Abstracts and Biographical Sketches

Session 1: What Makes Innovators?
Friday, March 20 (1:15 - 3:30pm)

Matthew Wisnioski, *Cultivating Innovation Experts from “New Men” to Everyperson*
Joyce Bedi, commentary

Who is an innovator? The title conjures a range of character traits: creative, entrepreneurial, iconoclastic, playful, collaborative, visionary. And a range of policy prescriptions: national prizes, maker camps, self-help, and federal legislation. This paper surveys efforts in the U.S. to identify and foster innovators from the 1960s to today. I trace two factors at the core of a wide range of programs and prescriptions: the rise of innovation expertise—formal methods and institutional practices for enhancing innovative activity—and the images of ideal innovators that expertise is to create. I seek answers to questions of practical relevance such as: How have programs and sponsors defined innovators and innovation? Have such programs successfully fostered them? And based on what criteria? But my aim also is to understand how and why “innovation” became a defining cultural frame of our time. Explicitly or implicitly, how individuals, organizations, and networks conceive of innovators is entangled with how they think about societal goals and accordingly how they allocate cultural and economic value. Exploring the interplay of expert knowledge and social vision brings into relief the contested politics of what counts as innovation, who gets to be an innovator, and who can access the tools to practice it.

Mickey McManus and Dutch MacDonald, *Building a New Mind with Collaborative Innovation*
Jennifer Gustetic, commentary

Curious, empathetic, imaginative and collaborative are all characteristics of innovative people. Yet, an individual may possess all of these traits and still fail at solving complex problems. Why? Because interdisciplinary collaboration is hard. The abundance of tools and methods that make us feel more powerful as innovators often cause us to dismiss the ideas of people who think differently. Does that mean collaboration is becoming a scarce resource? If the 20th century was about climbing a discipline’s mountain to get really good about making things and reaching the top to make them right, the 21st century will be about exploring the space between the mountains and figuring out the right things to make. The hardest problems are found at the intersections of these disciplines, and those problems simply can’t be solved alone. Innovation today is about honing individual skills and applying them in the service of collaborative, interdisciplinary teams. In the future, a team’s super power will come from their ability to trust, embrace diversity of thought and have empathy for how others work. In this paper, McManus explores how innovators can hone their own expertise and build stronger interdisciplinary teams at the same time.
“Innovation” and the prototypical “innovator” have become closely associated with certain institutions and regions, including MIT and Silicon Valley. Policy-makers and administrators around the globe are increasingly turning to these perceived innovation leaders for “best practices” and transferable models to foster innovation at home. This proliferation of standardized models stands in contrast to the vastly different scientific, technological, and socioeconomic needs of regions as diverse as the Middle East, Southeast Asia, and Latin America, which poses conceptual and practical challenges for innovation policy. In this paper, I analyze three cases of institution-building for innovation using a cross-country comparative study of three start-up universities in Abu Dhabi, Singapore, and Russia, all built in collaboration with MIT. I investigate these start-up universities as boundary objects that accommodate diverse needs and constraints, and different underlying understandings of innovation, while still maintaining a common identity as institutions that foster innovation according to the “MIT model.” I show how these universities incorporate MIT expertise and legitimacy while simultaneously catering to distinct local visions of what innovation is, how it works, how can be stimulated, why it is needed, and what type of human resources it requires. The paper shows how local understandings of innovation get translated into different expectations towards MIT, resulting in different institutional architectures and activities deployed in the pursuit of innovation. Finally, I explore the policy implication of circulating innovation models as boundary objects that can account for both local political culture and global reference points and validation pressures.

