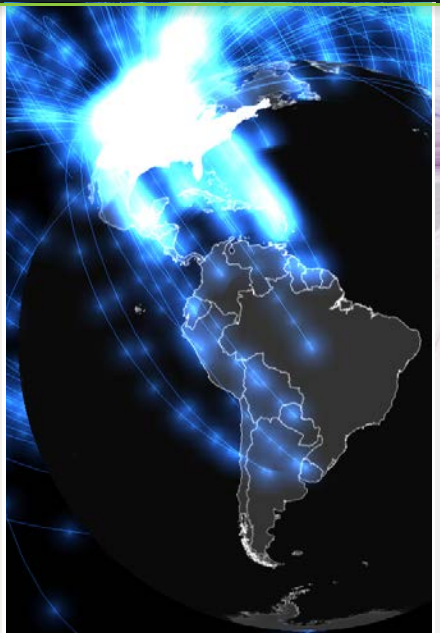
PLACES & SPACES
MAPPING SCIENCE

MACROSCOPES: A NEW VIEW OF THE WORLD

ANNUAL REPORT 2015






Letter from the Exhibit Team

The exhibit team: Lisel Record, Katy Börner, and Todd Theriault.

This was another eventful year full of new milestones, new directions, and new challenges for the *Places & Spaces* exhibit. After ten years, we had come to feel quite proficient at the task of presenting new science maps on an annual basis. However, we also knew that the decade mark presented the perfect opportunity for the exhibit to explore new territory. Hence, we decided to move beyond the frames of the static map of science and into the world of macroscope tools for interacting with science. For a decade, the *Places & Spaces* maps have engaged the imagination; now we wanted something that could more immediately turn imagination into action.

Still, moving from maps to macroscopes felt very much at times like leaving the comfort of home to venture into parts unknown. Many questions arose during the year-long journey from idea to reality: How do we make the macroscope as familiar and relevant to audiences as those other more everyday scopes, the microscope and the telescope? How do we bring a sense of conceptual unity to macroscope tools that employ varying methods to analyze diverse topics? How do we bring technical unity to macroscopes that use different software, employ different interfaces, and run on different platforms? And last but not least, how do we package what are often web-based tools for use in solitary study so that they perform well in the more communal space of the museum floor or the academic library?

Comparing notes on the poster exhibit in Torun, Poland.

Understanding the world through data at the Mundaneum's *Mapping Knowledge* exhibit in June, 2015.

In order to address technical and logistic aspects, we worked closely with Indiana University's Advanced Visualization Laboratory. Through a combined effort, four disparate macroscope tools were brought into visual and operational coherence. The end result is a touch screen kiosk that provides an inviting entry point for interacting with science and for viewing the world of science through macroscopes.

The past year was certainly a year of challenge and change. What did not change, however, was the enthusiastic support we received from the many friends of the exhibit around the world. It is our pleasure to thank the people who make the exhibit a success: our advisory board for their wise guidance through uncharted territory, our exhibit ambassadors for their ongoing efforts to promote science mapping and macroscope tools, the staff of the Cyberinfrastructure for Network Science Center for the varied talents they bring to the exhibit, the members of the Advanced Visualization Laboratory for meeting and surpassing our expectations, and the 2015 exhibit venue hosts for providing hospitable and intellectually stimulating environments.

So to all those mentioned above: Thank you for your support, your encouragement, and your good cheer. It is our firm belief that your contributions are abundantly evident to everyone who experiences *Places & Spaces*.

Focusing on 2015

Between the years 2005 and 2015, the *Places & Spaces: Mapping Science* exhibit brought new maps of science to the general public annually. Along the way, the exhibit gathered many of the best examples of data visualization created by leading experts in the natural, physical, and social sciences, scientometrics, visual arts, science policy, and the humanities. The exhibit now encompasses 100 science maps, an interactive display of worldwide scientific endeavors, hands-on activities for kids, illuminated globes, an award-winning animated film, and an informative and dynamic website.

Bernhard Porter's *Being a Map of Physics* generates discussion at the International Science Festival in Gothenburg, Sweden.

11th Iteration: Macroscopes for Interacting with Science

During the year's transition from static maps to interactive visualizations, it has become clear that there is a need for macroscope tools to serve as mediators between large data sets and the humans who seek meaning from them. Subject matter can be wide-ranging, but is unified by the goal of viewing the world of science through a digital lens in order to gain new perspectives and ask new questions.

