The Role of Information and Communications Technology (ICT) in Helping Decision-Makers Meet Food, Energy and Water (FEW) Needs

A workshop on Saturday, May 18 at Harvard Kennedy School of Government
8am – 5pm, Bell Hall, Belfer Buidling

The ICT for FEW workshop is being organized by an inter-disciplinary group of Fellows in the Sustainability Science Program at Harvard Kennedy School with the goal of better understanding the role that Information and Communications Technology (ICT) could play in improving Food-Energy-Water (FEW) policy, especially with respect to transparency, decision-making and citizenship engagement.

The workshop includes experts from the broader field of ICT for development (see below for a list of participants). The format of the workshop will consist of brief presentations followed by moderated open discussion. The scope of the workshop is purposefully broad and reflects an attempt to bridge divides across academic disciplines and across the FEW nexus.

Our hypothesis going into the workshop is that technologies exist, but there are clearly critical policy barriers for their effective use and deployment. What are the factors that lead to their effective deployment and what are the critical research questions that need to be examined to better address how ICT can fulfill FEW needs? Many people focus on the "potential" of ICT but what does the evidence show? We are particularly interested in considering these questions within the context of five themes, namely the potential of ICT to improve:

1. transparency and accountability in water resources management, and specifically, to monitor and report river flows in real-time
2. efficiency and citizen/customer engagement in water and sanitation service delivery
3. effective use of a "smart grid" for renewable energy
4. translation of climate change modeling information to end users and sourcing of relevant local data
5. transparency in the food value chain through product traceability (i.e. smart barcodes with information, like certification labels, about food items on supermarket shelves).

As the organizers of the workshop are at the start of their academic careers, one key goal of the workshop is to help define scholarly research agendas within this inter-disciplinary space and to discuss different methodologies and approaches for tackling them. The key insights from the workshop will be summarized into a report.

For more information, please contact: laura_pereira@hks.harvard.edu, patricia_guardabassi@hks.harvard.edu, and/or sharmila_murthy@hks.harvard.edu

Friday, May 17

6:30pm   **Dinner at Harvard Faculty Club**
Informal introduction of each participant (name/institution/interest)
Participants to write down a few questions/themes to discuss Saturday (collected at end)

Supper Talk - *ICTs 4 FEW 4 ALL?* by Bob Day (10-12 mins)
There are critical issues for an inter-disciplinary research agenda addressing the role that ICTs can play in promoting ubiquitous and secured access to food, energy and water (FEW). In identifying and starting to address these, this workshop advocates some refreshing approaches: avoid technology push; harness multi-disciplinary and multi-sectoral collaboration to tackle complex problems, using systemic thinking; combine the strengths of bottom -up and top-down approaches, amongst others. However, there are also major challenges that cannot and should not be avoided. For instance: a paucity of evidenced-based thinking and policy formulation based on evidence; ICT's poor track record for sustainable impact; a lack of awareness of the role that ICTs can play at the policy and strategy levels. These few remarks will provide a context to consider the question being posed for the workshop: What role can the data generated through ICTs play in aiding decision-making to meet current and future FEW needs in the wake of climate change?

Saturday, May 18

8:00   **Breakfast**

8:45am   **Welcome Remarks**
Professor Calestous Juma

9:10am   **Goals of this Workshop**
Laura Pereira

9:20am   **Session 1: Data Needs**
Moderator: Sharmila Murthy

The Importance of Data in Helping Decision-Makers to Meet Current and Future Food, Energy, Water (FEW) Needs by Deniz Susar (10-12 mins)
This presentation will look at the role and the importance of data in achieving development goals particularly in engaging citizens in the development process. After giving an overview of emerging trends in the area of data such as "big data", "open government data", the presentation will highlight major initiatives from the UN System and around the World such as UN Global Pulse, Open Government Partnership, UN Guidelines on Open Government Data related to the Water, Energy and Food Security Nexus.

Open Discussion

10:10am   **Session 2: Understanding the role of ICT** *for development*
Moderator: Patricia Guardabassi

Major Trends and Challenges of ICTD by Revi Sterling (10-12 mins)
This talk will address the challenges of ICTD, covering topics such as scale, "utility gaps," human motivation, replication of power structures, lack of integration, legal v. illegal tech, as well as

other things that people often forget about when they "add tech and stir." It will also consider how ICT can best serve development going forward, addressing issues such as white space/spectrum, pre-development readiness and integration with engineering for development.

