Creating the Policy and Legal Framework for a Location-Enabled Society

Co-organizers:
Center for Geographic Analysis, IQSS, Harvard University
Centre for Spatial Law and Policy, Washington, DC
Berkman Center for Internet and Society, Harvard University
Belfer Center for Science and International Affairs, Harvard Kennedy School

Co-sponsor:
The United States Geospatial Intelligence Foundation

Date: May 2-3, 2013

Location: Tsai Auditorium, CGIS Building South, Room S010
Address: 1730 Cambridge St., Cambridge, MA 02138

Location matters. Energy, sustainable agriculture, biodiversity, natural hazards, traffic and transportation, crime and political instability, water quality and availability, climate change, migration and urbanization – all key issues of the 21st century – have a location component. Critical geographic thinking, understanding and reasoning are essential skills for modern societies, and geospatial technologies for location based data collection, management, analysis and visualization have developed rapidly in recent decades. Today, these technologies are widely applied in routine operations in large corporations, entrepreneurial businesses, government agencies, non-governmental organizations (NGOs) and the social media of our daily lives. They save cost, improve efficiency, increase transparency, enhance communication, and help solve problems. Location-enabled devices are weaving “smart grids” and building “smart cities;” they allow people to discover a friend in a shopping mall, catch a bus at its next stop, check surrounding air quality while walking down a street, or avoid a rain storm on a tourist route – now or in the near future. And increasingly they allow those who provide services to track, whether we are walking past stores on the street or seeking help in a natural disaster.

Such deep penetration of the geospatial technologies into people’s daily lives, however, generates policy and legal concerns with privacy, ownership rights of location information, national and homeland security, uncertainty about government funding and regulation, and more. These issues are relatively new to the academic community and to human societies at large. Technology developers, industries, legal experts, policy makers and citizen rights advocates would be well served in talking to one another as they grapple with the opportunities and challenges of a location-enabled society.
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<tr>
<td>1:00 PM</td>
<td>Registration</td>
<td>Room CGIS S010</td>
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<tr>
<td>1:30 PM</td>
<td>Welcome &amp; Introduction</td>
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<td>Peter Bol &amp; Kevin Pomfret</td>
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<td>1:40 PM</td>
<td>Be Careful What You Ask For: Reconciling a Global Internet and Local Law</td>
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<td>Jonathan Zittrain</td>
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<td>Moderator: Peter Bol</td>
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<td>2:20 PM</td>
<td>Geospatial and Developing Economies</td>
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<td>Marcia Castro, Ron Garan, Ken Westrick, Lee Schwartz</td>
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<td>Moderator: Calestous Juma</td>
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<td>Taking Society’s Pulse in Real-Time</td>
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<td>Ben Lewis, Todd Mostak, Jeff Blossom, Chris Tucker</td>
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<td>Coffee Break</td>
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<td>3:50 PM</td>
<td>NSF and NIH Research on Geographic Data Confidentiality and Privacy</td>
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<td>5:30 PM</td>
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<td>6:00 PM</td>
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<td>9:00 AM</td>
<td>Welcome &amp; Introduction</td>
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<td>Peter Bol &amp; Kevin Pomfret</td>
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<td>9:10 AM</td>
<td>Managing Change by Technology Darwinism</td>
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<td>10:00 AM</td>
<td>Ebele Okobi is Global Head of Yahoo!’s Business &amp; Human Rights Program, where she leads Yahoo!’s efforts to promote privacy and free expression on the Internet, and works to identify innovative solutions to human rights challenges. Before joining Yahoo!, Ebele worked as a corporate lawyer at Davis Polk &amp; Wardwell, an attorney fellow at Consumers Union, a director of Advisory Services at Catalyst and as a member of the Management Development Program at NSF’s EMEA headquarters in Amsterdam, where she created marketing, corporate responsibility and business development strategy for Africa, NielkWomen and Nike Digital. Alex “Sandy” Pentland directs MIT’s Human Dynamics Laboratory and the MIT Media Lab Entrepreneurship Program, co-leads the World Economic Forum Big Data and Personal Data initiatives, and is a founding member of the Advisory Boards for Nissan, Motorola Mobility, and a variety of start-up firms. He has previously helped create and direct MIT’s Media Laboratory, the Media Lab Asia laboratories at the Indian Institutes of Technology, and Strong Hospital’s Center for Future Health. In 2012 Forbes named Sandy one of the ‘seven most powerful data scientists in the world’, along with Google founders and the CTO of Facebook.</td>
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<td>1:00 PM</td>
<td>Zachary Tumin is Special Assistant to the Director of the Belfer Center, and Faculty Chair, Science, Technology, and Public Policy Program. He leads the Belfer Center’s project on Information and Communications Technology and directs the Harvard component of a joint Harvard-MIT initiative in cyber security. His research focuses on the strategic management of collaboration across the boundaries of organizations, sectors, and citizens where information and communications technologies are critical enablers or obstacles. Of special interest are issues of people and politics, platforms, policy, and performance in matters of defense and intelligence, civic and political engagement, education, public health and public safety, and related areas. Stephen Erin is Assistant Dean for Information Technology at Harvard Design School. Director of Computer Resources, and lecturer in the Department of Landscape Architecture, at the Harvard Graduate School of Design. His MLA is from UMass/Amherst, his PhD from MIT, and he is a Fellow of the American Society of Landscape Architects (FASLA). His current interests include Geodesign, innovation in digitally enabled design teaching and learning, and algorithmic design. Urs Gasser is the Executive Director of the Berkman Center for Internet &amp; Society at Harvard University. He teaches at Harvard Law School and Fudan University School of Management (China). Urs led a consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.</td>
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<td>Stephen Erin is Assistant Dean for Information Technology at Harvard Design School. Director of Computer Resources, and lecturer in the Department of Landscape Architecture, at the Harvard Graduate School of Design. His MLA is from UMass/Amherst, his PhD from MIT, and he is a Fellow of the American Society of Landscape Architects (FASLA). His current interests include Geodesign, innovation in digitally enabled design teaching and learning, and algorithmic design. Urs Gasser is the Executive Director of the Berkman Center for Internet &amp; Society at Harvard University. He teaches at Harvard Law School and Fudan University School of Management (China). Urs led a consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.</td>
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<td>3:30 PM</td>
<td>Calestous Juma is Professor of the Practice of International Development and Director of the Science, Technology, and Globalization Project. He directs the Agricultural Innovation in Africa Project funded by the Bill and Melinda Gates Foundation and serves as Faculty Chair of Innovation for Economic Development executive program. Juma is a former Executive Secretary of the UN Convention on Biological Diversity and Founding Director of the African Centre for Technology Studies in Nairobi. He is co-chair of the African Union’s High-Level Panel on Science, Technology and Innovation and a jury member of the Queen Elizabeth Prize for Engineering. He has won several international awards for his work on sustainable development. Peter Bol is the Charles H. Carswell Professor of East Asian Languages and Civilizations. He led Harvard’s university-wide effort to establish support for geospatial analysis in teaching and research; in 2005 he was named the director of the CGA. He directs the China Historical GIS project, a collaboration between Harvard and Fudan University in Shanghai to create a GIS for 2000 years of Chinese history, and is involved in other projects aimed at enhancing digital information linkages between East Asian and Western scholars.</td>
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<td>4:30 PM</td>
<td>The following is a list of panel moderators:</td>
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<td>Calestous Juma</td>
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<td>Moderator: Peter Bol</td>
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**Panel Moderators**

