



Dupont Summit 2014

..... Science, Technology, and Environmental Policy Issues

December 5, 2014 ♦ Historic Whittemore House, Washington, DC

The Policy Studies Organization

Panel

“Big Data Analytics and Workforce Issues: Initiatives, Research, and Challenges”

Big data, in all of its manifestations and applications, is at the heart of today’s burgeoning information society. On the one hand, big data has been acclaimed in line with promises for societal benefits. However, on the other hand, big data also has been at the center of controversies and debates on the challenges and vulnerabilities that it has created relative to social, political, and economic power and relations. Whether addressed in terms of technical, social, or organizational perspectives, relevant topics are in the forefront of initiatives in the academy, government, and industry. Moreover, the advent of big data has raised questions about those who use it and who work with it, especially in light of socio-cultural and structural dynamics. The objectives of this panel include articulating critical research and policy questions and identifying problems that must be faced in order to answer them and to engage big data effectively. This panel will offer a comprehensive view on the promises and challenges of big data analytics and workforce issues, considering both instrumental and intrinsic aspects of big data to speak to its validity, credibility, applicability, and broader implications.

Organizer

Connie L. McNeely, Ph.D., *George Mason University*

Moderator

Jong-on Hahm, Ph.D., *George Mason University*

Panelists

Big Data Science in Biomedical Research: NIH on the Frontlines

Philip E. Bourne, Ph.D., *National Institutes of Health*

Privacy in the Age of Big Data: The Challenges and Opportunities for Research

Heng Xu, Ph.D., *National Science Foundation*

Big Data Adoption in the Environmental Health Domain: International Challenges and Perspectives

Erik Kuiler, Ph.D., *Systems Made Simple, Inc.*

Big Data and the Analysis of the Relationship Between Educational Institutions and the World Labor Market

Lisa M. Frehill, Ph.D., *Energetics Technology Center*

Building Proficiency In and For a World of Massive Data: Complex Issues and Approaches

Michelle Schwalbe, Ph.D., *National Research Council*

Data-Driven Science and the Academic Workforce: Issues, Implications, and Trends

Laurie A. Schintler, Ph.D., *George Mason University*



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Biographies

Philip E. Bourne, Ph.D., National Institutes of Health

Dr. Philip E. Bourne is the Associate Director for Data Science at the National Institutes of Health. Formerly, he was Associate Vice Chancellor for Innovation and Industry Alliances, a Professor in the Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of California San Diego, Associate Director of the RCSB Protein Data Bank, and an Adjunct Professor at the Sanford Burnham Institute. Dr. Bourne serves the national biomedical community through contributing ways to maximize the value of scientific data. His research focuses on biological and educational outcomes derived from computation and scholarly communication. He has published over 300 papers and 5 books, one of which sold over 150,000 copies.

Previously, Dr. Bourne co-founded four companies. He is also the co-founder and founding Editor-in-Chief of the open access journal *PLOS Computational Biology*. Dr. Bourne is committed to professional development through the *Ten Simple Rules* series of articles and a variety of lectures and video presentations. Dr. Bourne is a Past President of the International Society for Computational Biology, an elected fellow of the American Association for the Advancement of Science, the International Society for Computational Biology, and the American Medical Informatics Association. His awards include the Jim Gray eScience Award (2010), the Benjamin Franklin Award (2009), the Flinders University Convocation Medal for Outstanding Achievement (2004), the Sun Microsystems Convergence Award (2002), and the CONNECT Award for new inventions (1996 & 1997).

Heng Xu, Ph.D., National Science Foundation and Pennsylvania State University

Dr. Heng Xu joined the National Science Foundation (NSF) from the Pennsylvania State University in August 2013 through the IPA agreement. At Penn State, she is a tenured associate professor in the College of Information Sciences and Technology (aka the iSchool). Her current research focus is on the interplay between social and technological issues associated with privacy and security. She approaches privacy and security issues through a combination of empirical, theoretical, and technical research efforts. She has authored and co-authored over 80 research papers on information privacy, security management, human-computer interaction, and technology innovation adoption. Her work has been published in premier outlets across various fields such as Information Systems, Law, Computer Science, and Human-Computer Interaction, including *MIS Quarterly*, *Information Systems Research*, *University of Pennsylvania Journal of Constitutional Law*, *Proceedings of the International World Wide Web Conference (WWW)*, *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, *Proceedings of the ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW)*, and many others. She was a recipient of an NSF Career award (2010) and the endowed PNC Technologies Career Development Professorship (2010-2013).

Erik Kuiler, Ph.D., Systems Made Simple, Inc.

Dr. Erik Kuiler is an Informatics Subject Matter Expert at Systems Made Simple, Inc. Starting out his career as an Information Engineer in the late 1970s, he focuses on the development of lexicons, ontologies, and systems to support the management of data and information as enterprise assets. To date, he has developed various systems, ranging from a logistics-information exchange system for the United States Coast Guard to support the cutter fleet to an ontology-based prototype to classify tobacco products in an effort to support policy development and regulation enforcement.