Open Discussion

11am	**Coffee Break**

11:15 **Session 3: Promoting Innovation**
Moderator: Laura Pereira

Improving Water & Sanitation: The Role of Hackathons by Dan Shemie (5-7 mins)

The CommCare Platform: The Role of Open Source by Nnenna Okoye (5-7 mins)

Open Discussion

12:00 **Lunch AND Group Photo**

12:45pm **Session 4: FEW Nexus with Climate Change**
Moderator: Eunjee Lee

ICT and Food Vulnerability Analysis by Patrick Vinck (5-7 mins)

ICT in Trans-boundary Water Resource Management by Yohannes Gebretsadik (5-7 mins)

Open Discussion

1:30pm **Session 5: Perspective from Government Decision-Makers**

Benin: Césaire Ahanhanzo (5-7 mins)

Open Discussion

2:00pm **Coffee Break**

2:15pm **Session 6: Key themes and Questions → Break-out Groups**
The break-out groups will be designed to foster a more in-depth conversation around the key themes and questions that emerge at the workshop. The groups will be pre-determined so as to promote discussion across sectors and disciplines.

3:45pm **Plenary: Key Findings from Breakout Group**

4:30pm **Concluding Themes and Next Steps**

5pm **Adjourn**

Participants (in alphabetical order)

1. **Petrine Addae**, Master in Public Administration in International Development candidate, Harvard Kennedy School. petrine.10@gmail.com

2. **Césaire Ahanhanzo**, Masters in Public Administration-Mid-Career candidate and Mason Fellow, Harvard Kennedy School; and policy and leadership experience from Benin. cesaireahanhanzo@gmail.com

3. **Willow Brugh,** Director, Geeks Without Bounds; co-organizer and facilitator of events such as Random Hacks of Kindness, SpaceApps Challenge and Konbit Technologie. willow.bl00@gmail.com

4. **Dhairya Dalal**, Business systems analyst for Harvard Information Technology (HUIT), and Masters in Software Engineering candidate, Harvard Extension School. dhairya.dalal@rochester.edu

5. **Bob Day**, Founder and Co-Director, Non-Zero Sum Development; Member of Word Bank Expert Team working on Tanzanian Science, Technology & Higher Education Reform Program; and Special Advisor to the Mozambican Minister of Science and Technology. bobday@non-zero-sum.net

6. **Yohannes Gebretsadik,** Ph.D student at the University of Colorado, Boulder, and Visiting Student at the MIT Joint Program on the Science and Policy of Global Change. yohannes@mit.edu

7. **Pragun Goyal**, Master of Science candidate at the Responsive Environment research group at MIT Media Lab. pragun@media.mit.edu

8. **Calestous Juma**, Professor of the Practice of International Development at Harvard Kennedy School of Government. calestous_juma@harvard.edu

9. **Julia Cadaval Martins**, Visiting Researcher, Harvard Law School. juliacm@gmail.com

10. **Egghead O'Seun Odewale**, Fellow, Berkman Center for Internet & Society, Harvard University. oodewale@cyber.law.harvard.edu

11. **Mukhtar Abdi Ogle**, Masters in Public Administration-Mid-Career candidate and Mason Fellow, Harvard Kennedy School; and former Principal Examinations Secretary, Kenya National Examinations Council, Ministry of Education (Kenya) (2012). mukhtarogle13@gmail.com

12. **Nnenna Okoye**, Program Analyst, Dimagi.com. nokoye@dimagi.com

13. **Daniel Shemie**, Co-founder and project manager at mWater and former organizer of water-related 'hackathons' at World Bank. dan.shemie@gmail.com

14. **Revi Sterling**, Director of Information and Communication Technologies for Development (ICTD) at the Alliance for Technology, Learning and Society (ATLAS) at the University of Colorado Boulder. srsterling@gmail.com

15. **Deniz Susar**, United Nations Department of Economic and Social Affairs, who is currently serving as the Coordinator of the UNPAN Management Unit susar@un.org

16. **James Wescoat**, Aga Khan Professor, Aga Khan Program for Islamic Architecture and Department of Urban Studies and Planning, School of Architecture and Planning, MIT. wescoat@MIT.EDU

17. **Patrick Vinck**, Research Scientist at the Harvard School of Public Health and Associate Faculty with the Harvard Humanitarian Initiative (HHI). pvinck@hsph.harvard.edu