Calestous Juma is Professor of the Practice of International Development and Director of the Science, Technology, and Globalization Project. He directs the Agricultural Innovation in Africa Project funded by the Bill and Melinda Gates Foundation and serves as Faculty Chair of Innovation for Economic Development executive program. Juma is a former Executive Secretary of the UN Convention on Biological Diversity and Founding Director of the African Centre for Technology Studies in Nairobi. He is co-chair of the African Union’s High-Level Panel on Science, Technology and Innovation and a jury member of the Queen Elizabeth Prize for Engineering. He has won several international awards for his work on sustainable development. Peter Bol is the Charles H. Carswell Professor of East Asian Languages and Civilizations. He led Harvard’s university-wide effort to establish support for geospatial analysis in teaching and research; in 2005 he was named the director of the CGA. He directs the China Historical GIS project, a collaboration between Harvard and Fudan University in Shanghai to create a GIS for 2000 years of Chinese history, and is involved in other projects aimed at enhancing digital information linkages between East Asian and Western scholars.

Kevin Pomfret is the Executive Director of the Centre for Spatial Law and Policy and a lawyer focusing on the unique legal and policy issues associated with spatial data and spatial technology such as intellectual property rights, licensing, liability, privacy and national security. He is a member of the Board of Directors of the Open Geospatial Consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.

Zachary Tumin is Special Assistant to the Director of the Belfer Center, and Faculty Chair, Science, Technology, and Public Policy Program. He leads the Belfer Center’s project on Information and Communications Technology and directs the Harvard component of a joint Harvard-MIT initiative in cyber security. His research focuses on the strategic management of collaboration across the boundaries of organizations, sectors, and citizens where information and communications technologies are critical enablers or obstacles. Of special interest are issues of people and politics, platforms, policy, and performance in matters of defense and intelligence, civic and political engagement, education, public health and public safety, and related areas.

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Urs Gasser is the Executive Director of the Berkman Center for Internet & Society at Harvard University. He teaches at Harvard Law School and Fudan University School of Management (China). Urs led a consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.
Abstract: Earth Observation - whether from space, air, sea or on the ground - is critical to deal with the increasingly complex issues mankind faces across the globe. Resolving such transnational issues will mean collecting, distributing and analyzing vast amounts of information from a variety of sensors. These sensors are owned and/or operated by government, the private sector, non-governmental organizations and increasingly citizens themselves. This panel will address the complex legal and policy issues required to collect and share this information across borders.

Nancy Colleton is a leader in environmental communication and information. As the president of the Institute for Global Environmental Strategies (IGES) she leads numerous initiatives that promote better understanding of the changing planet. Nancy has worked vigorously with senior-level government, the private sector, non-governmental organizations and increasingly citizens themselves. This panel will address the complex legal and policy issues required to collect and share this information across borders.

Charlie Hale is a Policy Analyst at Google. He works on public policy and government affairs for Google’s geo products (Maps & Earth) and Google[x], which includes the self-driving car project and Google Glass, among others. He is also Co-Founder at Global Health Corps, and a member of the Advisory Board at Envaya.

Role of Government in a Location-enabled society
Steve Goldsmith, Nigel Jacob, Ebele Okobi, Sandy Pentland

Abstract: The session will focus on the role of government as an enabler of strategic policy frameworks for location based services, data, and related issues. Roundtable participants will consider three different focal points for discussion: (1) conceptual strategies that can be used to foster relationships between government, industry, and citizens; (2) organizational approaches to leadership in the development of policies, norms, and laws around the risks and opportunities presented by spatial data; and (3) existing and envisioned technical interventions including standards development, legal interoperability, considerations of privacy and security, and generation of frameworks of cooperation.

Stephen Goldsmith is the Daniel Paul Professor of Law and Economics, board member at Code For America, Fellow at the Center for Advancement of Public Action at Harvard's Kennedy School of Government. He cur- rently directs the Mayoral Performance Analytics Initiative at Harvard, a project to highlight local government efforts to use new technologies that connect breakthroughs in the use of big data analytics with community input to reshape the relationship between government and citizen. He previously served as Deputy Mayor of New York and Mayor of Indianapolis, where he earned a reputation as one of the country’s leaders in public-private partnerships, competition, and privatization. Stephen was also the chief domestic policy advisor to the George W. Bush campaign in 2000.

Nigel Jacob is the co-founder of New Urban Mechanics, board member at Code For America, Fellow at the Center for Advancement of Public Action at Bennington College, and a policy advisor at Boston City Hall. He is working to create a network of civic innovation laboratories that spans the globe and enables cities to collaborate around the development of new kinds of civic technologies. He specializes in development of public-private collaborations, civic innovation, civic software architecture and engineering, and research and development.