Over the next decade, *Places & Spaces* will seek out and share truly exceptional macroscopes via touchscreen kiosks that travel with the exhibit. To inaugurate this new direction, the 11th iteration features four macroscopes, prime examples each of the power of tools to synthesize, analyze, and visualize staggeringly large and complicated sets of data. The process of selecting these macroscopes follows closely our previous approach to

What is a Macroscope?

Have you ever looked at tiny plant cells through a microscope? Or peered into the night sky to see lunar craters with a telescope? Both of these scopes allow us to view objects that are either too small or too distant for the naked eye.

Similarly, macroscopes are software tools that help us focus on patterns in data that are too large or complex to see unaided. Interactive by nature, anyone can use them to visually explore data and ask and answer new questions.

map selection, with a call for submissions and review by the curators and international advisory board.

This year's iteration features four macroscopes that were selected for their analytical insight, explanatory power, and technical innovation. Through animation and color coding, Cameron Beccario's **Earth** visualizes the forces of wind and wave, tracks temperature both real and perceived, and monitors levels of chemicals and particulates in the atmosphere. Moving from wind currents to scientific advice, **AcademyScope** encourages both expert practitioners and the intellectually curious to explore all reports published by the National Academies of the Sciences, Engineering, and Medicine over the last twenty years intuitively and visually. Representative of this iteration's emphasis on wide-angle perspectives, Kalev H. Leetaru's **Mapping Global**

Macroscopes featured in the 11th Iteration kiosk.


Visitors engaging with the macroscope kiosk at the David J. Sencer CDC Museum (photo courtesy of Mike Jensen).

Society collects local news stories from a variety of media around the world in 65 different languages to track moments of co-occurrence—instances where two countries are mentioned together in the same story. Networks of social, political, economic, and geographic ties between countries interlace the globe, tracing patterns one might never have expected. This first iteration of macroscopes is completed by **Charting Culture**, which uses birth and death records to chart human migration patterns and to visualize the rise and fall of cultural centers over the last 2600 years of European and American history.

Focusing on 2015

Venues

This year marked a milestone in the history of *Places & Spaces*; namely, it was the year the exhibit met and surpassed the 300-venue mark. On average, then, the exhibit has appeared at 30 locations per year for over a decade. Such an active schedule means that the exhibit gets very little rest, and this past year was no exception. After wrapping up a successful run at the **University of Miami** at the end of 2014, the full exhibit traveled north in January 2015 for a three-month stay at **Duke University** in Durham, North Carolina. It served as a focal point for many special events, including a keynote from curator Katy Börner, a screening of the award-winning film, *Humanexus*, a digital scholarship workshop, and a conference on the topic of mapping academic disciplines.

> *This exhibit reveals the power that a good visualization has to convey complex information. Visualizations tell the story of data in a way that isn't readily evident when you're only looking at raw numbers.*
>
> Kristi Holmes, Director of the Galter Health Sciences Library and Assoc. Professor in Preventive Medicine-Health and Biomedical Informatics

The 11 large crates full of maps, labels, and interactive elements then made their way up to **Northwestern University's** Galter Health Sciences Library in downtown Chicago, Illinois. Originally slated for a four-month installation, the exhibit was held over an additional month due to popular demand.

Other Venues

In addition to these full-exhibit displays, selected maps were featured at the **International Science Festival** in Gothenburg, Sweden and at the offices of the **EA European Academy of Technology and Innovation Assessment** in Bad Neuenahr-Ahrweiler, Germany. *Places & Spaces* also made appearances at such key events as the **American Association for the Advancement of Science Annual Meeting** in San Jose, California, the **National Institutes of Health Science of Team Science Conference** in Bethesda, Maryland, the **International Conference on Scientometrics and Informatics** in Istanbul, Turkey, and the **Association of Science-Technology Centers Conference** in Montréal, Canada. Of course, this is only a small sampling of venues for 2015—a full listing can be found at **scimaps.org/exhibitions.**