HARVARD Kennedy School
MOSSAVAR-RAHMANI CENTER
for Business and Government
Sustainability Science Program

Organizers in the Sustainability Science Program Fellows (in alphabetical order)

18. **Patricia Guardabassi**, PhD (engineering) – energy patricia_guardabassi@hks.harvard.edu

19. **Alicia Harley**, doctoral candidate (policy) – food harley@post.harvard.edu

20. **Eunjee Lee**, PhD (atmospheric sciences) – climate eunjee_lee@hks.harvard.edu

21. **Angela Livino**, doctoral candidate (engineering) – water angela_livino@hks.harvard.edu

22. **Scott Moore**, doctoral candidate (political science) – water scott_moore@hks.harvard.edu

23. **Sharmila Murthy**, JD, MPA (law) – water sharmila_murthy@hks.harvard.edu

24. **Laura Pereira**, DPhil (geography) – food, climate laura_pereira@hks.harvard.edu

25. **Chao Zhang**, PhD (engineering) – water, energy chao_zhang@hks.harvard.edu

Participant Bios

Petrine Addae just completed a Master in Public Administration in International Development (2013) at Harvard Kennedy School. She earned her BA degree in Economics and Psychology from the University of Ghana. Prior to enrolling at HKS, she served as an Assistant Economics Officer in the Ministry of Finance and Economic Planning (MOFEP) in Ghana. At MOFEP, she was in the Policy Analysis and Research Division and her main duty was to collate and analyze poverty reduction expenditure data. This data contributed to the national tracking of progress on the Millennium Development Goals and the translation of policy objectives into national budget.

Césaire Ahanhanzo is a Mid-Career Masters in Public Administration candidate, Harvard Kennedy School. A native of Benin in West Africa, he is by training an Economist-Statistician. From 1999 to early 2006, he worked for the Ministry of Health of Benin, where he was responsible for managing the Health Information System for communicable diseases. In March 2006, he joined "Agence de Médecine Préventive," an international non-profit organization, where he helped to design and implement a research project on the epidemiology of diseases that can be avoided through immunization in Africa, and also helped to build the capacity of local health practitioners. In addition, Césaire has carried out several consulting projects in Health Information System for the World Health Organization in numerous countries in Africa. He also recently conducted an impact evaluation baseline study in the health sector for the World Bank in Benin. He is very interested in exploring how Information Communication and Technology can be used to help alleviate the disease burden caused by lack of access to good quality water in Sub-Saharan Africa.

Olivier Donat Andriamahefaparany is currently a Mason Fellow Mid-Career MPA student at Harvard Kennedy School. In the last 12 years, Mr. Andriamahefaparany took different high level responsibilities in the Malagasy Government. Secretary General of the Ministry of Tourism affairs from May 2002 until February 2004, Secretary General of the Municipality of Antananarivo City from Mars 2004 until December 2004, Minister of Energy, Mines, Potable water and Sanitation from December 2004 until September 2007. In September 2007, he was elected Member of Parliament in the National Assembly of Madagascar where he was member of the two commissions "Infrastructure" and "Finance and Economy". His constituency was the fifth district of the Capital City Antananarivo. He received a Degree in Electrical Engineering from the University of Applied Sciences of Constance, Germany, a Master of Science in Renewable Energies from the University of Oldenburg in Germany and a master's degree in business administration from the Lancaster University Management School, UK. From July 2009 until June 2010, he was Hubert H. Humphrey Fellow at the University of Minnesota, Humphrey School of Public Affairs.

Willow Brugh is an organic chat client, spanning a multitude of subcultures and putting like-minded (but differently disciplined) people in touch. Many of these connections are made at events she co-organizes and facilitates like Random Hacks of Kindness, SpaceApps Challenge, Konbit Technologie (the first hackathon to ever take place IN Haiti),H4D2, and #EveryoneHacks. She is a co-founder and current board member of Jigsaw Renaissance, a learning and making community in Seattle; co-founder and past director ofSpace Federation, linking together hacker and maker spaces; and current director Geeks Without Bounds. GWOB is an accelerator for humanitarian projects, and deployed with the FEMA Innovation Team for Hurricane Sandy response. 2013 brings the new adventure of researching how decentralized groups scale at MIT's Center for Civic Media.