Kipp Jones, Valerie Shuman, Kara Selke, Geoff Weiss, Jukka-Pekka Onnela, Meraj Mirza

3:40 PM - 3:50 PM
The Law and Earth Observation: Military, Commercial, Environmental and Scientific Perspectives
Nancy Colleton, Dan Jablonsky, Keith Masback, Charlie Hale
Moderator: Jeff Harris

Friday, May 3, 2013 (continued)       Room CGIS S010

9:30 AM - 9:50 AM
UN-Global Geospatial Information Management (UNGGIM): Legal and Policy Challenges
Greg Scott
Moderator: Kevin Pomfret

9:50 AM - 11:00 AM
Privacy Issues Associated with Location and Geospatial information
Kirk Goldsberry, Dave DiBiase, Jeremy Crampton, Nicolas Oreskovic, Sarah Williams
Moderator: Kevin Pomfret

11:00 AM - 11:10 AM
Coffee Break

11:10 AM - 12:20 PM
Spatial Data Infrastructures: Laying the Foundation
Matt Gentile, Latanya Sweeney, Bernd Resch, Chris Tucker, Jerry Mechling, Raj Singh
Moderator: Zachary Tumin

12:20 PM - 1:20 PM
Lunch & Poster Competition

1:20 PM - 2:30 PM
The Internet of Things: Policy and Legal Frameworks Necessary to support Smart Grid/Intelligent Transportation Systems/Smart Cities
Kipp Jones, Valerie Shuman, Kara Selke, Geoff Weiss, Jukka-Pekka Onnela, Meraj Mirza
Moderator: Stephen Ervin

2:30 PM - 3:40 PM
The Law and Earth Observation: Military, Commercial, Environmental and Scientific Perspectives
Nancy Colleton, Dan Jablonsky, Keith Masback, Charlie Hale
Moderator: Jeff Harris

3:40 PM - 3:50 PM
Coffee Break

3:50 PM - 5:00 PM
Role of Government in a Location-Enabled Society
Steve Goldsmith, Nigel Jacob, Ebele Okobi, Sandy Pentland
Moderator: Urs Gasser

5:00 PM - 5:30 PM
Closing Remarks: Geospatial Science, Technology and Innovation
Calestous Juma
Moderator: Kevin Pomfret

5:30 PM - 5:40 PM
Poster Awards
Peter Bol

5:40 PM - 6:30 PM
Reception
Be Careful What You Ask For: Reconciling Access Controlled: The Shaping of Power, Rights, and Responsibilities - whether by countenancing global privatization of some Internet governance issues through organizations like ICANN, committing to new international agreements on sub- stance and procedure to prevent the friction caused by borderless data flows, or by a “live and let live” set of localization technologies to shape the Internet to suit the respective societies it touches. These shifts will help ease the tension between the certitudes that the Internet is global, while the imposition of regulation is almost always local. Such curves for the longstanding dilemmas of Internet jurisdic- tion and access are especially challenging the originally cherished aspects of a global Internet as well - urging us to consider the iatrogenic effects of bulldozing online activity to conform more to the boundaries of the physical world that preceded it, and explaining why, in the United States and elsewhere, there are contradictory policies emerging about the Internet’s future.

Jonathan Zittrain is Professor of Law at Harvard Law School and the Harvard Kennedy School of Government, Professor of Computer Science at the Harvard School of Engineering and Applied Sciences, and co-founder of the Berkman Center for Internet and Society. His research interests include: battles for control of digital property and content, cryptography, electronic privacy, the roles of intermediaries within Internet architecture, human computing, and the useful and unobtrusive deployment of technology in education. He performed the first large-scale tests of filtering technology in China and Saudi Arabia, and as part of the OpenNet Initiative co-edited a series of studies of Internet filtering in China and more than one dozen new ones. Other areas of research include expansion of the Brazilian Amazon frontier and the impacts of large-scale development projects implemented in the region; use of spatial analysis in the Social Sciences; population dynamics and mor- phology models, and its influence on the evolution of cities; vector analysis with development projects and climate change; and modeling the impact of extreme climatic events on the transmission of malaria in the Amazon. Castro has applied geographical information systems, remote sensing, and spatial statistics to her research, and proposed novel methods in spatial analysis.

Ron Garan is a highly decorated Fighter Pilot and Test Pilot, Explorer, Entrepreneur and Humanitarian who has spent the last 30 years helping to build and targeted social enterprise can solve many of the problems facing our world. He is a current NASA astronaut who has traveled 71,075,867 miles in space. Ron and his astronaut friends have been involved in NASA’s Open Innovation Initiative, which seeks to increase openness, transparency, collabora- tion, and innovation within government. Working in partnership with the US Agency for Interna- tional Development (USAID), Ron is leading an ef- fort called Unity Node to develop a universal, open source, collaborative platform to enable humani- tarian organizations around the world to work to- gether toward their common goals and is assisting USAID to establish the Advanced Geospatial Research Projects Agency for Development program.

Marcia Castro is Associate Professor of Demography in the Department of Global Health and Popu- lation, Harvard School of Public Health, and Asso- ciate Faculty of the Harvard University Center for the Environment. Her research focuses on the de- velopment and use of multidisciplinary approaches, combining data from different sources, to identify the determinants of malaria transmission in different ecological settings, providing evidence for the improvement of current control policies, and the impact of the development of new ones. Other areas of research include expansion of the Brazilian Amazon frontier and the impacts of large-scale development projects implemented in the region; use of spatial analysis in the Social Sciences; population dynamics and mor- phology models, and its influence on the evolution of cities; vector analysis with development projects and climate change; and modeling the impact of extreme climatic events on the transmission of malaria in the Amazon. Castro has applied geographical information systems, remote sensing, and spatial statistics to her research, and proposed novel methods in spatial analysis.

Geoff Zeiss has more than 20 years experience in geospatial software industry and 15 years experi- ence developing enterprise geospatial solutions for the federal government and private industry. His particular interests include the convergence of BIM, CAD, geospatial, and 3D; open source geospatial, and optimizing utility workflowas to support smart grid. Currently Geoff is Principal at Zeiss Global and Policy, a thought leadership consulting firm.

