

About the Authors

Luis Alvarez

Luis Alvarez was appointed CEO of BT Global Services in October 2012, reporting to the CEO of BT Group. BT Global Services is a £7 billion business, which provides managed networked IT services to around 7,000 large corporate and public-sector customers in over 170 countries worldwide. Mr Alvarez joined BT Global Services in April 1999 as Multimedia and Internet Director, then as Country Manager for BT's Spanish, Portuguese, and Latin American operations. Prior to his current role, he was President of BT in Europe, Middle East, Africa, and Latin America, with responsibility also for BT's Global Telecom Markets unit. Before BT, Mr Alvarez held management positions at Ericsson, IBM, Grupo Santander, and Banesto. He has a Telecommunications Engineering degree from UPM, Madrid, and continued his education at ESADE, IMD, and Tuck University. He has won awards from organizations such as ComputerWorld, Directivo Plus, the Spanish Association of Telecommunications Engineers, and Spain's leading business school, ESIC. He is very active in BT's global sustainability work.

Anurag Behar

Anurag Behar is the Chief Sustainability Officer of Wipro and the Chief Executive Officer of the Azim Premji Foundation, a not-for-profit organization that works across India to improve the equity and quality of public education. The Foundation has institutional presence in seven Indian states, working with their public school systems, which have over 350,000 schools. It also runs a university focused on education and other domains of human development. He was also a World Economic Forum Young Global Leader in 2008, and writes a regular column for the Mint.

Attilio Di Battista

Attilio Di Battista is a Junior Quantitative Economist with the Global Competitiveness and Risks Team at the World Economic Forum. He works on the development and computation of a range of indexes and is the co-author of various studies, including the flagship *Global Competitiveness Report*. His areas of expertise include international trade and competitiveness, institutions and development, investment flows, and financial stability. Prior to joining the Forum, he worked at the International Trade Centre (UNCTAD/WTO) on export strategy, policy, and trade competitiveness analysis. He has a Bachelor's degree in International and Diplomatic Sciences from Università degli Studi di Trieste in Gorizia and a Master in International Economics from the Graduate Institute of International and Development Studies in Geneva, where he conducted research on the attractiveness of Italian provinces for foreign direct investments, focusing on the role of institutions and economic geography.

Bahjat El-Darwiche

Bahjat El-Darwiche is a Partner with Strategy& based in Beirut. He is the leader of the firm's Communications, Media, and Technology practice in the Middle East. He has worked in the areas of telecommunications-sector strategy development, policymaking and regulatory management, digitization, business development and strategic investments, and corporate management as well as governance, operating models, and restructuring.

Soumitra Dutta

Soumitra Dutta is the Anne and Elmer Lindseth Dean and Professor of Management at the Samuel Curtis Johnson Graduate School of Management at Cornell University, New York. Prior to July 2012, he was the Roland Berger Chaired Professor of Business and Technology at INSEAD and the Founding Director of eLab, a center of excellence in the digital economy. Professor Dutta obtained his PhD in Computer Science and his MSc in Business Administration from the University of California at Berkeley. His current research is on technology strategy and innovation policies at both corporate and national levels. He has won several awards for research and pedagogy and is actively involved in strategy and policy consulting. His research has been showcased in the global media and he has received several awards, including the Light of India Award '12 (from the *Times of India* media group) and the Global Innovation Award '13 (from INNOVEX in Israel).

Luis Enriquez

Luis Enriquez is a Director in McKinsey & Company's Brussels office, where he has worked primarily in the infrastructure and regulated industries. He has focused on regulation, operations, and pricing in telecommunications (fixed and mobile businesses) and energy. He co-leads McKinsey's global efforts in regulation, regulatory economics, and stakeholder management and has worked extensively in this area both at McKinsey and prior to joining the firm. Mr Enriquez has an AB in Economics from Harvard University and did his doctoral work in Economics at the University of California at Berkeley, where he focused on the economic dynamics of interconnection among telecommunications networks.

John Garrity

John Garrity is Cisco's Global Technology Policy Advisor. He is responsible for policy engagement and data-driven analytical research on technology issues related to the potential of IT and network connectivity for economic growth, competitiveness, social inclusion, and environmental protection. His research covers the expansion of fixed and wireless broadband, national broadband agendas, municipal strategies for ICT use, Internet protocol network traffic demand, and Internet governance. Previously he was a manager in Cisco's Strategy and Economics group, guiding strategic direction for the Emerging Markets organization, a business unit with geographic market coverage across 130 countries. Prior to Cisco, Mr Garrity worked at the World Bank in the Corporate Strategy Group, and he has held positions in the US Federal Trade Commission as well as in state government. He holds a Master in Applied Economics from Ohio State University.