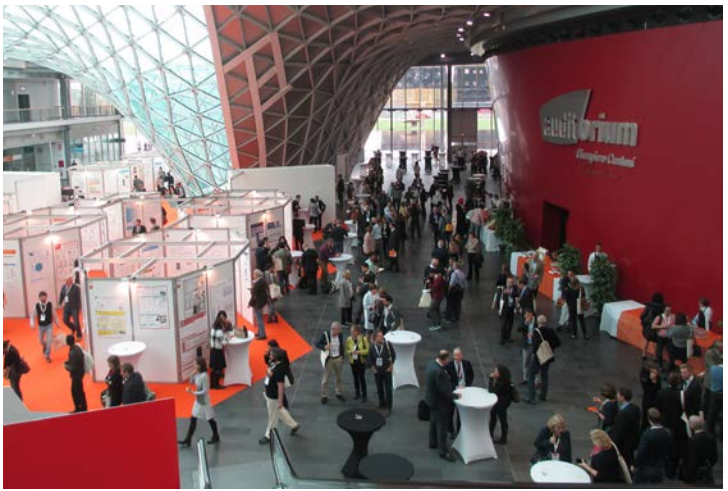
> *Hosting **Places & Spaces: Mapping Science** was a wonderful opportunity for Duke. The diversity of maps meant that there was something for everyone. It was also incredibly meaningful to be able to get up close and see all of the magnificent detail of the complex visualizations. There was always something new to discover in the exhibit. It brought the campus community together around data visualization and enriched the environment in which we teach, research, work, and play.*
>
> Angela Zoss, Data Visualization Coordinator, Duke University Libraries

International Science Festival, Gothenburg, Sweden.

Focusing on 2015

A Focus on Health

Many major events in 2015 highlighted the ability of data visualization to aid in making smarter, more efficient decisions in service to improving public health. The exhibit opened at the **Galter Health Science Library** at Northwestern University's Feinberg School of Medicine in January and rounded out the year with a **Visual Healthcare Analytics** workshop co-organized with the Regenstrief Institute, an internationally respected informatics and healthcare research organization. Throughout the year, preparations for the exhibition's 2016 opening at the **Centers for Disease Control and Prevention** commenced, and the exhibit was represented



The European Food Safety Authority's 2nd Scientific Conference in Milan, Italy.

Using Science on a Sphere to display maps of science at the 2015 SuperComputing Conference in Austin, Texas.

at the **European Food Safety Authority** conference, where curator Katy Börner presented an argument for the power of visualizations to help us both to understand the extent and structure of our collective knowledge and to identify bursts of activity, pathways of ideas, and borders that beg to be crossed. Going forward, we hope to continue our participation in these important issues of healthcare, disease prevention, and wellbeing.

Workshops

Our first event of the year was held in San Jose, California, at the AAAS Annual Meeting. Entitled **Visual Insights from Big Data: Envisioning**

Curator Katy Börner, venue host Petra Ahrweiler, Aoibheann Gibbons, and exhibit ambassador Andrea Scharnhorst celebrate a successful exhibit opening at the 2015 Annual EA Conference in Bonn, Germany.

Science, Engineering, and Innovation, the session organized by Börner and chemical consultant Joseph E. Sabol brought together experts from chemistry, engineering, science policy, and the arts to showcase visual solutions that are instrumental in achieving high return on investment. In the summer, a workshop on **Forecasting Science: Models of Science and Technology Dynamics for Innovation Policy** took place at the ISSI Conference in Istanbul, Turkey. This workshop brought together researchers working on models of science, technology, and innovation (STI) to both share their latest research and collectively create a roadmap to future modeling efforts.

This was followed in October by **Plug-and-Play Macroscopes: Modular Hardware and Software Platforms that Render Data into Insights**, held at the Association of Science–Technology Centers Conference in Montréal, Canada. Gathering academic researchers and science museum practitioners who investigate and develop modular hardware and software platforms, the workshop featured talks and discussion on the use of plug-and-play platforms for the analysis and visualization of sensor, social media, and other datasets. **Visual Analytics in Healthcare**, co-organized with the Regenstrief Institute, brought healthcare and public health professionals, biomedical informaticians, visualization and data analytics experts, and developers to Indiana University in November. Together, they brainstormed ways to advance the use of big data analytics for health monitoring and management. For more information on past and upcoming workshops, please visit **cns.iu.edu/workshops**.

Advancing the use of big data analytics for healthcare during the Visual Analytics in Healthcare Workshop co-organized with the Regenstrief Institute.