Session 2: How Ought Innovators Be Made?
Friday, March 20 (3:50 - 6:00pm)

Lucy Sanders, *Measuring Absence: Women and Technology Innovation*
Janet Abbate, commentary

Technology innovation and computational advances are changing the world in a wide variety of ways – smart homes, smart cars, smart health, smart education, smart cities and so much more. As a young discipline, computing benefited greatly from the creative contributions of women. However, despite women’s early participation in computing, the expansion of women’s career choices into many fields that were not traditional for women, and women’s increasing participation in the private sector, today only 19% of all software developers are female. Of that 19%, very few are found in technology leadership roles that would enable them to make truly innovative contributions. While ample evidence exists to support the benefit of diverse thinking in computing innovation, numerous social and cultural influences impede women’s contributions to technical innovation teams. Hence, women are essentially “absent” from technology innovation - absent because of low participation, absent because the world doesn't experience their potential contributions, and absent because when women do make a technical contribution, they are often ignored, not recognized and not given credit for their ideas. This paper explores the influences negatively impacting women and technology innovators, describes adoptable practices that can mitigate these impacts, and discusses the important work of NCWIT (National Center for Women & Information Technology), an NSF-funded effort to significantly increase women’s meaningful participation in computing.
Erik Fisher, David Guston, and Brenda Trinidad, *Reflections on Responsible Innovation, Training, and Institutional Capacity Building*

Donna Riley, Commentary

Responsible innovation is an emerging term of art that builds on decades of policy experience, educational aspirations and scholarly insight around the complex interactions of science, technology and society. While the precise meaning of the term and its various cognates is still emerging and contested, we outline what we see as three distinctive features of responsible innovation as a practical and concerted attempt by science policy actors and others to address societal dimensions of science and innovation. We then briefly outline some of the implications for (re)training scientists, engineers and others involved in various aspects of innovation. Finally, we reflect on some of the integrative conditions and outcomes of the Center for Nanotechnology in Society at Arizona State University (CNS-ASU) as a basis for informing experimental institutional designs aimed at building capacities for responsible innovation.

Benoît Godin, *Innovation: The Conceptual History of an Anonymous Concept*

Lee Vinsel, commentary

Innovation is a term of honor and a catchword that everyone understands spontaneously – or thinks he understands – that every theorist talks about and every government espouses. Yet, it has not always been so. For most of history, the concept innovation has been a dirty word. The history of the concept of innovation is an untold story. It is a story of myths and conceptual confusions. In this paper, I will study the ways in which thoughts on innovation of early-modern society gave rise to innovation theory in the 20th century. Namely how, when and why a pejorative and morally connoted word shifted to a much valued concept. I offer a short history of the concept of innovation, going back to antiquity. A history that takes the use of the concept seriously: from polemical to instrumental to performative.

Session 3: Crafting Cultures for Innovators
Saturday, March 21 (9:45am - 12:10pm)

Eric Hintz, *A Tale of Two Institutes: Services for Inventors at the Franklin Institute and American Institute, 1824-1950*

David Kirsch, commentary

Inventors—successful ones, at least—do not work alone. Historically, inventors have partnered with venture capitalists, patent attorneys, manufacturers, marketers, and salesmen as they have moved along the spectrum from invention to innovation. Indeed, during the 19th and early 20th centuries, nominally “independent” inventors and their intermediaries together constituted a recognizable and vibrant professional community, which coalesced in mechanics’ institutes and inventors’ professional societies. These organizations served as foci for inventors’ professional activities, conferred legitimacy on their profession, and occasionally lobbied for political reforms. Thus, to fully understand innovation expertise, we must understand how these institutions served as mechanisms for training inventors, transmitting inventive culture, and helping inventors marshal the resources they needed to be successful. This paper compares the services available to independent inventors at two prominent mechanics’ institutes in the U.S., the Franklin Institute in Philadelphia and the American Institute in
New York. In the 19th century, these organizations provided support for inventors. However, around the turn of the 20th century, they scuttled many of these inventor-oriented programs to focus on science education, thereby depriving independents of an important source of institutional support. This paper explains why inventors—unlike scientists and engineers—failed to maintain durable organizations that might have been effective advocates for an increasingly troubled profession.