Jukka-Pekka Onnela is an Assistant Professor in the Department of Biostatistics, Harvard Univer- sity School of Public Health. He is interested in a broad range of theoretical and applied problems in network science. His current research focuses on statistical and mathematical analysis and modeling of social networks and their connection to human health; development of metrics and methods for network analysis; network theory; and online social systems and social media.

Meraj Miraj is a visiting professor at the Center for Geographic Analysis, currently conducting research on historical GIS of Makkah and Saudi Arabia using the WorldMap platform. Since 1975, he is interested in a broad range of theoretical and applied problems in network science. His current research focuses on statistical and mathematical analysis and modeling of social networks and their connection to human health; development of metrics and methods for network analysis; network theory; and online social systems and social media.
Abstract: Government agencies are the repositories of vast amounts of data, much of it tied to a location, an individual or both. This information is the foundation for creating a location-based society. However, sharing this data between government agencies has always been a challenge from a policy and legal standpoint. These issues have become even more important due to the increase in citizens becoming both direct users and data providers in this process. This panel will discuss these issues and suggest ways in which they can be addressed.

Matt Gentile is head of geospatial practice and principal at Deloitte Financial Advisory Services. He is a member of the National Geospatial Advisory Committee (NGAC), a committee that provides recommendations and policy and management issues and advice on development of the National Spatial Data Infrastructure (NSDI). Matt is recognized as a thought leader and entrepreneur in the geospatial community, dedicating the past four years to the protection and promotion of public policy and geospatial technology.

Latanya Sweeney is the Director of the Data Privacy Lab in QSBS at Harvard. As Professor of Government and Technology in Residence, she creates and uses technology to assess and solve societal, political and governance problems, and teaches others how to do the same. One focus area is data privacy, and she has published on Policy and Law: Identifiability of de-identified data. Dr. Sweeney’s current research goal is to replace the 3 historical pillars of privacy (consent, notice, and de-identification) with new technology-powered mechanisms that help provide a privacy fabric appropriate for today’s setting. The goal is to allow society to reap the benefits of emerging technologies while enjoying privacy protection.

Bernd Resch is Research Director (Live Geography) at University of Heidelberg, Research Affiliate at the MIT SENSEable City Lab (USA), Visiting Fellow at Harvard University (USA) and Lecturer at University of Technology. Bernd Resch did his PhD in the area of “Live Geography” (real-time monitoring of environmental geo-processes) together with University of Salzburg and MIT. His research interests revolve around environmental monitoring, crowd-sourcing methods, People as Sensors, real-time analysis of urban dynamics, Sensor Fusion, interoperability in geo-sensor networks, web-based data analysis and geo-visualization techniques. He also serves an Editorial Board member of the International Journal of Advances in Software and the Journal of Location-based Services, Co-chair of the GeoInformatics 2013 conference, Co-chair of the GEOProcessing conference, Co-organiser of the Young Researchers’ Forum GIScience, and a development team of the Bachelor/Master Programme of the Salzburg University of Applied Sciences.

Chris Tucker’s bio is included above.

Jerry Meechling is a research vice president at Gartner Inc. From 1983 to 2011, he was a faculty member of the Harvard Kennedy School, where he taught graduate-level courses on information management and led the Strategy Computing in the Public Sector, a research and executive-education program. A fellow of the National Academy of Public Administration and four-time winner of the Federal Executive Board Award, he is also a member of the Institute of Politics, an aide to the mayor of New York City and assistant administrator of the New York City Environmental Protection Administration, and director of Boston’s Office of Management and Budget.

Raj Singh serves as a Director of Interoperability Programs for OGC. He manages multi-vendor software prototyping projects developing collaborative, interoperable, and interoperable spatial information ecosystems. He also shepherds OGC’s mass market efforts to better align geospatial standards with the general IT industry. Currently, Raj is passionate about creating an open catalog of tweets filtered by any keyword in space and time. He is completing the distribution and analysis of large Twitter datasets from the Middle East. He hopes to continue building functionality into MapD, creating a general-purpose platform that will allow real-time exploration, analysis and visualization of large datasets.

Jeff Tucker is a Senior GIS Specialist at the CGA. He has 17 years working in the GIS industry as a technician, analyst, developer, and manager. Prior to joining the CGA, Jeff was the GIS Photogrammetry and Data Analysis Director for Devon, and served as Chairman of Denver’s GIS Steering Committee. He is interested in developing tools, teaching methods, and maps using geographic information that can be used by any student or professional to enhance their work.

Chris Tucker is active in the geospatial industry and the GIS national security community, and as Principal of Yale House Ventures, manages a portfolio of technology startups and social ventures. He was the founding chief strategic officer of In-Q-Tel, the CIA’s venture capital fund, charged with developing In-Q-Tel’s overall strategy for tackling the complex, rapidly evolving, and high-impact national security problems of the agency. Tucker is the founder of the MapStory Foundation which seeks to develop an online social media channel/platform that enables a global community of experts to “crowd source” socio-cultural data, conduct socio-temporal analysis, and to publish “MapStories” as spatio-temporally enabled narratives. Tucker serves on the board of directors of the Open Geospatial Consortium and the U.S. Army’s Geospatial Technical Exchange Program, or has served on Federal Advisory Committees such as the Defense Science Board’s Intelligence Task Force and the United States Department of Interior’s National Geospatial Advisory Committee.

Ken Westrick is a business leader with broad experience and background in renewable energy, weather & climate, sustainable technologies, especially as applied in an international context. His speaking engagements and the Intergovernmental Panel on Climate Change and climate risks, renewable energy resources, weather and hydrological modeling methods, climate change impact studies have been featured on RE. He is an author and CTO at RESurety, Inc., co-founder and CEO at Westeva, and board member of the Latin American and Caribbean Council on Renewable Energy.

Lee Schwartz is The Geographer at the US Dept of State. He is also the director of the State Department’s Office of the Geographer and Global Issues. Schwartz’s office has centered its efforts on emergency responses to humanitarian disasters, which involve digital mapping, imagery analysis and fieldwork operations designed to deliver relief to vulnerable refugees and displaced persons. He also leads a program designed to build partnerships to support the use GIS&T for sustainable development activities in Africa.