Translations

This year, we continued our efforts to make *Places & Spaces* map descriptions available in as many languages as possible to enlarge and inform our global audience. At the present moment, a quarter of the world's population can now read map descriptions in their native language. We are particularly appreciative of the University of Miami's contribution of the Spanish translation of the exhibit, prepared by Mabel Basterrechea, Ph.D., Department of Modern Languages and Literatures, College of Arts and Science, University of Miami. With 2015 exhibits at the **Universidad de los Andes** in Bogotá, Colombia and at the **Instituto Politécnico Nacional** in Mexico City, they were very much appreciated. Most map descriptions are now also available in Chinese, German, and Polish.

Polish language exhibit material accompanied the science maps at the University of Warsaw, Poland.

The *Atlas of Knowledge* and related materials at the European Food Safety Authority's 2nd Scientific Congress in Milan, Italy.

Atlas of Knowledge: Anyone Can Map

In 2015, The MIT Press published Katy Börner's follow-up volume to her popular and award-winning *Atlas of Science: Visualizing What We Know*. While the first *Atlas* introduced readers to science mapping and traced the evolution of the craft over time, the *Atlas of Knowledge* is more concerned with the "how" of mapmaking: ways to best address the demands of particular tasks and the needs of users; strategies for collecting, analyzing, and visualizing data; and methods of interpreting data visualization. Drawing on 15 years of research and tool development, the *Atlas* introduces a theoretical visualization framework meant to empower anyone to systematically render data into insights. The framework covers major types and levels

of analysis; it identifies and explains different types of insight needs, data scales, visualizations, graphic symbols, and graphic variables; and it deeply integrates statistical, geospatial, topical, and network analysis and visualization. Praised by Ben Shneiderman in the journal *Nature* as "a tribute to human ingenuity in creating our new world of visual thinking," the *Atlas of Knowledge* is a valuable resource both for those seeking to understand the mechanics of mapmaking and for those interested in making their own maps of science.

Places & Spaces Welcomes Two New Ambassadors

Places & Spaces welcomes Scott Weingart, Digital Humanities Specialist at Carnegie Mellon University and Albert Ali Salah, Assistant Professor of Computer Engineering and Chair of the Cognitive Science Program at Boğaziçi Üniversitesi, as the newest exhibit ambassadors.

IVMOOC students work in teams on projects for real-world clients.

The new IVMOOC data visualization app available for iPhone, iPad, and Android phones and tablets.

IVMOOC

CNS continues to offer its popular Information Visualization MOOC (**ivmooc.cns.iu.edu**) to those interested in learning more about current practices and methodologies in data visualization. The IVMOOC, which in its initial run in 2013 attracted participants from more than 100 countries, provides an overview of information visualization and teaches the process of producing effective visualizations that take into account the needs of users. Students in upcoming IVMOOC classes can now download a new flashcard app as a study aid. The app features more than 50 visualizations and their names, types, and properties, and is now available at the Google Play and Apple iOS stores. The course was one of the first MOOCs offered by Indiana University and the first to have students work in teams with actual clients on real-world projects.

Looking Forward

12th Iteration

The call is out already for submissions to the 12th iteration of *Places & Spaces*, the theme of which is **Macroscopes for Making Sense of Science**. If last year is any indication, we expect a bounty of interesting and innovative macroscopes from which to choose. No doubt, this will make the selection process a challenge, but, as always, we will receive expert guidance from our talented group of advisory board members. The new macroscopes will be ready for display by October of 2016.

Centers for Disease Control and Prevention

In keeping with its commitment to public health education and disease prevention, the Centers for Disease Control and Prevention has invited *Places & Spaces* to spend a five-month residency in its David J. Sencer CDC Museum. This pairing of exhibit and venue represents a particularly good fit as both entities recognize the power of data visualization to confront many of society's most significant challenges. Complimenting *Places & Spaces* are some recent examples of CDC's mapping and data visualizations for use by public health professionals and policy makers as well as infographics designed to communicate with the general public. The exhibit will run from January 25 to June 17, 2016 and will feature a number of special events related to data visualization and science mapping. More information can be found at **scimaps.org/CDC**.

> *CDC uses maps to better understand patterns and relationships between environmental, social and personal risk factors, and diseases and injuries over time and space. Visualizations can make it easier for CDC to take faster, better actions to protect the public's health.*
>
> Dr. Robin Wagner, Chief Science Officer for the Office of Public Health Scientific Services, Centers for Disease Control

Places & Spaces at the David J. Sencer CDC Museum (photo courtesy of Mike Jensen).