Doreen Lorenzo, “Herding Kittens”: Doreen Lorenzo and the Creative Mind
Matthew Wisnioski, commentary

A self-proclaimed ‘kitten herder,’ Doreen Lorenzo has been leading innovative minds through the process of turning chaos into creativity a majority of her professional career. Following a short biographical sketch, this interview follows her career through working in market films for Apple Inc., head of digital and later President of frog design, and lastly through her work in her former role, President of Quirky Inc. Explaining some of the mechanics of Quirky, Doreen shares how predictive measures and mass public influence can greatly impact design. She draws from her experience to share insights on managing creative minds and how that translates into the design process.

Monica Smith, commentary

Why do investments in certain places yield jobs, growth, and prosperity while similar investments made in seemingly identical places fail to produce the desired results? Starting with the observation that innovation clusters spatially across a broad spectrum of industries, my work seeks to understand the mechanisms and institutions that promote the creation of useful knowledge. In my conceptualization, entrepreneurs, as the agents who recognize opportunity, mobilize resources, and create value, are key to the creation of institutions and the building of capacity that will sustain regional economic development. Entrepreneurs benefit from location. But entrepreneurs are also pivotal as agents of change that can transform local communities. The initial event or entrepreneurial spark that gives rise to prosperous regions is not deterministic nor do they automatically set in motion path dependencies that automatically yield successful places. What matters most is human agency—the building of institutions and the myriad public and private decisions that determine what I call the character of place—a spirit of authenticity, engagement, and common purpose.

Session 4: Innovation Expertise from ‘K’ to Gray
Saturday, March 21 (1:30 - 3:50pm)

Natalie Rusk, Designing Learning Environments that Engage Young People as Creators
R. Benjamin Knapp, commentary

In order to thrive in a complex and rapidly changing world, young people need opportunities to design, test, and revise their ideas based on experience. In this paper, I tell the story of two learning environments that engage young people in developing their creative potential. First, I describe the ideas that shaped the Computer Clubhouse, an after-school program where youth (ages 10 to 18) design projects that build on their interests, with the support of adult mentors. Next, I explore how
the principles guiding the Computer Clubhouse influenced the design of Scratch, a web-based environment where young people (ages 8 and up) create interactive stories, games, and animations—and share them with others in a dynamic online community. I examine what youth participants say about their experiences in these creative environments, and offer suggestions for others seeking to broaden participation of young people in creative and collaborative learning environments.

Humera Fasihuddin and Leticia Britos Cavagnaro, University Innovation Fellows: The Making of an Innovation Movement
Marie Stettler, commentary

The University Innovation Fellows (UIF) are a national community of students in engineering and related fields who are leading a movement to ensure that all students gain the knowledge, skills and attitudes required to compete in the economy of the future. The program empowers student leaders to increase peer engagement with entrepreneurship, innovation, creativity, design thinking and venture creation. Fellows develop extra-curricular offerings, initiate strategic projects, and collaborate on joint projects while also championing a national movement for change in academia. The UIF is a program of the National Center for Engineering Pathways to Innovation (Epicenter). Funded by a five-year NSF grant, Epicenter arose from a recognized national imperative for engineering graduates to not only have strong technical skills, but also be able to recognize opportunities, understand customer needs and develop viable solutions that solve society’s most pressing problems. While the program’s initial focus was in undergraduate engineering education, Fellows have spearheaded interdisciplinary alliances with STEM, business and liberal arts disciplines.

Errol Arkilic, Raising the Innovation Corps
Walter D. Valdivia, commentary

In the spring of 2011, a small group of slightly irreverent and off-kilter program staff developed the Innovation Corps. What seems like an obvious extension of the NSF program portfolio today was, at the time, a high-risk start-up led by a bunch of misfits with a small chance of success. This paper, by the founding lead architect of I-Corps, describes some of the bedrock principles of the program and thought processes that went into its structuring.