Taking Society’s Pulse in Real-Time

Ben Lewis, Todd Mostak, Jeff Blossom, Chris Tucker

Abstract: TweetMap is a web-based platform for real-time visualization and analysis of georeferenced tweets. It is built on the MapD, a massively parallel database platform, and WorldMap, both are under rapid development at MapD. They can stantomately see the distribution and intensity of tweets filtered by any keyword in space and time. What is the value of such a platform in the hands of researchers, decision makers, service providers, or criminals?

Ben Lewis is a Senior GIS Specialist at the Center for Geographic Analysis. He is system architect for Geographic Analysis. He is system architect for the TetraMap, an OGC GIS geosynchronization, and conformance testing procedures for OGC’s web services and encoding standards. Raj has a PhD in Planning Information Systems and a Master’s in City Planning from MIT.

The Internet of Things: Policy and Legal Frameworks Necessary to Support Smart Grid/Intelligent Transportation Systems/Smart Cities

Kipp Jones, Valerie Shuman, Kara John, Geoff Zeiss, Bukka-Pekka Onnela, Meraj Mirza

Abstract: Many predict that in the very near future we will see billions of devices connect- ed to the internet. This “Internet of Things"
Abstract: This talk addresses the landscape of data confidentiality research challenges and opportunities generated by three inter-related AAG research initiatives: 1) Addressing Challenges For Geospatial Data-Intensive Research Communities: Research on Unique Confidentiality Risks & Geospatial Data Sharing within a Virtual Data Enclave (funded by NSF); 2) the AAG Initiative for an NIH-wide Geospatial Infrastructure for health research (funded by NIH and AAG); and 3) Geospatial Frontiers of Health and Social Environments (funded by NIH). These AAG initiatives have generated linked and interactive data confidentiality research needs and agendas in the rapidly expanding domains of spatial technology, spatio-temporal data generation, and related research methods. They have also created an increased awareness by health and biomedical researchers as well as by geographers of the core role that geography and GIScience plays in addressing global health and sustainability needs, both in research and in practice.

Douglas Richardson is the Executive Director of the Association of American Geographers (AAG). During the past ten years, he led a highly successful organizational renewal of the AAG and has built strong academic, research, publishing, and financial foundations for the organization’s future. Prior to joining the AAG, Dr. Richardson founded and for 18 years was the president of GeoResearch, Inc., a private-sector scientific research company specializing in geographic science and technology, including geographic information science and systems (GIS), spatial modeling, and Global Positioning Systems (GPS). GeoResearch developed and patented the world’s first real-time interactive GPS/GIS technologies, leading to far-reaching changes in the ways in which geographic information is collected, mapped, integrated, and used within geography, as well as in society at large. The technologies and methods pioneered by GeoResearch are now at the heart of a wide array of real-time interactive mapping, navigation, location-based business, geographic research, mobile computing, military operations, and large-scale operations management applications of most major industries and governments. Richardson sold his company and its core patents in 1998. Richardson continues to conduct research and publish across multiple dimensions of geography, ranging from the GISciences to the GeoHumanities, and from international health research to interactions between science, innovation, and human rights. He holds a Bachelor's degree from the University of Michigan and a PhD in Geography from Michigan State University. He has served on dozens of NGO and corporate boards of directors, and currently is a member of the National Geospatial Advisory Committee.
Managing Change by Technology Darwinism  
Jeff Harris

Abstract: Increasingly the world is now experiencing how the industrial internet now leverages the power of vast storage, communication and computational resources to connect machines embedded with sensors and sophisticated software to other machines and to us so data can be extracted, made sense of, and used to reveal new meaning and understanding where it did not exist before. Increasingly machines will have the analytical intelligence to self-diagnose and self-correct and this US leads to will deliver the right information to the right people, in real time, producing better business and social outcomes. Additionally, harnessing the power and availability of this information technology with skilled data analysts will enable the delivery of improved big data analytics faster and at lower costs. That said: the challenge will be to determine how to best align the technology, business, and skilled analysts to achieve world-class operational performance. This will drive a need for massive culture change as we struggle across both generational and private - government boundaries for how the speed and the why of massive technology empowerment and best how people, society and existing processes adapt. This change will not happen overnight. People and their governing bodies need new rules of the road in both law and regulation as society works to best understand the risks and rewards for widespread adoption of technologies that are infringing on the traditional boundaries of personal privacy. Learned behaviors both good and bad will be an important part of this evolution.

Jeffrey Harris has contributed to US national security in both Government and Industry for 35 years where he has fostered new technologies, programs and capabilities that have contributed significantly to US national security capabilities. He currently consults for Lockheed Martin in technical development. He served as President of Lockheed Martin Missiles and Space and President of Lockheed Martin Special Programs. He served as President of Space Imaging, the first company to commercially distribute and Space and President of Lockheed Martin. He served as President of the US Geospatial Foundation Board, Centre for Spatial Law and Policy Advisory Board and is the Chairman of Open Geospatial Consortium Board.

UN-Global Geospatial Information Management (UNGGIM): Legal and Policy Challenges  
Greg Scott

Abstract: The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) was established in July 2011 to be the official UN consultative inter-governmental mechanism on geospatial information. The fundamental objective is to ensure that Member States are able to set the agenda for the development of global geospatial information, whilst progressing its implementation.

Geospatial information is now being used by governments, organisations and individuals across the globe to support modelling and analysis to understand complex situations, enable effective decision making, drive innovation and efficiencies, and underpin economic growth. The global recognition of the power of accurate and reliable geospatial information has resulted in world leaders wanting to use this data to tackle global issues, including sustainable development. While the geospatial community recognises that this is technically achievable in a location-enabled society, the legal and policy frameworks required to facilitate the implementation are developing in a consistent way and are falling well behind technological developments. Member States are at different stages of geospatial development and are carrying out their responsibilities in a consistent and transparent legal and policy framework.

In this regard, UN-GGIM is assisting national governments in addressing very real challenges in areas such as data privacy, licensing, ownership, access, liability, quality, intellectual property, national security, etc. and their role in these complex processes. This presentation will discuss some of these legal and policy challenges.