Dhairya Dalal is currently a business systems analyst for Harvard Information Technology (HUIT). He is also pursuing a masters in Software Engineering at the Harvard Extension School. He is passionate about developing and leveraging ICTs and web technologies to build communities and to utilize them for social change. In his spare time, he serves as a consultant to TechChange, where he teaches online workshops on digital organizing, social media strategy, and OpenData APIs, and web development for change. Recently, he started volunteering with Random Hacks of Kindess and Geeks Without Bounds to organize hackathons and maker-spaces to bring together developers, local government, and community organizations to build and leverage open technologies to solve social problems.

Bob Day, PhD, is the Founder and Co-Director of Dr Day is the founder and co-director of a South African consultancy, "Non-Zero-Sum Development", specializing in knowledge ecology, the information society, the future, and innovation. Born in the UK, Bob Day immigrated to South Africa 38 years ago after receiving his PhD in Applied Physics at Imperial College, University of London. Since the 1980s he has been applying Science, Technology and Innovation (STI), supplemented by ICTs, Knowledge Management, and Foresight to alleviate poverty and promote socio-economic development. He held senior positions in the Medical Research Council, the Council for Scientific and Industrial Research, and UNISA, but in 2003 he founded Non-Zero-Sum Development to pursue this passion in a more focused way. Non-Zero-Sum Development is working with leading development organizations, regional and national research organizations, as well as several national government institutions on a range of STI initiatives in many African countries.

Yohannes Gebretsadik is a Ph.D student at the University of Colorado, Boulder, and a Visiting Student at the MIT Joint Program on the Science and Policy of Global Change. Yohannes has participated in large-scale projects since 2003. His focus is mainly within the Nile Basin, in areas of flood protection and early warning, transboundary joint multipurpose projects, irrigation and drainage, watershed management, Basin wide Hydrologic Studies, and development of planning and decision support tools. He specializes in analysis involving Hydrologic and Water resources systems modeling, GIS and remote sensing analysis. Yohannes obtained his Bachelors of Science Degree in Civil Engineering and Masters of Science Degree in Hydraulic Engineering from Addis Ababa University. He is currently pursuing his PhD in Water Resources Engineering at the University of Colorado at Boulder.

Pragun Goyal is a first year masters student at the Responsive Environments research group at the MIT Media Lab. He is working with Ethan Zuckerman, the Director of the Center for Civic Media at MIT, to develop a project to help people in nations where electric power is scarce to sell power to their neighbors. They are designing a piece of prototype hardware that plugs into a diesel generator or other power source, distributes the power to multiple outlets, monitors how much power is used, and uses mobile payments to charge the customer for the power consumed. The project involves a lot of creative thinking about an improvised smart grid.

Patricia Guardabassi is a Giorgio Ruffolo Post-doctoral Research Fellow in the Sustainability Science Program. Her research investigates how the production of ethanol could be sustainably introduced in African countries drawing on the successful Brazilian experience in introducing sugarcane ethanol in its energy matrix. Over the past decade she has been associated with the Brazilian Reference Center on Biomass, developing studies related to biomass-based energy production. Patricia is contributing to collaborative work with the Initiative on Biofuels and Globalization led by Henry Lee. She is a chemical engineer (2001) and holds a PhD in Science (2011) and Master's degree in Energy (2006) both from the University of São Paulo. Her dissertation analyzes the main barriers to the development of bioethanol industry in developing countries, especially those located in Latin America and Africa. She has published papers and chapters on the sustainability of biofuels production in Brazil. Her faculty host is Henry Lee. Her SSP research topic is "The role of public policies to overcome the obstacles to the expansion of biofuel programs in African countries."

Alicia Harley is a doctoral candidate in Public Policy and a Giorgio Ruffolo Doctoral Research Fellow in the Sustainability Science Program at Harvard's Kennedy School of Government. She is broadly interested in innovation systems, participation and collective action in agriculture development. Within these literatures, she studies institutional reform and strategies for improving iterative learning processes and organizational reflexivity in support of innovation and technology cooperation in agriculture development. Her dissertation is on technology adoption and local innovation amongst smallholder farmers in Egypt and India, focusing on the different capabilities of public, private and civil society sectors in supporting smallholder agriculture. Alicia also leads the food and agriculture systems working group as part of a collaborative project with the Initiative on Innovation and Access to Technologies for Sustainable Development led by Professor William Clark. She received her BA, magna cum laude, in Environmental Science and Public Policy and a citation in Arabic from Harvard College in 2008 and subsequently worked as a greenhouse gas reduction program coordinator for Harvard's Office for Sustainability. Following that, she spent a year in Cairo as a Fulbright Scholar researching the political economy of agriculture and

food security in Egypt before returning to graduate school. Her SSP research topic is "Innovation and technology transfer in agri-food systems for sustainable development and improved livelihoods."