“Super Commentary” and Overall Discussion
Saturday, March 21 (4:10-5:00pm)

W. Bernard Carlson

To close the workshop, W. Bernard Carlson will lead an open conversation to find significant connections between participants’ work. This concluding session will identify overarching themes from the papers, commentary, and discussions to be further explored as we pursue future publications.
BIOGRAPHICAL SKETCHES

Janet Abbate is an associate professor of Science and Technology in Society at Virginia Tech and co-director of the STS graduate program in Northern Virginia. She specializes in the history and policy of computing, with books including Inventing the Internet (MIT Press, 1999) and Recoding Gender (MIT Press, 2012), which explores how gender has shaped computing and suggests how the experiences of female pioneers can inform current efforts to broaden participation in science and technology. Her current research investigates the emergence of computer science as an intellectual discipline, an academic institution, and a professional identity. She received her BA from Harvard-Radcliffe and her PhD from the University of Pennsylvania.

Errol Arkilic leads M34 Capital, a private investment firm that focuses on seed-stage investments in companies being spun out of academic and corporate research labs. Previously, he was the founding lead program director of the National Science Foundation Innovation Corps, a role he took after leading the software and services portfolio at NSF for six years. Prior to his government service, he was founder and CEO of StrataGent Lifesciences. He has a PhD in Aero/Astronautics from MIT.

Catherine Ashcraft is a Senior Research Scientist with the National Center for Women & Information Technology (NCWIT) at the University of Colorado Boulder. Her research focuses on issues related to gender, diversity, and technology; organizational change and curriculum reform; and popular culture, media representations, and youth identity (especially as relates to race-ethnicity, gender, class, sexuality). She also has taught and presented at national and international venues on these topics for the past 15 years and has worked with a variety of government entities, advocating for CS/IT/ICT education and workplace policy. Dr. Ashcraft has published widely in top education and interdisciplinary journals, including the American Educational Research Journal, the International Journal of Qualitative Studies in Education, Men & Masculinities, Curriculum Inquiry, Teachers College Record, Anthropology & Education Journal, and Youth & Society. She obtained her MA in Organizational Communication and her PhD in Education from the University of Colorado.

Joyce Bedi is the Senior Historian at the Lemelson Center. She is responsible for the Center’s scholarly publication program and website, and assists with the development of scholarly programs and exhibitions. She is the co-editor, with Arthur Molella, of the Lemelson Center Studies in Invention and Innovation book series with MIT Press, and of the first volume in the series, Inventing for the Environment. Bedi has also authored publications and exhibitions on the work of Harold Edgerton in stroboscopic photography. Before joining the Lemelson Center in 1995, Bedi’s research and curatorial career included positions at the MIT Museum, the Edison National Historic Site, the IEEE History Center, and the Powerhouse Museum in Sydney, Australia.

Leticia Britos Cavagnaro is Deputy Director of the National Center for Engineering Pathways to Innovation (Epicenter), an NSF-funded initiative to foster innovation and entrepreneurship in engineering education nationwide. She is also a lecturer at Stanford University’s Hasso Plattner Institute of Design (d.school), where she teaches students of all disciplines how to build their creative confidence to become engines of innovation in their own lives, and as members of teams and organizations. She has a PhD in Developmental Biology from Stanford’s School of Medicine, and is a former member of the Research in Education & Design Lab (REDlab) at Stanford’s School of Education. She has worked to bring design thinking to hundreds of teachers and students of all ages, as well as corporate and non-profit leaders in the US and abroad. In 2013, Leticia engaged thousands of people
from over 130 countries in learning design thinking and applying the methodology to innovate in their contexts, via an experiential MOOC (http://novoed.com/designthinking).

**W. Bernard Carlson** is professor and chair of the Department of Engineering and Society with a joint appointment in the Corcoran Department of History at the University of Virginia. He is the author of several books on the history of science, technology, and innovation, including *Tesla: Inventor of the Electrical Age* (Princeton, 2013) and *Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900* (Cambridge, 1991). Carlson’s research interests include American business history, entrepreneurship, and social and cognitive theories of innovation. He is currently under contract to Oxford University Press as the general editor of *The Handbook of the History of Technology*. Carlson holds an AB from Holy Cross College and an MA and PhD from the University of Pennsylvania.