Greg Scott is Inter-Regional Advisor on Global Geospatial Information Management in the United Nations Statistics Division (UNSD). UNSD is mandated to provide secretariat support to the recently created United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), an inter-governmental mechanism created by the Economic and Social Council (ECOSOC) in July 2011. In his role within the Secretariat, Greg provides high level strategic policy, technical and procedural advice and coordination in the implementation of UN-GGIM initiatives, particularly with the GGIM Bureau and Member States of the United Nations, and related International Organizations involved in national, regional and global geospatial information management.

Privacy Issues Associated with Location and Geospatial Information  
Kirk Goldsberry, Dave DiBiase, Jeremy Crampton, Nicolas Oreskovic, Sarah Williams

Abstract: Technology has resulted in a growing number of ways for an individual’s location to be collected and shared. This information can be used to provide a number of economic, societal and governmental benefits. However, it also raises questions as to what privacy rights and responsibilities do governments, industry and individuals have with respect to such privacy concerns. The panel has been designed to discuss this complicated and important topic from a variety of perspectives.

Kirk Goldsberry is a Visiting Scholar at the Center for Geographic Analysis at Harvard University, and an Associate Professor of Geography at the University of Colorado at Boulder. He has designed and taught courses on mapping, urban geography, and public health. His research focuses on the use of geospatial technologies to provide information to aid decision making in a wide array of applications including urban planning, public health, and resource management.

Nicolas Oreskovic is a physician at Massachusetts General Hospital. His research interests are to better understand how the characteristics of a location (“built environment”) affect and influence human health, especially energy balance and chronic disease, among both children and adults. His research has included mapping various locations and measuring and collecting data, and linking these data with health outcomes.

Sarah Williams is currently an Assistant Professor of Urban Planning and the Director of the Civic Data Lab Project at Massachusetts Institute of Technology’s (MIT) School of Architecture and Planning. The Civic Data Lab empowers community residents and others to develop and use sophisticated technologies to expose and communicate urban patterns and policy issues to broader audiences. Before coming to MIT Williams was Co-Director of the Spatial Information Design Laboratory at Pennsylvania State University. Williams has won numerous awards including being named top 25 planners in the technology and 2012 Game Changer by Metropolis Magazine. Her work is currently on view in the Museum of Modern Art (MoMA), New York.

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UN-Global Geospatial Information Management (UNGGIM): Legal and Policy Challenges

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Abstract: Government agencies are the repositories of vast amounts of data, much of it tied to a location, an individual or both. This information is the foundation for creating a location-aware society. However, sharing this data between government agencies has always been a challenge from a policy and legal standpoint. These issues have become even more important due to the increase in citizens becoming both data users and data providers in this process. This panel will discuss these issues and suggest ways in which they can be addressed.

Matt Gentile is head of geospatial practice and principal at Deloitte Digital Advisory Services. He is a member of the National Geospatial Advisory Committee (NGAC), a committee that provides recommendations and guidance to the Geospatial Information and Management issues and advice on development of the National Spatial Data Infrastructure (NSDI). Matt is a recognized thought leader and entrepreneur in the geospatial community, dedicating the past 20 years to the development of public policy and geospatial technology.

Latanya Sweeney is the Director of the Data Privacy Lab in 1Q85 at Harvard. As Professor of Government and Technology in Residence, she creates, implements, and uses technology to assess and solve societal, political and governance problems, and teaches others how to do the same. One focus area is data privacy, and she has published on Policy and Law: Identifiability of de-identified data. Dr. Sweeney’s current research goal is to replace the 3 historical pillars of privacy (consent, notice, and de-identification) with new technology-powered mechanisms that provide a fabric of privacy fabric appropriate for today’s setting. The goal is to allow society to reap the benefits of emerging technologies while enjoying privacy protection.

Ben Lewis is a Senior GIS Specialist at the Center for Geographic Analysis. He has 17 years working in the GIS industry as a technician, analyst, developer, and manager. Prior to joining the CGA, Ben was the GIS Photogrammetry Manager at University of Denver, and served as Chairman of Denver’s GIS Steering Committee. He is especially interested in developing tools, teaching methods, and maps using geographic information that can be used by any student or professional to enhance their work.

Chris Tucker is active in the geospatial industry and the GIS national security community, and as Principal of Yale House Ventures, manages a portfolio of technology startups and social ventures. He was the founding chief strategic officer of In-Q-Tel, the CIA’s venture capital fund, charged with developing In-Q-Tel’s overall strategy for tackling the world’s most challenging national security problems. Tucker serves on the board of the Global Foundation which seeks to develop an online social media platform that enables a global community of experts to “crowd source” socio-cultural phenomena, and to publish “MapStories” as spatio-temporal enabled narratives. Tucker serves on the board of directors of the Open Geospatial Consortium and the Open Geospatial Foundation, and serves, or has served on Federal Advisory Committees such as the Defense Science Board’s Intelligence Task Force and the United States Department of Interior’s National Geospatial Advisory Committee.
Abstract: As the Internet becomes part of daily living rather than a place to visit, its rough edges - such as content promoted by sovereigns wanting to protect consumers, prevent network resource abuse, and eliminate speech deemed harmful - now within reach to permit sovereigns with competing rulesets to play down their differences whether by countenancing global privatization of some Internet governance issues through organizations like ICANN, committing to new international agreements on substance and procedure to reduce the friction caused by transborder data flows, or by a “live and let live” set of localization technologies to shape the Internet to suit the respective societies it touches. These shifts will help ease the tension between the certitudes that the Internet is global, while the imposition of regulation is almost always local. Such cure for the longstanding dilemmas of Internet jurisdiction and venue has been the relatively untouched, cherished aspects of a global Internet as well - urging us to consider the iatrogenic effects of bulldozing online activity to conform more to the boundaries of the physical world that preceded it, and explaining why, in the United States and elsewhere, there are contradictory policies emerging about the Internet’s future.