Modeling Science, Technology & Innovation Conference

This interdisciplinary conference, which will take place at the National Academy of Sciences Building in Washington, DC, brings together academic, government, and industry experts in science, technology, and innovation (STI) models and decision making. Just as practices such as

meteorology, finance, epidemiology, and defense have successfully utilized big data and computational modeling to generate increased understanding and efficiency, STI decision making can deeply benefit from predictive simulations that help understand the impact of funding, policy, or other decisions on future developments. Bringing together leading experts from economics, social science, scientometrics and bibliometrics, information science, physics, and science policy, this conference aims to identify grand challenges and opportunities for future research and development on STI models.

What if the evening news featured predictions of emerging science and technology trends?

Science Forecasts

Just like weather forecasts, science forecasts use a moderator to communicate complex data to large and diverse audiences. However, instead of explaining weather, science forecasts communicate local and global developments in science, technology, and innovation. Börner's team collaborated with colleagues in the school of journalism to record the pilot episode of the first science forecast show. It features a moderator that explains global science trends using a geospatial map of scientific collaboration patterns and twitter activity. Fred Cate then interviews Johan Bollen on using Twitter data for detecting episodes of depression. Last but not least, the moderator explains a large-scale map of science and zooms into medical research, foreshadowing the next episode. The science forecast pilot debuted on October 30, 2015, during the Commerce Data Advisory Council meeting at the National Oceanic and Atmospheric Administration's David Skaggs Research Center (NOAA) in Boulder, CO.

Speaker Series

In celebration of the first macroscope iteration of the *Places & Spaces* exhibit, we are looking forward to bringing a slate of data visualization speakers to Indiana University's Bloomington campus in the spring of 2016. Macroscope makers **Kalev H. Leetaru** and **Mauro Martino**, mapmaker **Marc Smith**, and artist **Carrie Longley** will all speak to how data visualization provides a new view of the world—one that allows us to follow our wonder into new terrain. The speaker series is supported by generous funding from the Data Science program at Indiana University, the Cyberinfrastructure for Network Science Center, the Indiana University Network Science Institute, and Indiana University's Consortium for the study of Religion, Ethics, and Society, a consortium sponsored by the Vice President for Research Office. See details at **cns.iu.edu/cnstalks/past.html**.

Exhibit Advisors

Gary Berg-Cross is a cognitive psychologist (PhD, SUNY–Stony Brook) who has taught at a number of institutions over his career (SUNY, Widener, University of Delaware, George Washington, George Mason University, and others). Currently, Berg-Cross is a Co-Principal Investigator on a four-year, NSF-sponsored study entitled Spatial Ontology Community of Practice: An Interdisciplinary Network to Support Geospatial Data Sharing, Integration and Interoperability (SOCoP-INTEROP Project). [Potomac, MD, USA]

Bob Bishop is chairman and founder of BBWORLD Consulting Services Sàrl and president and founder of the ICES Foundation. In addition, Bishop is involved in a range of global initiatives: he is a Fellow of the Australian Davos Connection (ADC), an elected member of the Swiss Academy of Engineering Sciences (SATW), and serves on the advisory panels for the École Polytechnique Fédérale de Lausanne's Blue Brain Project and Human Brain Project. [Geneva, Switzerland]

Kevin Boyack is president of SciTech Strategies, Inc., where his work centers on developing more accurate global maps of science. He has published nearly 30 articles on various aspects of science mapping and related metrics. Current interests include the detailed mapping of the structure and dynamics of science and technology, the application of full text to science mapping and bibliometrics, and the identification of emerging topics. [Albuquerque, NM, USA]

Donna J. Cox is the first Michael Aiken Chair, director of the Advanced Visualization Laboratory (AVL) at the National Center for Supercomputing Applications, and director of the Illinois eDream Institute, all at the University of Illinois at Urbana-Champaign. She is a recognized pioneer in Renaissance Teams and supercomputer visualizations for public outreach, and in 2006 she was selected by the Chicago Museum of Science as one of 40 modern-day Leonardo da Vinci's. [Urbana-Champaign, IL, USA]

Bonnie DeVarco is a Media X Distinguished Visiting Scholar at Stanford University. She writes and lectures on design science, virtual worlds, next-generation geographic information systems, information visualization, and the culture of cyberspace. Currently, DeVarco is completing a book on Buckminster Fuller entitled *Invisible Architecture II*, co-authoring *Shape of Thought*, a work on the history and evolution of visual language, and co-editing a book on Ludic Cartography. [Palo Alto, CA, USA]