Thierry Geiger

Thierry Geiger is an Associate Director and Senior Economist with the Global Competitiveness and Risks Team at the World Economic Forum. He leads the competitiveness practice on Asia. As head of quantitative research and analytics, he supervises the development and computation of a wide range of indicators and indexes. He is also responsible for the team's technical assistance and capacity-building activities. Mr Geiger is co-editor of *The Global Enabling Trade Report* and co-author of *The Global Competitiveness Report* and *The Global Information Technology Report*, and is the lead author of several regional and country studies. A Swiss national, Mr Geiger holds a BA in Economics from the University of Geneva, an MA in Economics from the University of British Columbia, and was a Fellow of the Forum's Global Leadership Programme. Prior to joining the Forum, he worked for the World Trade Organization and Caterpillar Inc. He is co-founder of Procab Studio, a Geneva-based IT company.

Ferry C. Grijpink

Ferry C. Grijpink is a Principal in McKinsey's Singapore office. He focuses on advising telecommunication clients across Europe, Africa, and Asia on strategy and technology-related topics. Mr Grijpink is co-leading McKinsey's research on the deployment and commercialization of next-generation infrastructures such as fiber and mobile broadband. He has a strong record in ensuring that analytical findings are delivering real change for clients. He has written numerous articles on general telecommunications industry development as well as on specific topics related to 4G, mobile OTT, and frequency auctions. Before joining McKinsey, Mr Grijpink worked for Gemini Consulting in their high tech consulting unit, where he served consumer electronics and semiconductor companies. He has also been active as an entrepreneur in the mobile Internet space. Mr Grijpink holds an MSc in Electrical Engineering with a major in Telecommunications from the Delft University of Technology.

Mikael Hagstroem

Mikael Hagstroem is passionate about the role of technology in transforming and proactively disrupting outmoded business models to identify new areas for growth. As Head of G-SIBs for SAS, he leads the digital transformation process for global systematically important banks, helping SAS top clients rise to the challenges and harness the opportunities of the digital era. As head of SAS's Asia Pacific region, he leads the fastest-expanding geography in the company, opening new frontiers for SAS software. Mr Hagstroem is a member of the board of directors of the Atlantic Council and the Executive Committee that functions as the United States Council for International Business (USCIB)'s board of directors. He is also Vice Chair of the World Economic Forum's Global Agenda Council on Data-Driven Development. From 2010 to 2014, he served as Chair of the American Chamber of Commerce to the European Union (AmCham EU) Executive Council. A noted authority on digital transformation, Mr Hagstroem has participated as an expert on numerous panels and lectures on the subject.

Mathias Herzog

Mathias Herzog is a Partner with Strategy& based in Los Angeles. He is a leader in the firm's Digital Services practice and focuses primarily on the technology, media, and retail sectors. Mr Herzog advises clients on the shift from physical to digital and works with organizations to define digital and multi-channel growth strategies. He has led strategy and transformation initiatives in North America, Europe, and Asia.

Laura Hosman

Laura Hosman is Assistant Professor of Ethics, Public Policy, Science & Technology (EPPST) at California Polytechnic State University, holding a joint appointment in Political Science and Science, Technology, and Society (STS). She has held prior academic positions at Illinois Institute of Technology; the University of California, Berkeley; and the University of Southern California (USC). With an emphasis on action-oriented, in-the-field work, her research focuses on the role for information and communications technologies (ICTs) in developing countries, particularly in terms of their potential effects on socio-cultural factors, human development, and economic growth. She earned an MA in International Relations as a Fulbright Scholar at the University of Amsterdam. She also holds an MA in Economics and a PhD in Political Economy and Public Policy, both from the University of Southern California (USC).

Juan Jung

Juan Jung is Coordinator of Regulation and Studies in the Iberoamerican Association of Telecom Enterprises (AHCIE) and the Coordinator of the Centre of Studies of Telecom of Latin America, AHCIE's think tank for the region. From his position in AHCIE he has coordinated several studies related to economy and regulation of the industry. He is member of the program committee of the Latin-American Congress of Telecommunications and has participated in several seminars and conferences in the region. He holds a degree in Economics from the University of the Republic (Uruguay) and a Master in Economics from the University of Barcelona (Spain). Currently he is doing research for his PhD studies at the University of Barcelona.

Michael Kende

Michael Kende is the Chief Economist of the Internet Society. In this capacity, he is responsible for providing strategic insights regarding the economics of Internet issues and emerging trends as well as leading economic research and analyses in order to deepen the Internet Society's thought leadership in development, policy, and technology issues. Prior to joining the Internet Society in August 2013, he was a Partner at Analysys Mason, a global consulting firm focused on telecommunications and media, where he worked with operators and regulators in all regions of the world. At Analysys Mason, he was head of the Policy and Regulatory sector, head of the US office, and in charge of developing its Internet practice. He has a PhD in Economics from MIT and spent five years as a Professor of Economics at INSEAD before joining the Federal Communications Commission (FCC). At the FCC, he was the Director of Internet Policy Analysis, responsible for managing a wide range of policy analyses and regulatory decisions concerning Internet policy, broadband deployment, and mergers.