**Humera Fasihuddin** manages the University Innovation Fellows Program, a key initiative of the Epicenter and a joint-venture between Stanford University and VentureWell (formerly NCIIA). In her capacity as senior program officer, she trains students to create lasting institutional impact that enhances the innovation and entrepreneurship ecosystem on campus. While at VentureWell she led the creation of numerous programs including the organization’s first foray in advanced venture training workshops, which today account for over half of the 501c(3)’s income. Prior to VentureWell, Humera created innovation networks between industry and the University of Massachusetts Amherst under an NSF Partnership for Innovation grant. Humera began her career at the publicly-traded UK firm Rexam, serving as product manager in their precision coated materials subsidiary. Humera holds a BS from Smith College and a MBA from UMass Amherst.

**Maryann Feldman** is the Heninger Distinguished Professor in the Department of Public Policy at the University of North Carolina. Her research and teaching interests focus on innovation, the commercialization of academic research, and the factors that promote technological change and economic growth. Dr. Feldman was the winner of the 2013 Global Award for Entrepreneurship Research, awarded by the Swedish Entrepreneurship Forum and the Research Institute of Industrial Economics, for her contributions to the study of the geography of innovation and the role of entrepreneurial activity in the formation of regional industry clusters. Her recent work explores emerging industries, entrepreneurship and the process of regional transformation, the topic of the edited book, *Cluster Genesis: The Origins of Technology-Based Economic Development* (Oxford, 2006). She has also recently completed a study of the industrial applications of optical science, which will be published in *Economic Geography*. Currently, Feldman is actively engaged in researching the industrial genesis of the Research Triangle region, in a joint project with Nichola Lowe.

**Erik Fisher** is an assistant professor with a joint appointment in the School of Politics and Global Studies and the Consortium for Science, Policy and Outcomes at Arizona State University. He also serves as the Associate Director for Integration in the Center for Nanotechnology in Society. Fisher is PI on the NSF-funded *Socio-Technical Integration Research* project and co-leads a Real-time Technology Assessment (RTTA) research thrust. Fisher studies the multi-level governance of emerging technologies, spanning the nested chains of agency from "lab to legislature." He developed the collaborative, interdisciplinary approach of Midstream Modulation to help understand how social and ethical aspects of science and engineering decision-making may be broadened. Fisher's work has appeared in various journals including *Research Policy*, *Science and Public Policy*, and *NanoEthics*. He guest edited a special issue of *Science and Engineering Ethics* on "Science and Technology Policy in the Making: Observation and Engagement" and co-edited *The Yearbook of Nanotechnology in Society*,
Volume 1: Presenting Futures (Springer, 2008). Fisher holds a doctorate in Environmental Studies, a master’s degree in Classics (both from the University of Colorado), and a bachelor's degree in Philosophy and Mathematics from St. John's College in Annapolis.

Benoît Godin has been professor at the Institut National de la Recherche Scientifique (Montreal, Canada) since 1992. He holds a DPhil in science policy from Sussex University and has written extensively on concepts in science. From 2000-2007, he conducted a project on the history of science and technology statistics from which two books have been published: Measurement and Statistics on Science and Technology: 1920 to the Present (Routledge, 2005), and La science sous observation: cent ans de mesures sur les scientifiques, 1906-2006 (Presses de l’Université Laval, 2005). More recently, he launched a large-scale project on the intellectual history of innovation from antiquity to the present day. From that project came many papers and a book: Innovation Contested: The Idea of Innovation Over the Centuries (Routledge, 2015).

Jennifer Gustetic is the Assistant Director for Open Innovation at the White House Office of Science and Technology Policy. She previously served as the Prizes and Challenges Program Executive in the Office of the Chief Technologist at NASA Headquarters in Washington, D.C. Prior to her time at NASA, Gustetic was the lead for the strategic engagement and communications practice at Phase One Consulting Group. In this capacity she managed the development and implementation of the DOT Open Government Plan for the Department of Transportation. Her interests and experience focus on the public sector with concentrations on prizes and challenges, open government, innovation, public-private partnerships, grants management, and technology policy. Gustetic holds a bachelor’s degree in aerospace engineering from the University of Florida and a master’s degree in technology policy from MIT.