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 was Chancellor of the University of Guyana and has been elected to several scientific academies including the Royal Society of London, the US National Academy of Sciences, the World Academy of Sciences, the UK Royal Academy of Engineering and the African Academy of Sciences. He has won several international awards for his work on sustainable development. He holds a doctorate in science and technology policy studies and has written widely on science, technology, and environment. Juma serves on the boards ofseveral international bodies andis editor of the International Journal of Technology and Globalisation and theInternational Journal of Biotechnology. His latest book, The New Harvest: Agricultural Innovation in Africa, was published by Oxford University Press in 2011. He is currently working on on books on engineering for development and resistance to new technologies.

Eunjee Lee is a Giorgio Ruffolo Post-doctoral Research Fellow in the Sustainability Science Program and based at Harvard's Department of Organismic and Evolutionary Biology. She is exploring the sustainability of the hydrologic cycle in the Amazon and surrounding regions with the ongoing expansion of agriculture and changes in climate and increasing carbon dioxide. Eunjee is contributing to collaborative work with the Initiative on Sustainable Development in Amazonia: Land Use and the Hydrologic Cycle led by Professor Paul Moorcroft. Prior to joining Harvard, Eunjee received her Sc.D. in Atmospheric Sciences from the Massachusetts Institute of Technology (MIT) in 2011 and worked as a post-doctoral research associate at the MIT Center for Global Change Science. Her dissertation investigated the role of meteorology-driven seed dispersal in the plant migration process and the impacts of anticipated climate change on natural biogeography and ecosystems. Eunjee is a recipient of the Martin Fellowship for Sustainability (2008) and the MIT Presidential Fellowship (2005). She also holds a master's degree in Chemistry from Ohio State University, and a bachelor's degree in Chemical Engineering from Seoul National University. Her faculty host is Paul Moorcroft. Her SSP research topic is "Integrated assessment of land-use and hydrology for sustainable development of the Amazon under changing climate."

Angela Livino is a Giorgio Ruffolo Doctoral Research Fellow in the Sustainability Science Program and based at Harvard's School of Engineering and Applied Sciences and a Fulbright Fellow. She is doctoral student in water resources at the Civil Engineering Program at the Federal University of Rio de Janeiro. Her work assesses the impact of changed Amazon water balances for precipitation and hydrology on the operation of hydropower stations and explores how the design and operation of hydropower plants might be modified to adapt to changed hydrological patterns. Angela is contributing to collaborative work with the Initiative on Sustainable Development in Amazonia: Land Use and the Hydrologic Cycle led by Professor Paul Moorcroft. She was a senior advisor on energy supply at Empresa de Pesquisa Energetica, Brazil's agency for power planning (2005-2012). Prior to that she was a senior engineer at Operador Nacional do Sisetma Electicos (1998-2001). She received a Masters of Engineering in water resources (2001) and a Bachelor of Sciences in Civil Engineering (1999) from the Federal University of Rio de Janeiro. Her masters work developed a stochastic model to forecast daily stream flow in to be used in operating programming of hydropower plants in Brazil. Her faculty host is John Briscoe. Her SSP research topic is "Analyzing the impacts of climate change on Amazon rivers and the implications for energy development."

Julia Cadaval Martins is a Visiting Researcher at Harvard Law School, working on cooperative arrangements for water governance in federal systems, looking at different models of assigning responsibilities between multiple levels of government and how these models have evolved. She previously worked as a consultant on a social and economic development project in the North of Brazil and was also a researcher in a project funded by the Brazilian government that assessed the problems in the relationship between regulatory agencies and the judiciary. Julia

holds a Bachelor of Laws degree from the Rio de Janeiro State University, a Master of Laws degree from the Pontifical Catholic University of Rio de Janeiro, and an LL.M. degree from Harvard Law School, where she was also

a Summer Academic Fellow. Julia's research focuses on law and development, central-local government relations, water governance, and institutional design.