Bruno Lanvin

Bruno Lanvin is the Executive Director of Global Indices at INSEAD (Global Information Technology, Global Innovation Index, and Global Talent Competitiveness Index). He is a director on the boards of ICANN and IDA Infocomm (Singapore), and a Broadband Commissioner (www.broadbandcommission.org). In 2009–10 he chaired the Global Advisory Council on the Future of Government (World Economic Forum). From 2000 to 2007, he worked for the World Bank in a variety of positions, including Senior Advisor for E-strategies, Regional Coordinator (Europe and Central Asia) for ICTs and e-government issues, Chairman of the Bank's e-Thematic Group, and Manager of the Information for Development Program (infoDev). In 2000, Mr Lanvin was appointed Executive Secretary of the G-8 DOT Force. Before that, he worked for some 20 years in senior positions in the United Nations. The author of numerous books and articles on international economics, information technology, and development, he holds a BA in Mathematics and Physics, an MBA from Ecole des Hautes Etudes Commerciales (HEC) in Paris, and a PhD in Economics from the University of Paris I – La Sorbonne.

Rami Maalouf

Rami Maalouf is a Senior Associate with Strategy& based in Dubai, and a member of the firm's Communications, Media, and Technology practice in the Middle East. He works with telecommunications operators and national innovation programs across emerging markets, focusing on the areas of strategy development, digitization, and operating models.

James Manyika

James Manyika is a Director at McKinsey & Company, where he is one of the leaders of McKinsey's Global High Tech, Media and Telecom Practice and the McKinsey Global Institute. Based in Silicon Valley, he has worked with many of the world's leading information and communication technology companies on a variety of issues, including strategy, innovation, and business transformation. Dr Manyika has led research on business strategy issues as well as topics related to the global economy—including innovation, competitiveness, productivity, and technology and its impact on business and the economy—and has published in various publications. He is also a frequent speaker at industry forums. Dr Manyika is a member of President Obama's Global Development Council, the national Innovation Advisory Board of the US Secretary of Commerce, and multiple other boards. Prior to McKinsey, Dr Manyika was on the engineering faculty at Oxford University and a Fellow at Balliol College, Oxford University, a Visiting Scientist at NASA Jet Propulsion Laboratory, and a Faculty Exchange Fellow at MIT.

Punya Mishra

Punya Mishra is a Professor of Educational Technology and Educational Psychology at Michigan State University, where he also directs the Master of Arts in Educational Technology program. He is internationally recognized for his work on technology integration in teacher education as well as his research on teacher creativity. The Technological Pedagogical Content Knowledge (TPACK) framework developed by him (in collaboration with Dr. M. J. Koehler) has been described as "the most significant advancement in the area of technology integration in the past 25 years." Dr Mishra's academic and creative work is published on his website.

Lohini Moodley

Lohini Moodley is a leader in McKinsey's Telecommunications, Media, and Technology practice in Africa. A major focus of her work is on unlocking the potential of information and communication technologies (ICTs) to transform lives, businesses, and national economies in Africa. Ms Moodley has been leading McKinsey's research on digital trends in Africa. Her research has provided insight into how consumers and small- and medium-sized enterprises are using the Internet as well as implications for governments and telecommunications operators in the region on how to increase broadband adoption and usage. She has contributed to recent reports include *Lions Go Digital: The Internet's Transformative Potential in Africa* and *Offline and Falling Behind: Barriers to Internet Adoption*. Ms Moodley also leads a McKinsey program called Remarkable Women in sub-Saharan Africa, which aims to equip high-potential South African women with the skills to become great leaders. She has a BSc (Hons) in Mathematics and Applied Mathematics from the University of Cape Town and an MSc in Mathematics from the University of South Africa.

Robert Pepper

Robert Pepper leads Cisco's Global Technology Policy team working with governments and business leaders across the world in areas such as broadband, IP-enabled services, wireless and spectrum policy, security, privacy, Internet governance, and ICT development. He joined Cisco in July 2005 from the Federal Communications Commission, where he served as Chief of the Office of Plans and Policy and Chief of Policy Development beginning in 1989. There he led teams developing policies promoting the development of the Internet, implementing telecommunications legislation, planning for the transition to digital television, and designing and implementing the first US spectrum auctions. Dr Pepper serves on the board of the US Telecommunications Training Institute (USTTI) and advisory boards for Columbia University and Michigan State University, and is a Communications Program Fellow at the Aspen Institute. He is a member of the US Department of Commerce's Spectrum Management Advisory Committee, the UK's Ofcom Spectrum Advisory Board, and the US Department of State's Advisory Committee on International Communications and Information Policy. He received his BA and PhD from the University of Wisconsin-Madison.