Sara Irina Fabrikant is a professor of geography and head of the Geographic Information Visualization and Analysis (GIVA) group at the GIScience Center at the Geography Department of the University of Zürich, Switzerland. She is the elected chair of the Cognitive Visualization Commission of the International Cartographic Association, and she serves on the editorial boards of eight of the leading journals in GIScience and cartography. [Zürich, Switzerland]

Marjorie M.K. Hlava is president, chairman, and founder of Access Innovations, Inc. She has served as president of several organizations in the international information arena, including NFAIS, ASIS&T, ASIDIC, and Documentation Abstracts. In 2014, she released The Taxobook, a three-part series on the creation and implementation of controlled vocabularies. That same year, she was awarded the ASIS&T Award of Merit for her work in information technology application. [Albuquerque, NM, USA]

Peter A. Hook is an Assistant Professor of Library and Information Science at Wayne State University in Detroit, MI. He received his doctorate from the School of Informatics and Computing at Indiana University where his primary research focus was information visualization, particularly the visualization of knowledge organization systems, concept mapping, and the spatial navigation of bibliographic data in which the underlying structural organization of the domain is conveyed to the user. [Detroit, MI, USA]

Manuel Lima is a Fellow of the Royal Society of Arts, a senior user experience design lead at Microsoft Bing, and the founder of VisualComplexity.com—a visual exploration of mapping complex networks. Nominated by *Creativity* magazine as "one of the 50 most creative and influential minds of 2009," Lima is a leading voice on information visualization and a frequent speaker at conferences and schools around the world. [New York, NY, USA]

Lev Manovich is professor at the City University of New York (CUNY) Graduate Center and author of several books on digital culture, including the recent *Software Takes Command* (Bloomsbury Academic, 2013). In 2007, Manovich founded the Software Studies Initiative in order to develop a new paradigm of Cultural Analytics through data analysis and interactive visualization of patterns and trends in media and visual cultures. [New York, NY, USA]

Carlo Ratti, an architect and engineer by training, practices in Italy and teaches at the Massachusetts Institute of Technology, where he directs the SENSEable City Lab. Ratti has co-authored over 200 publications, exhibited his work at venues around the world, and holds several patents. He has been included in *Esquire* magazine's "Best and Brightest" list, *Blueprint* magazine's "25 People Who Will Change the World of Design" and *Forbes* magazine's "People You Need to Know in 2011." [Cambridge, MA, USA]

Eric Rodenbeck is founder and creative director of the San Francisco-based design and technology studio, Stamen Design. Since 1997, he has worked with interactive design to extend the boundaries of online media and live information visualization. In 2008, he was named one of *Esquire* magazine's "Best and Brightest" new designers and thinkers, and one of *i-D* magazine's top 40 designers to watch. [San Francisco, CA, USA]

André Skupin, professor of geography at San Diego State University, is interested in the application of geographic metaphors, cartographic principles, and computational methods to the visualization of non-geographic information. His research is interdisciplinary, aimed at increased cross-fertilization between geography, information science, and computer science. Recent work includes novel methods for visualizing human movement and demographic change as trajectories in n-dimensional attribute space. [San Diego, CA, USA]

Caroline Wagner holds the Wolf Chair at Ohio State University's John Glenn School of Public Affairs and is an expert in the field of science and technology and its association to policy, society, and innovation. She has served as a professional staff member for the U.S. Congress Committee on Science, Space, and Technology, the Congressional Office of Technology Assessment, and the State Department and as advisor to the European Commission, World Bank, U.S. National Science Foundation, and others. [Columbus, OH, USA]

Benjamin Wiederkehr is founding partner and managing director of the Zürich-based design and data visualization studio, Interactive Things. He is also part of the Open Government Data task force in Switzerland and helps to facilitate open access to government data for everyone. On Datavisualization.ch, Wiederkehr provides insight into his research and working process and documents topical use cases in the field of data visualization. [Zürich, Switzerland]

Stephen Uzzo is vice president of science and technology for the New York Hall of Science where he works on exhibit and program development projects related to STEM learning, scientific visualization, sustainability, and network science. Uzzo also serves on the faculty of the New York Institute of Technology Graduate School of Education, where he teaches STEM teaching and learning. [Queens, NY, USA]

Moritz Stefaner is a freelance designer on the crossroads of data visualization, information aesthetics, and user interface design. With a background in cognitive science and interface design, Stefaner's work beautifully balances analytical and aesthetic aspects in mapping abstract and complex phenomena. In 2010, he was nominated for the Design Award of the Federal Republic of Germany, and his work has been exhibited at SIGGRAPH and Ars Electronica. Portfolio at moritz.stefaner.eu. [Lilienthal, Germany]

Maximillian Schich and Mauro Martino's *Charting Culture* macroscope provides a new view of cultural migrations.