Scott Moore is a joint Giorgio Ruffolo Doctoral Research Fellow in the Sustainability Science Program and the Energy Technology Innovation Policy project, a joint project of the Science Technology and Public Policy Program and the Environment and Natural Resources Program at the Belfer Center for Science and International Affairs. He is a doctoral candidate in Politics at Oxford University. He is a political and environmental scientist and is interested in the political and public policy dimensions of environmental change, particularly energy and climate, water resource, and marine issues. His dissertation is a comparative study of territorial politics and river basin management in the United States, India, China, and France. Scott is contributing to collaborative work with the Initiative on Sustainable Energy Development in China led by Professor Henry Lee. He comes to the Kennedy School from the Brookings Institution, where he researched energy and water policy implementation in China at the Brookings-Tsinghua Center for Public Policy in Beijing. Scott was an intern with the US Department of Energy China Office, a Global Governance 2020 Fellow, and a youth delegate at several UN climate conferences. He is a recipient of a Truman Fellowship, Fulbright Fellowship, and Rhodes scholarship. He received a Masters of Science in Environmental Change and Management from Oxford University (2008) and a Bachelor of Arts from Princeton University's Woodrow Wilson School of Public and International Affairs (2008). Scott intends to pursue a career in both academia and public policy. His faculty host is Henry Lee. His SSP research topic is "The politics of thirst: Hydropolitics in China."

Sharmila Murthy is a joint Fellow in the Human Rights to Water and Sanitation Program at the Carr Center for Human Rights Policy and the Sustainability Science Program at the Mossavar-Rahmani Center for Business and Government. Her research focuses on the intersection of human rights, poverty, and the environment. She has written on the relationship between land security and the challenges of realizing the human right to water and sanitation in the slums of Mumbai, India; on the history and meaning of the human right to water and sanitation and its relationship to the controversy over privatization; on the human right to water in the Negev in Israel; on Iraq's constitutional mandate to ensure the just distribution of water; and more broadly on water governance in the Middle East. She also serves as the Lead Investigator for the Water Sector in an interdisciplinary, cross-sectoral research project on "Innovation and Access to Technologies for Sustainable Development." Her faculty hosts are Professors Mathias Risse and William Clark. Sharmila received her JD from Harvard Law School, her Master in Public Administration from Harvard Kennedy School, and Bachelor of Science in Natural Resources from Cornell University. She clerked for the Honorable Martha Craig Daughtrey on the U.S. Court of Appeals for the Sixth Circuit.

Egghead O'Seun Odewale is a Fellow at the Berkman Center for Internet & Society, Harvard University. He is conducting research on how new technology has impacted open societies in Africa and the politics of control associated with the various experience. Odewale has been part of West Africa's social media actions influencing human rights, development research, governance and human security issues. He's best known as a citizen journalist influencing media practice and electoral transitions in the sub-continent. He has degrees in natural science and security sector governance. He has worked variously with regional institutions like the West African Civil Society Forum (WACSOF), the West African Bar Association (WABA) and recently, the Economic Community of West African States as Programme Officer (Youth), Programme Officer (Governance and Human Rights) and Research Assistant (Disaster Risks Reduction) respectively. His research experiences spanning the academic and development sectors cover both the natural and social sciences. In the development sector his focus areas include human rights, governance and political processes, regional integration and human security (security sector governance and architecture). He has five years of field experiences in Elections Observations and Monitoring in twelve member states of ECOWAS and other parts of Africa, UNOWA youth employment mapping in West Africa and inclusion of young people in processes for attainment of the Millennium Development Goals (MGDs) under the United Nations Millennium Campaign African office situated in Nairobi.

Mukhtar Abdi Ogle is currently a Master in Public Administration, Candidate at Harvard Kennedy School (2012-13), where is also a Edward S Mason Fellow in Public Policy Analysis and Management. He has extensive experience working with Kenya's Ministry of Education. He has served as Principal Examinations Secretary, Kenya National Examinations Council, Ministry of Education (Kenya); as National Research Coordinator, Southern and Eastern Africa Consortium for Education Quality (SACMEQ-KENYA); and as National Investment Programme Manager of the Kenya Education Sector Support Programme (KESSP): Examinations and Testing. He was also a member Member of the Presidential Education Reform Committee in Kenya (2011-12); UWEZO Advisory Board for East Africa and Kenya Chapter (2009 -2012); National Inter-Faith Dialogue Board (2008-2012); Advisory Board Committee of the Islamic Foundation (Kenya) (2011-2012); USAID Education Technical Contact Group (Nairobi);   National Council of Persons with Disabilities in Kenya (NCPWD), Chair of the Advocacy Sub-committee; MIT J-PAL Policy Team for Education in Africa; National Education Trustee of the Islamic Development Bank (Kenya) (July 2012); Diversity and Inclusion Committee, Harvard Kennedy School of Government (2012-2013). He received a Bachelor of Education from Kenyatta University, Nairobi, Kenya 1991 and a Master of Arts (MA) from Loughborough University, United Kingdom 2004.