Jonathan Zittrain is Professor of Law at Harvard Law School and the Harvard Kennedy School of Government, Professor of Computer Science at the Harvard School of Engineering and Applied Sciences, and co-founder of the Berkman Center for Internet & Society. His research interests include the boundaries of the physical world that preceded the Internet and explaining why, in the United States and elsewhere, there are contradictory policies emerging about the Internet’s future.
Abstract: Earth Observation - whether from space, air, sea or on the ground - is critical to deal with the increasingly complex issues mankind faces across the globe. Resolving such transnational issues will mean collecting, distributing and analyzing vast amounts of information from a variety of sensors. These sensors are owned and/or operated by government, the private sector, non-governmental organizations and increasingly citizens themselves. This panel will address the complex legal and policy issues required to collect and share this information across borders.

Nancy Colleton is a leader in environmental communication and information. As the president of the Institute for Global Environmental Strategies (IGES) she leads numerous initiatives that promote better understanding of the changing planet. Nancy has worked vigorously with senior-level government and industry executives to increase the awareness, value and use of Earth observations and to emphasize the need for a comprehensive strategy to ensure that citizens, business, and government at all levels have the environmental intelligence needed for improved decision making.

Dan Jablonsky serves as DigitalGlobe’s Senior Vice President, General Counsel and Secretary. Prior to joining DigitalGlobe, he was a shareholder at Brownstein Hyatt Farber Schreck, LLP, a law firm, where he practiced corporate and securities law. Before joining Brownstein, Dan served as the Interim Co-General Counsel and Senior Corporate Counsel, Securities and M&A at Flextronics. He has handled financial fraud and insider trading cases as a member of the Division of Enforcement of the U.S. Securities and Exchange Commission, and practiced corporate and securities law with O’Melveny & Myers LLP. Dan served as an officer and nuclear engineer in the United States Navy.

Keith Mashback is the Chief Executive Officer of the United States Geospatial Intelligence Foundation (USGIF). The Foundation promotes the geospatial intelligence (GEOINT) tradecraft and sustains a GEOINT Community among government, industry, academia, professional organizations and individuals. He is a member of NOAA’s Advisory Committee on Commercial Remote Sensing and a former member of the Intelligence Task Force of the Defense Science Board.

Charlie Hale is a Policy Analyst at Google. He works on public policy and government affairs for Google’s geo products (Maps & Earth) and Google[x], which includes the self-driving car project and Google Glass, among others. He is also Co-Founder at Global Health Corps, and a member of the Advisory Board at Envoya.

Role of Government in a Location-enabled society
Steve Goldsmith, Nigel Jacob, Ebele Okobi, Sandy Pentland

Abstract: The session will focus on the role of government as an enabler of strategic policy frameworks for location based services, data, and related issues. Roundtable participants will consider three different focal points for discussion: (1) conceptual strategies that can be used to foster relationships between government, industry, and citizens; (2) organizational approaches to leadership in the development of policies, norms, and laws around the risks and opportunities presented by spatial data; and (3) existing and envisioned technical interventions including standards development, legal interoperability, considerations of privacy and security, and generation of frameworks of cooperation.

Stephen Goldsmith is the Daniel Paul Professor of the Practice of Government and the Director of the Innovations in American Government Program at Harvard’s Kennedy School of Government. He currently directs the Mayoral Performance Analytics Initiative at Harvard, a project to highlight local government efforts to use new technologies that connect breakthoughs in the use of big data analytics with community input to reshape the relationship between government and citizen. He previously served as Deputy Mayor of New York and Mayor of Indianapolis, where he earned a reputation as one of the cases as a leader in public-private partnerships, competition, and privatization. Stephen was also the chief domestic policy advisor to the George W. Bush campaign in 2000.

Nigel Jacob is the co-founder of New Urban Mechanics, board member at Code For America, Fellow at the Center for Advancement of Public Action at Benning College, and a policy advisor at Boston City Hall. He is working to create a network of civic innovation laboratories that spans the globe and enables cities to collaborate around the development of new kinds of civic technologies. He specializes in development of public-private collaborations, civic innovation, civic software architecture and engineering, and research and development.

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Thursday, May 2, 2013

1:00 PM - 1:30 PM Registration

1:30 PM - 1:40 PM Welcome & Introduction
   Peter Bol & Kevin Pomfret

1:40 PM - 2:20 PM Be Careful What You Ask For: Reconciling a Global Internet and Local Law
   Jonathan Zittrain
   Moderator: Peter Bol

2:20 PM - 3:30 PM Geospatial and Developing Economies
   Marcia Castro, Ron Garan, Ken Westrick, Lee Schwartz
   Moderator: Calestous Juma

3:30 PM - 3:50 PM Coffee Break

3:50 PM - 5:00 PM Taking Society’s Pulse in Real-Time
   Ben Lewis, Todd Mostak, Jeff Blossom, Chris Tucker
   Moderator: Kirk Goldsberry

5:00 PM - 5:30 PM NSF and NIH Research on Geographic Data Confidentiality and Privacy
   Doug Richardson
   Moderator: Peter Bol

5:30 PM - 6:30 PM Reception

Friday, May 3, 2013

8:30 AM - 9:00 AM Registration and breakfast

9:00 AM - 9:10 AM Welcome & Introduction
   Peter Bol & Kevin Pomfret

9:10 AM - 9:30 AM Managing Change by Technology Darwinism
   Jeff Harris
   Moderator: Peter Bol

Ebele Okobi is Global Head of Yahoo!’s Business & Human Rights Program, where she leads Yahoo!’s efforts to promote privacy and free expression on the Internet, and works to identify innovative solutions to human rights challenges. Before joining Yahoo!, Ebele worked as a corporate lawyer at Davis Polk & Wardwell, an attorney fellow at Consumers Union, a director of Advisory Services at Catalyst and as a member of the Management Development Program at SIE’s EMEA headquarters in Amsterdam, where she created marketing, corporate responsibility and business development strategy for Africa, NikeWomen and Nike Digital.