David Guston is professor of political science and co-director of the Consortium for Science, Policy and Outcomes at Arizona State University. He is Principal Investigator and Director of the Center for Nanotechnology in Society at Arizona State University, an NSF-funded Nano-scale Science and Engineering Center (NSF # 0531194) dedicated to studying the societal implications of nanoscale science and engineering research. He is widely published and cited on research and development policy, technology assessment, public participation in science and technology, and the politics of science policy. His book, Between Politics and Science: Assuring the Integrity and Productivity of Research (Cambridge, 2000) was awarded the 2002 Don K. Price Prize by the American Political Science Association for best book in science and technology policy. He is the general editor of the two-volume Encyclopedia of Nanoscience and Society (Sage, 2010). He has held visiting positions at Columbia University, the Copenhagen Business School and the Kent School of Law. He holds a BA from Yale and a PhD from MIT.

Eric S. Hintz is an historian with the Lemelson Center for the Study of Invention and Innovation at the Smithsonian’s National Museum of American History. He serves as a curator for the Center’s forthcoming (2015) exhibition, Places of Invention; produces the Center’s annual symposium series, “New Perspectives on Invention and Innovation;” coordinates the Center’s fellowship and grant programs; and assists in the collection of historically significant artifacts and documents. Eric’s research interests include the history of science and technology and US business and economic history; he specializes in the history of invention. Eric is currently working on a book that considers the changing fortunes of American independent inventors from 1900-1950, an era of expanding corporate R&D. He earned a BS in aerospace engineering from the University of Notre Dame and an MA and PhD in the history and sociology of science from the University of Pennsylvania.
David Kirsch is associate professor of Management and Entrepreneurship in the M&O Department at the University of Maryland's Robert H. Smith School of Business. From 1996 to 2001, Kirsch held various adjunct and visiting appointments at the Anderson Graduate School of Management, University of California, Los Angeles. His research interests include industry emergence, technological choice, technological failure and the role of entrepreneurship in the emergence of new industries. He is the author of *The Electric Vehicle and the Burden of History* (Rutgers, 2000). His work on the early history of the automobile industry has also been published in *Business History Review* and *Technology and Culture*. In 2003, his co-authored article on the Electric Vehicle Company received the IEEE Life Members Prize from the Society for the History of Technology. Kirsch is also interested in methodological problems associated with historical scholarship in the digital age. With the support of grants from the Alfred P. Sloan Foundation and the Library of Congress, he is building a digital archive of the Dot Com Era that will preserve at-risk, born-digital content about business and culture during the late 1990s. Selected materials are available to the public at www.dotcomarchive.org. He received his PhD in history from Stanford University in 1996.

R. Benjamin Knapp is the director of the Institute for Creativity, Arts, and Technology (ICAT) and Professor of Computer Science at Virginia Tech. He also leads the Music, Sensors, and Emotion research group, with researchers in the UK and the US. For more than 20 years, he has been working to create meaningful links between human-computer interaction, universal design, and various forms of creativity. He has served as a Fulbright Senior Specialist at University College, Dublin, and chief technology officer of the Technology Research for Independent Living Centre. As the director of technology at MOTO Development Group in San Francisco, he managed teams of engineers and designers developing human-computer interaction systems for companies such as Sony, Microsoft, and Logitech. He co-founded BioControl Systems, a company that develops mobile bioelectric measurement devices for artistic interaction. He also has served as professor and chair of the Department of Computer, Information, and Systems Engineering at San Jose State University. He holds a bachelor’s degree in electrical engineering from North Carolina State University and a doctorate and master’s degrees in electrical engineering from Stanford University.