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Lisa M. Frehill, Ph.D., Energetics Technology Center and National Science Foundation

Dr. Lisa M. Frehill is on assignment to the National Science Foundation (NSF), Strategic Human Capital Planning, as an Organizational Evaluation and Assessment Researcher. Her home institution is Energetics Technology Center in St. Charles, MD. She is responsible for science, technology, engineering, and mathematics (STEM) workforce analysis and planning as well as program assessment and evaluation efforts in support of United States Department of Defense clients. She has been a past NSF awardee, with more than \$5 million in grants associated with gender and ethnic diversity in STEM, first as an associate professor of sociology at New Mexico State University and later as executive director of the Commission on Professionals in Science and Technology. She is an expert on diversity in STEM, program evaluation, and data analytics in support of STEM human resources policy.

Michelle Schwalbe, Ph.D., National Research Council

Dr. Michelle Schwalbe is the Director of the Committee on Applied and Theoretical Statistics and a Program Officer with the Board on Mathematical Sciences and their Applications at the National Research Council (NRC). She has also worked with the Board on Energy and Environmental Systems and the Report Review Committee at the NRC. Her research interests include statistics, computing, big data management, and uncertainty quantification. Prior to joining the National Academies, she held positions at Oak Ridge National Laboratory and Lawrence Livermore National Laboratory. She received a Ph.D. in Mechanical Engineering and a M.S. in Applied Mathematics from Northwestern University and a B.S. in Applied Mathematics specializing in Computing from the University of California, Los Angeles.

Laurie A. Schintler, Ph.D., George Mason University

Dr. Laurie A. Schintler is an Associate Professor in the School of Policy, Government, and International Affairs at George Mason University. She is Director of the Transportation, Policy, Operations, and Logistics (TPOL) Program and an Associate Director of the Center for the Study of International Medical Policies and Practices (CSIMPP) in the School. Her areas of expertise include network analysis, Big Data, visualization, social media, socio-spatio modeling, science and technology, health and medical policy, and transportation and traffic modeling, among others. In these areas, Dr. Laurie A. Schintler has over 50 peer-reviewed articles, book chapters, a co-edited book entitled *New Advances in Transportation and Telecommunications Modeling: Cross-Atlantic Perspectives* (2005), and numerous blog posts, invited presentations/briefings, and media appearances. She is currently completing a book under contract with Springer entitled *Data Exploration and Visualization for the Social Sciences* and has a contract (with Connie L. McNeely) with Sage to produce an *Encyclopedia of Big Data*. Dr. Schintler has received over one million dollars in grants and contracts from National Institutes of Health, Department of Transportation, National Park Service, Department of Homeland Security, and other funding sources. She is the recipient of a patent for a “System and Method for Analyzing the Structure of Logical Networks” (USPTO: 20100306372, July 2010, with S. Gorman, R. Kulkarni, and R. Stough) and is co-founder of the geospatial mapping company, Fortiusone (later rebranded as Geo-IQ and acquired by ESRI). She received her Ph.D. from the University of Illinois, Urbana-Champaign, Urban and Regional Planning Department.

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Jong-on Hahm, Ph.D., George Mason University

Dr. Jong-on Hahm is a Distinguished Senior Fellow in the School of Policy, Government, and International Affairs at George Mason University. Her research focuses on global investments in science, technology, engineering, and math (STEM) to spur innovation and economic growth; global STEM workforce migration; diversity in science; global intellectual property rights; and Big Data uses, analyses, and controversies.

Dr. Hahm served in the Office of International Science and Engineering at the National Science Foundation, where she managed relations with countries in Europe and Eurasia and in East Asia and the Pacific. She was a Research Professor in the Elizabeth J. Somers Women’s Leadership Center at George Washington University and Vice President of the Biotechnology Institute. She led the National Academies Committee on Women in Science and Engineering to national prominence, spurring Congress to request a study of gender differences in academic careers in science, engineering, and mathematics. Her service on advisory boards has included the George Washington University Research Advisory Board, President Clinton’s Interagency Council on Women Working Group on Science and Technology, the UN Conference and Forum on Science and Technology, and Board of Trustees of Montgomery College and of the Adventist Rehabilitation Hospital of Maryland.

Dr. Hahm earned a Ph.D. in Neuroscience from the Massachusetts Institute of Technology, M.A. from American University, and B.Sc. from McGill University.

Connie L. McNeely, Ph.D., George Mason University

Dr. Connie L. McNeely is currently Professor of Public Policy at George Mason University, where she is also the Co-Director of the Center for Science and Technology Policy. Her teaching and research address various aspects of science and technology, healthcare, organizational behavior, public policy, governance, social theory, and culture. She currently directs major projects on big data analytics, on scientific networks, and on migration and diversity in the science and technology workforce, and leads an International Research Group on Global Innovation in Science and Technology. Emphasizing comparative and historical perspectives, her work also has engaged questions on international development and organization and on issues related to race, ethnicity, nation, and gender. She has conducted research on education and socio-legal relations and has ongoing projects examining institutional and cultural dynamics in matters of globalization and polity participation. Dr. McNeely has numerous publications and is active in several professional associations, serves as a reviewer and evaluator in a variety of programs and venues, and sits on several advisory boards and committees.