Bring the Exhibit Home

Bring *Places & Spaces* to Your Institution

Put your institution on the map by hosting *Places & Spaces* at your university, museum, or library. The exhibit consists of 100 framed high-resolution maps and accompanying labels and introductory panels. Included as well are additional elements such as the Illuminated Diagram, Ingo Günther's WorldProcessor Globes, the Hands-on Science Maps for Kids, and the award-winning film *Humanexus*. Exhibit curators will be happy to speak with you about the benefits of hosting *Places & Spaces* and the logistics involved in doing so.

> *Share these educational science maps with your whole institution by becoming an official exhibit host!*

Potential hosts concerned about space should know that the exhibit has been presented well as smaller conceptual units in separate (but not too distant) spaces. We can discuss with you the arrangement that best suits your situation.

Over its ten-year history, *Places & Spaces* has appeared at some of the world's most renowned institutes of knowledge and learning, including the National Academy of Sciences, the New York Public Library, the Chinese Academy of Sciences, the Royal Netherlands Academy of Arts and Sciences, and many more universities, libraries, and museums around the globe (see scimaps.org/exhibitions for a complete list of venues). Contact us at recorde@indiana.edu today to begin the process of bringing *Places & Spaces* to your institution.

Places & Spaces at Northwestern University.

Ward Shelley's *History of Science Fiction* graces a large tiled media wall as part of the Digital Display.

Think Outside the Frame!

Our designers have worked with IT experts from universities around the country to create an exhibit experience that is truly larger than life. The *Places & Spaces* Digital Display is a dazzling showcase for these stunning maps of science, taking the viewer through the evolution of science mapping from its earliest beginnings to its most cutting-edge developments.

> *Don't have enough wall space for the physical exhibit? You can display all 100 maps on a single wall!*

In bringing the exhibit to the big screen, great care has been taken to preserve the maps' rich color and clarity. Thus, the large-screen display offers a presentation that is grand in scale, but doesn't sacrifice the qualities that audiences have come to expect and treasure. You can display the maps on your institution's digital wall, or project them onto a light surface for an equally impressive experience. We will work closely with you on customizing the display to perfectly fit your space.

This unique production debuted in 2012 at the IQ-Wall in the Herman B Wells Library at Indiana University. It has also been on display at Brandeis University, Israel's Weizmann Institute of Science, Rice University, Duke University, and North Carolina State University's state-of-the-art Immersion Theater. The digital display made its European debut at this year's International Science Festival in Gothenburg, Sweden. To learn how to bring the *Places & Spaces* Digital Display to a screen near you, contact us at recorde@indiana.edu.

Purchase a Map of Science

Any visit to the *Places & Spaces* exhibit is sure to be memorable, but many attendees find themselves wanting to take with them something more tangible than memories. The majority of our exhibit maps are available for purchase at our online store (scimaps.org/store). All maps are 24" x 30" (61 x 76 cm) and can be ordered as inkjet prints, high-quality archival prints, and framed prints.

In addition, some fans of the exhibit find the theme of a particular iteration especially relevant to the interests of their institution. To meet this need, poster versions of each iteration are also available at the *Places & Spaces* online store. They consist of two posters per iteration, with each poster measuring around 67" x 36" (170 x 92 cm). The posters feature all ten maps from the iteration, their descriptions, colorful photos, and interesting exhibit information.

*Inkjet Print: $45/map**

*Premium Archival Print: $100/map**

*Laminated Foam Core with Metal Frame: $250/map**

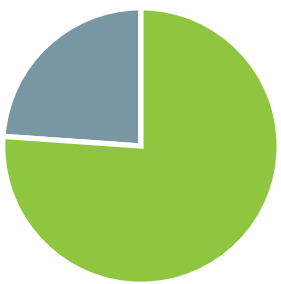
**Shipping not included and varies by location*

Finances & Numbers

Finances

Exhibit finances are managed by the Cyberinfrastructure for Network Science Center at the School of Informatics and Computing, Indiana University. Shown below are exhibit income expenditures for 2015. Exhibit revenues come from map sales, venue contributions, and support by the Cyberinfrastructure for Network Science Center.