Doreen Lorenzo is currently an independent consultant for management and operations of innovative companies. Previously, she has served as President of both Quirky and frog design, inc. She drove frog’s strategy, oversaw its worldwide operations, and was instrumental in taking it from a traditional design boutique to one of the world's foremost global innovation firms. In addition to her years building an interdisciplinary design business, she has been a member of the World Economic Forum's Global Agenda Council on Emerging Technologies and has become an internationally recognized thought leader on innovation and design. Lorenzo has also worked Director of Marketing Communications and Internet Marketing for Power Computing, where she built an online marketing division that brought in millions of dollars a day in product sales-long before Internet retailing was commonplace. Lorenzo holds a BA from the State University of New York, Stony Brook and an MS from Boston University's School of Communications.

Dutch MacDonald is the President and CEO of MAYA Design. He previously served as the company's chief operating officer. Prior to joining MAYA, MacDonald practiced architecture for more than 17 years, and was vice president at EDGE Studio, one of the Pittsburgh region’s most respected and creative architectural practices. He has been featured in publications such as Dwell, Fast Company, Architectural Record, and Metropolitan Home, and has exhibited his work at the Heinz Architectural Center and Florida Atlantic University. MacDonald’s video and installation work has been shown at
Pittsburgh’s Mattress Factory and at CMU’s Frame Gallery. He is the immediate past president of the Pittsburgh chapter of the American Institute of Architects and serves on the Governance Board of America Makes. He is a registered architect in both Pennsylvania and New York. He holds a BArch from Carnegie Mellon University and has also studied at the Ecole Polytechnique Federale de Lausanne and the University of Pittsburgh.

**Mickey McManus** is a pioneer in the field of collaborative innovation, pervasive computing, human-centered design and education. He is a principal of MAYA Design and the chairman of the board. For over a decade, he served as MAYA’s president, delivering above industry average profit margins—while consistently re-investing substantial funds back into MAYA’s R&D efforts. He spearheaded the launch of MAYA’s Pervasive Computing practice to help companies kick-start innovation around business challenges in a vastly connected world, where computing devices continue to outnumber people. To further explore this emerging value at the intersection of design, technology, and business, he co-authored *Trillions: Thriving in the Emerging Information Ecology* (Wiley, 2012), which received the 2013 Axiom Gold Award for best business book about technology. He has a BFA in industrial design from the University of Illinois and holds nine patents in the area of connected products, vehicles and services.

**Sebastian Pfotenhauer** is a lecturer and research scientist with the MIT Technology & Policy Program and the MIT Portugal Program, and a fellow of Harvard Program on Science, Technology and Society, Harvard Kennedy School. His research interests revolve around national and regional innovation strategies, capacity-building in science, innovation, and higher education, and the (global) governance of complex socio-technical systems. In his current research, he is focusing particularly on the role of complex international science, technology and innovation partnerships as policy instruments for social and economic development; national imaginaries of innovation; and the global circulation of innovation models and "best practices." Pfotenhauer has served as consultant and advisor to various public and private sector organizations, including the OECD, Skolkovo Foundation in Russia, and the government of Alberta, Canada. He holds a Master’s degree in Technology & Policy from MIT, a PhD in Physics from the University of Jena, Germany, and has received post-doctoral training in technology policy and STS at MIT and Harvard.

**Donna Riley** is professor of Engineering Education at Virginia Tech, where she is affiliate faculty in the Department of Science and Technology in Society. She is currently on rotation as Program Director for Engineering Education at the National Science Foundation. Riley joined Virginia Tech in 2014 after thirteen years as a founding faculty member in the Picker Engineering Program at Smith College, the first engineering program at a U.S. women’s college, and one of very few engineering programs in a liberal arts college context. Riley is the author of two books, *Engineering and Social Justice* (Morgan and Claypool, 2008) and *Engineering Thermodynamics and 21st Century Energy Problems* (Morgan and Claypool, 2011). She holds a BSE in Chemical Engineering from Princeton University and a PhD in Engineering and Public Policy from Carnegie Mellon University.