Alex “Sandy” Pentland directs MIT’s Human Dynamics Laboratory and the MIT Media Lab Entrepreneurship Program, co-leads the World Economic Forum Big Data and Personal Data initiatives, and is a founding member of the Advisory Boards for Nissan, Motorola Mobility, and a variety of start-up firms. He has previously helped create and direct MIT’s Media Laboratory, the Media Lab Asia laboratories at the Indian Institutes of Technology, and Strong Hospital’s Center for Future Health. In 2012 Forbes named Sandy one of the ‘seven most powerful data scientists in the world’, along with Google founders and the CTO of Facebook. Pentland directs MIT’s Human Dynamics Laboratory and the MIT Media Lab Entrepreneurship Program, co-leads the World Economic Forum Big Data and Personal Data initiatives, and is a founding member of the Advisory Boards for Nissan, Motorola Mobility, and a variety of start-up firms. He has previously helped create and direct MIT’s Media Laboratory, the Media Lab Asia laboratories at the Indian Institutes of Technology, and Strong Hospital’s Center for Future Health. In 2012 Forbes named Sandy one of the ‘seven most powerful data scientists in the world’, along with Google founders and the CTO of Facebook. Pentland directs MIT’s Human Dynamics Laboratory and the MIT Media Lab Entrepreneurship Program, co-leads the World Economic Forum Big Data and Personal Data initiatives, and is a founding member of the Advisory Boards for Nissan, Motorola Mobility, and a variety of start-up firms. He has previously helped create and direct MIT’s Media Laboratory, the Media Lab Asia laboratories at the Indian Institutes of Technology, and Strong Hospital’s Center for Future Health. In 2012 Forbes named Sandy one of the ‘seven most powerful data scientists in the world’, along with Google founders and the CTO of Facebook.

Panel Moderators

Calestous Juma is Professor of the Practice of International Development and Director of the Science, Technology, and Globalization Project. He directs the Agricultural Innovation in Africa Project funded by the Bill and Melinda Gates Foundation and serves as Faculty Chair of Innovation for Economic Development executive program. Juma is a former Executive Secretary of the UN Convention on Biological Diversity and Founding Director of the African Centre for Technology Studies in Nairobi. He is co-chair of the African Union’s High-Level Panel on Science, Technology and Innovation and a jury member of the Queen Elizabeth Prize for Engineering. He has won several international awards for his work on sustainable development.

Peter Bol is the Charles H. Carswell Professor of East Asian Languages and Civilizations. He led Harvard’s university-wide effort to establish support for geospatial analysis in teaching and research; in 2005 he was named the director of the CGA. He directs the China Historical GIS project, a collaboration between Harvard and Fudan University in Shanghai to create a GIS for 2000 years of Chinese history, and is involved in other projects aimed at enhancing digital information linkages between East Asian and Western scholars.

Kevin Pomfret is the Executive Director of the Center for Spatial Law and Policy and a lawyer focusing on the unique legal and policy issues associated with spatial data and spatial technology such as intellectual property rights, licensing, liability, privacy and national security. He is a member of the Board of Directors of the Open Geospatial Consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.

Zachary Tumin is Special Assistant to the Director of the Belfer Center, and Faculty Chair, Science, Technology, and Public Policy Program. He leads the Belfer Center’s project in Information and Communications Technology and directs the Harvard component of a joint Harvard-MIT initiative in Cyber Security. His research focuses on the strategic management of collaboration across the boundaries of organizations, sectors, and citizens where information and communications technologies are critical enablers or obstacles. Of special interest are issues of people and politics; platforms, policy, and performance in matters of defense and intelligence; civic and political engagement; education, public health and public safety; and related areas.

Stephen Emen is Assistant Dean for Information Technology at Harvard Design School. Director of Computer Resources, and lecturer in the Department of Landscape Architecture, at the Harvard Graduate School of Design. His MLA is from UMass/Amherst, his PhD from MIT, and he is a Fellow of the American Society of Landscape Architects (FASLA). His current interests include Geodesign, innovation in digitally enabled design teaching and learning, and algorithmic design.

Urs Gasser is the Executive Director of the Berkman Center for Internet & Society at Harvard University. He teaches at Harvard Law School and Fudan University School of Management (China). Urs serves on the board of directors of the Helix Center and the Board of Directors of the Open Geospatial Consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.

Peter Bol is the Charles H. Carswell Professor of East Asian Languages and Civilizations. He led Harvard’s university-wide effort to establish support for geospatial analysis in teaching and research; in 2005 he was named the director of the CGA. He directs the China Historical GIS project, a collaboration between Harvard and Fudan University in Shanghai to create a GIS for 2000 years of Chinese history, and is involved in other projects aimed at enhancing digital information linkages between East Asian and Western scholars.

Kevin Pomfret is the Executive Director of the Centre for Spatial Law and Policy and a lawyer focusing on the unique legal and policy issues associated with spatial data and spatial technology such as intellectual property rights, licensing, liability, privacy and national security. He is a member of the Board of Directors of the Open Geospatial Consortium and is active in other geospatial associations. Prior to attending law school, Kevin served as a satellite imagery analyst and a Soviet analyst for the U.S. government where he helped to develop imagery collection strategies to monitor arms control agreements. He also served as the special assistant to the U.S. government official responsible for developing the intelligence community’s satellite imagery collection and exploitation requirements.
Location matters. Energy, sustainable agriculture, biodiversity, natural hazards, traffic and transportation, crime and political instability, water quality and availability, climate change, migration and urbanization – all key issues of the 21st century – have a location component. Critical geographic thinking, understanding and reasoning are essential skills for modern societies, and geospatial technologies for location based data collection, management, analysis and visualization have developed rapidly in recent decades. Today, these technologies are widely applied in routine operations in large corporations, entrepreneurial businesses, government agencies, non-governmental organizations (NGOs) and the social media of our daily lives. They save cost, improve efficiency, increase transparency, enhance communication, and help solve problems. Location-enabled devices are weaving “smart grids” and building “smart cities;” they allow people to discover a friend in a shopping mall, catch a bus at its next stop, check surrounding air quality while walking down a street, or avoid a rain storm on a tourist route – now or in the near future. And increasingly they allow those who provide services to track, whether we are walking past stores on the street or seeking help in a natural disaster.

Such deep penetration of the geospatial technologies into people’s daily lives, however, generates policy and legal concerns with privacy, ownership rights of location information, national and homeland security, uncertainty about government funding and regulation, and more. These issues are relatively new to the academic community and to human societies at large. Technology developers, industries, legal experts, policy makers and citizen rights advocates would be well served in talking to one another as they grapple with the opportunities and challenges of a location-enabled society.