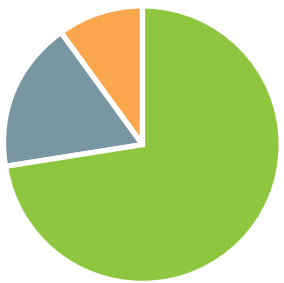
2015 Expenses*



Total: $65,376.59

Salaries	$49,881.03
Design & Venue Acquisition	$15,495.56
Workshops & Events	N/A

2015 Revenue*



Total: $65,376.59

CNS Support	$47,405.88
Venue Contributions and Other Revenues	$11,610.71
Map Sales	$6,360.00

Exhibit in Numbers (since 2005)

Exhibit Maps: 100
Exhibit Macroscopes: 4
Map & Macroscope Makers: 226
Map Maker Countries: 17

Display Venues: 332
Press Items: 198
Workshops Organized: 34
Website Visits: 4,012,282

Exhibit Ambassadors around the World

*This report covers the exhibit's 2015 fiscal year: Jan 1 - Dec 31, 2015.

References

Books & Essays

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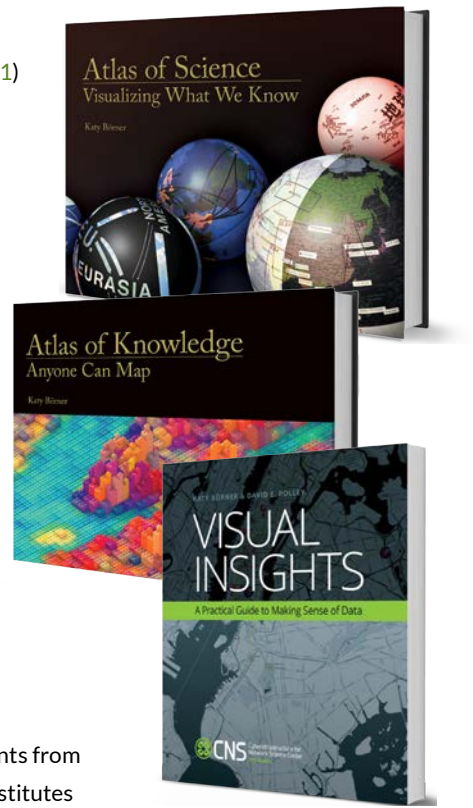

Tools

Science of Science (Sci2) Tool (sci2.cns.iu.edu) is a desktop application that was specifically designed for the study of science. It supports the temporal, geospatial, topical, and network analysis and visualization of data sets at the micro (individual), meso (local), and macro (global) levels.

Data

The Scholarly Database (sdb.cns.iu.edu) provides easy access to more than 26,300,000 papers, patents, and grants from major databases such as MEDLINE, U.S. Patent and Trademark Office, National Science Foundation, National Institutes of Health and National Endowment for the Humanities Awards as well as Clinical Trials. Users can register for free to cross-search these databases and to download result sets as dumps for science of science research and science policy practice.

Connect with Us

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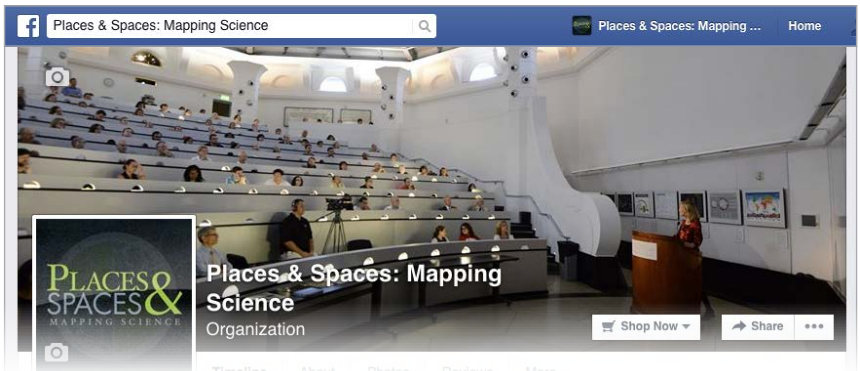

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