**Natalie Rusk** is a learning researcher at the MIT Media Lab where she develops technology-based initiatives that engage youth in creating projects based on their interests. She is a lead developer of Scratch, a programming language and online community that has engaged more than 5 million young people in learning to code interactive stories, games, and animations. She initiated the Computer Clubhouse after-school program, where young people from low-income communities around the world learn to express themselves creatively with new technologies. She worked for 10 years in science and technology museums, collaborating on national initiatives, such as the Playful Invention
Lucy Sanders is CEO and co-founder of the National Center for Women & Information Technology (NCWIT) housed at the University of Colorado at Boulder. She has an extensive industry background in R&D and executive positions at AT&T/Lucent Bell Labs for over 20 years. In 1996, she was awarded the Bell Labs Fellow Award, the highest technical accomplishment bestowed at the company, and she has six IT patents. She has served on the Mathematical Sciences Research Institute Board of Trustees at UC Berkeley, as well as on the Information Technology Research and Development Ecosystem Commission for the National Academies and the Innovation Advisory Board for the U.S. Department of Commerce. She is a recipient of the Computing Research Association's 2012 Habermann Award, and in 2011 was recognized with the University of Colorado’s George Norlin Distinguished Service Award. She is a recipient of the 2013 U.S. News STEM Leadership Hall of Fame Award.

Sonja Schmid is an assistant professor in the Department of Science and Technology in Society at Virginia Tech’s Northern Virginia campus. She teaches courses in social studies of technology, science and technology policy, qualitative studies of risk, energy policy, and nuclear nonproliferation. Fluent in Russian, she investigates the history and organization of nuclear industries in the Former Soviet Union and Eastern Europe and studies how national energy policies, technological choices, and nonproliferation concerns shape each other. Her recent book Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry (MIT Press, 2015) is based on extensive archival research in Russia and on interviews with nuclear experts. In her current NSF-supported project, she investigates the challenges of globalizing nuclear emergency response.

Monica Smith is the exhibition program manager for the Smithsonian’s Lemelson Center for the Study of Invention and Innovation. She serves as project director, co-curator, and principal investigator for the Center’s NSF-funded Places of Invention exhibition project. Previously, she was the project historian and then the second project director and principal investigator for the Center’s NSF-funded Invention at Play traveling exhibition, which won an AAM Excellence in Exhibition award. Her publications include: “The Lemelson Center’s Places of Invention Project,” co-authored with Art Molella, in Technology and Innovation (2014); “The Electric Guitar: How We Got from Andres Segovia to Kurt Cobain” in Regional Cultures in American Rock ‘n’ Roll (2012); and “Invention at Play” in Museums at Play (2011). She also has served as editor in chief of the Journal of Museum Education and is on the Board of the Rotary Club of Washington, D.C.

Marie Stettler is a graduate student in Virginia Tech’s Department of Science and Technology in Society. She is also working towards a graduate certificate in the newly formed Interdisciplinary Graduate Education Program in Human Centered Design. She works as a research assistant under the guidance of Matthew Wisnioski. As Senior Class President at Rose-Hulman, she co-led a campus-wide initiative: Rose-Hulman Exploring Alternative Career Tracks (REACT). REACT brought nontraditional alumni back to campus to expose engineering and science students to underrepresented career opportunities. Her research interests include the intersection of design thinking; international development; and religious language, imagery, and beliefs. She holds a B.S. degree in mechanical engineering and international studies from Rose-Hulman Institute of Technology.

Brenda Trinidad is a doctoral candidate in Human and Social Dimensions of Science and Technology at Arizona State University and a research assistant at the Center for Nanotechnology in Society. She has
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**Walter D. Valdivia** is a fellow in the Center for Technology Innovation at Brookings. He studies innovation policy and inequality, and focuses on technology transfer and the governance of emerging technologies. Valdivia's published work includes studies of: public values of the Bayh-Dole Act, wage disparities resulting from the emergence of nanotechnologies, and the tensions between academic freedom and national security with respect to export controls. He has also co-authored a policy report assessing R&D investments in Arizona. His current research examines the distributional outcomes of various modes of university technology transfer, the institutional path-dependence of innovation, and the role of academic freedom in the governance of emerging technologies. Valdivia holds a BS in economics from Universidad Católica Boliviana, and an MS in economics and a PhD in public administration from Arizona State University.

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