Nnenna Okoye is program analyst at Dimagi, a privately held social enterprise founded in 2002 that seeks to deliver open and innovative technology to help underserved communities everywhere.   She is responsible for creating relationships with nongovernmental organizations that lead to tangible results for frontline workers. She volunteers for Node Africa, an initiative created by Africans for Africans, to enable young Africans to launch careers in social enterprises.

Laura Pereira is a Giorgio Ruffolo Post-doctoral Research Fellow in the Sustainability Science Program and Gundle South African Public Service Fellow. She uses complex adaptive systems theory to identify areas of adaptive capacity in the food system to climate change and other drivers of global environmental change. Her work has a developing country focus and she has conducted research in South Africa, Mozambique and Brazil. Laura is collaborating with the Initiative on Innovation and Access to Technologies for Sustainable Development where her host is Prof William Clark. Her project seeks to explore incentives for innovation within the food system in order to achieve food security goals under the added pressure of climate change and her research will be based in Brazil and South Africa. She has a BSc (Hons) with distinction in Ecology and Environmental Science from the University of the Witwatersrand in South Africa (2007) and received an Master of Science in Nature, Society and Environmental Policy from the University of Oxford (2008) with the support of an overseas postgraduate merit award from the University of the Witwatersrand. For her DPhil studies at the University of Oxford, she was the recipient of an Oppenheimer Memorial Grant, a Clarendon Scholarship and a Commonwealth Scholarship. Her DPhil thesis is entitled 'Private sector adaptive capacity to climate change impacts in the food system: Food security implications for southern Africa and Latin America' and she is expecting to have her viva in June 2012. Her faculty hosts are William Clark and Calestous Juma. Her SSP research topic is "Drivers of innovation in the food system faced with climate change."

Dan Shemie is the co-founder and project manager at mWater, a non-profit organization dedicated to the application of inexpensive, point-of-use mobile technologies for water and sanitation. Like an increasing number civic start-ups, mWater has its roots in the hacking community, of which Dan is an active member. Previously with the World Bank's Water Unit, Dan led efforts to design and execute numerous water-related hackathons in different countries. He has extensive experience translating user defined problems into usable entry points for the technology community and pairing water agencies with start-ups. He is also the co-author of a two-year flagship report on urban water insecurity in sub-Saharan Africa. Prior to his time at the World Bank, Dan lived and worked in China, returning most recently to complete a study of water quality in Lake Taihu. Dan holds an M.Sc in Water Science, Policy and Management from the University of Oxford, and a B.A. from McGill University.

Sarah Revital Sterling (Revi) is the founder and director of the first Information and Communication Technology for Development (ICTD) professional master's program in the United States, a program that places equal emphasis on technology, methodology, and development studies. Sterling also consults extensively for the United Nations, development agencies and high technology companies interested in utilizing technology for societal benefit. Previously, Sterling worked at Microsoft for 10 years where she spearheaded Microsoft Research's efforts in gender equity in computer science, as well as working as a software engineer and program manager for several versions of Windows, BackOffice Server, and products in the Emerging Technologies division. She has served on the leading gender and technology boards, and testified before the U.S. Congress about the need for more women in the technical workforce. She moved into the field of ICTD to research the impact of technology on women's empowerment in underdeveloped communities and specializes in creating custom hardware and software solutions for marginalized populations. She is most concerned on the "hidden" barriers to ICTD use and access. Some of these topics include gender and power relations, development readiness, community expectation management and systemic disempowerment. Her current research explores the potential of ICT to establish and sustain mental health interventions in remote communities with a history of trauma and isolation. Dr. Sterling has active field projects in Africa, India, and South America, as well as underserved communities in the United States. She is the recipient of the 2012 Anita Borg Institute Women of Vision award for Social Impact.