Sergio Sandoval

Sergio Sandoval is a Senior Expert in McKinsey & Company's Brussels Office. Mr Sandoval joined the firm in late 2001 and has been part of McKinsey's global efforts in regulation, regulatory economics, and stakeholder management for the past six years. He has been a lead author in the annual *Global Information Technology Report* of the World Economic Forum since 2005, with articles focused on topics of regulation, next-generation networks, and the economic impact of high-speed broadband networks. He is also the key liaison person between McKinsey and the European Union—his Brussels-based location enables him to maintain high-level contacts and get information first hand from key European industry stakeholders in Brussels such as the European Telecommunications Network Operators' Association (ETNO), the European Competitive Telecommunications Association (ECTA), the Centre for European Political Studies (CEPS), and EurActiv. Prior to joining McKinsey, Mr Sandoval worked with Colombia's Presidency of the Republic as Economic Advisor to the President. He obtained a BS and an MA in Economics from Los Andes University in Colombia, and an MBA with high honors from Solvay Business School.

Milind Singh

Milind Singh is a principal with Strategy& in Dubai and a member of the firm's Communications, Media, and Technology practice in the Middle East. He works with policymakers, regulators, and operators across emerging markets, helping them navigate change and maximize their returns from digitization.

Kara Sprague

Kara Sprague is a Principal with McKinsey's Business Technology Office in San Francisco. She is a leader in McKinsey's Software and Services, Cloud, and IT Infrastructure practices. She works with enterprise and consumer technology providers, specializing in technology disruptions (e.g., cloud, big data, mobility, cyber security) and bringing substantial experience in corporate and business unit strategy, product and services strategy, go-to-market, and business-building. Ms Sprague is an active contributor to McKinsey's external and internal research. She was recently the lead author of the report *Offline and Falling Behind: Barriers to Internet Adoption*, and has authored several articles on technology-related topics that have been featured in the *McKinsey Quarterly*, *Recall*, and the *Financial Times*. She is also a frequent speaker at industry forums. Before joining McKinsey, Ms Sprague worked at Oracle Corporation, Hewlett Packard, and Agilent Technologies. She has three degrees from MIT: Bachelor of Science in Electrical Engineering and Computer Science, Master of Engineering in Electrical Engineering and Computer Science, and Master of Science in Technology and Public Policy.

Malin Strandell-Jansson

Malin Strandell-Jansson is a Knowledge Expert in McKinsey & Company's Stockholm Office, specializing in telecommunications regulation. She is working for McKinsey & Company's global telecom practice and is closely affiliated with the strategy practice regulatory service line. Between 2006 and 2010 she held the position of Team Leader for McKinsey's global group of analysts focusing on mobile telecommunications research, and has served as the coordinator for McKinsey's marketing and sales special interest group. She holds a Master of Law in Law and Information Technology from Stockholm University in Sweden and a Political Science degree with a major in International Law from Åbo Akademi in Finland.

Dominic Vergine

Dominic Vergine was appointed Head of Sustainability and Corporate Responsibility at ARM in December 2013. He is responsible for developing ARM's sustainability and corporate responsibility programs. Mr Vergine is currently driving several initiatives focused on delivering technology across the developing world and exploring ways that technology can help improve global sustainability. He is also involved in company reporting, marketing, business development, government affairs, and public policy for the sustainable development of ARM. Prior to ARM, Mr Vergine co-founded Icen Mobile, Aptivate and Vertus Tech. As CEO of Aptivate, he worked with governments and international agencies across Europe and Sub-Saharan Africa to focus on technology for international development (ICT4D). Mr Vergine is also Chair of Trustees and Co-Founder of The Humanitarian Centre. He has a Master degree in English Literature from the University of Oxford and a Post-Graduate Certificate in Sustainable Business from the University of Cambridge.

Dale Wiggins

Dale Wiggins is Vice President and General Manager of the Philips HealthSuite Digital Platform (HSDP). HSDP is the core infrastructure for Philips solutions, with patient-centricity and continuity of care built into the design. HealthSuite is fully open in order to create a rich ecosystem that can enable continuum of care with big data and integrated clinical solutions. Previously, Mr Wiggins was General Manager of Philips Research North America, leading the laboratory contributing to global research programs in the fields of healthcare and lighting. Prior to this appointment, he was Chief Technology Officer of the Patient Care and Clinical Informatics business. He drove strategic technology plans and oversaw activities related to several principal healthcare industry themes, including systems integration within the hospital enterprise architecture, clinical decision support, interoperability standards, and outcomes improvement studies and other clinical research. Mr Wiggins joined Philips in 2001 from Hewlett-Packard, where he held various management, architecture, and engineering positions. He holds BS and MS degrees in Computer and Systems Engineering.