Deniz Susar is a staff member at the United Nations Department of Economic and Social Affairs (UNDESA). He is currently serving as the Coordinator of the UNPAN Management Unit (UMU) at the Division for Public Administration and Development Management (DPADM). His main research areas include e-government, open government, citizen engagement, and open government data. He has managed the data collection teams of the United Nations E-Government Survey and drafted the chapter on Multi-Channel Service Delivery in the last edition. Deniz holds a Master Degree on International Political Economy and Development from Fordham University, New York, USA and a Computer Engineering degree from the Bosphorus University of Istanbul, Turkey. He worked in several environments in both the private and public sector: he assumed senior project manager positions in technology companies serving the social and private sector in Dublin, Ireland and in Istanbul, Turkey.

James L. Wescoat, Jr. is the Aga Khan Professor, Aga Khan Program for Islamic Architecture and Department of Urban Studies and Planning, School of Architecture and Planning, MIT. His research has concentrated on water systems in South Asia and the US from the site to river basin scales. For the greater part of his career, Professor Wescoat has focused on small-scale historical waterworks of Mughal gardens and cities in India and Pakistan. He led the Smithsonian Institution's project titled, "Garden, City, and Empire: The Historical Geography of Mughal Lahore," which resulted in a co-edited volume on Mughal Gardens: Sources, Places, Representations, Prospects , and The Mughal Garden: Interpretation, Conservation, and Implications with colleagues from the University of Engineering and Technology-Lahore. These and related books have won awards from the Government of Pakistan and Punjab Government. The overall Mughal Gardens Project won an American Society of Landscape Architects national research merit award, as did a project on The Moonlight Garden: New Discoveries at the Taj led by Elizabeth Moynihan. At the larger scale, Professor Wescoat has conducted water policy research in the Colorado, Indus, Ganges, and Great Lakes basins, including the history of multilateral water agreements. He led a USEPA-funded study of potential climate impacts in the Indus River Basin in Pakistan with the Water and Power Development Authority (WAPDA). More recently, he led an NSF-funded project on "Water and Poverty in Colorado." He is currently conducting comparative research on international water problems. In 2003, he published Water for Life: Water Management and Environmental Policy with geographer Gilbert F. White (Cambridge University Press); and in 2007 he co-edited Political Economies of Landscape Change: Places of Integrative Power (Springer Publishing) for LAF Landscape Futures Initiative.

Patrick Vinck, Ph.D. is a Research Scientist at the Harvard School of Public Health and Associate Faculty with the Harvard Humanitarian Initiative (HHI). Before joining HHI in 2011, he directed and co-founded the Initiative for Vulnerable Populations at UC Berkeley's Human Rights Center, where he focused on managing and implementing empirical studies on the process of social reconstruction in countries affected by mass violence. His work is informed by several years of experience working on development projects in Africa. Vinck also-cofounded KoBo, a digital data collection project to advance human rights research. He serves as a member on the Committee on Scientific Freedom and Responsibility of the American Association for the Advancement of Science; an Adjunct Associate Professor at Tulane University's Payson Center for International Development; and a regular consultant on vulnerability analysis to the United Nations World Food Programme. His work has been published in journals covering a wide range of disciplines, including political science, social science, public health and medicine. He graduated as an engineer in applied biological sciences from Gembloux Agricultural University (Belgium), and holds a Ph.D. in International Development from Tulane University.

Chao Zhang is a joint Giorgio Ruffolo Post-doctoral Research Fellow in the Sustainability Science Program and the Energy Technology Innovation Policy project, a joint project of the Science Technology and Public Policy Program and the Environment and Natural Resources Program at the Belfer Center for Science and International Affairs. His research focuses on environmental policy assessment and the role of technologies in achieving sustainability, with emphasis on the application of modeling tools and environmental system analysis methods. Chao is contributing to collaborative work with the Initiative on Sustainable Energy Development in China led by Professor Henry Lee. He received both his PhD in Environmental Science and Engineering (2012) and Bachelor of Engineering in Environmental Engineering (2007) from Tsinghua University. For his PhD dissertation he developed a coupled bottom-up and top-down model to evaluate water pollution reduction potentials in China's key industries and to simulate the economic and social impacts of alternative water pollution control policies. This research was jointly supported by several projects on environmental technology assessment and policy evaluation funded by the National Science Foundation, China's Ministry of Environmental Protection, and China's Ministry of Industry and Information Technology. His faculty host is Henry Lee. His SSP research topic is "Integrated assessment of environment, energy and resource policies in China."