
Contributors

Peter Allen is Emeritus Professor at Cranfield University. He developed and ran the Complex Systems Research Centre in the School of Management at Cranfield University. He is still actively involved in ongoing research. He has a PhD in theoretical physics and from 1970 to 1987 worked with Professor Ilya Prigogine at the Université Libre de Bruxelles on research that led on to the development of complexity science. He is an Editor in Chief of *Emergence: Complexity and Organization*. He has written and edited several books in the field of complexity and socio-economic modelling and published well over 200 articles in a range of fields including ecology, social science, urban and regional science, economics, systems theory, and physics. In 2011 he co-edited the *Sage Handbook on Complexity and Management* and in 2015 co-authored *Embracing Complexity* (Oxford University Press) with Jean Boulton and Cliff Bowman. He has been a consultant to multiple governmental and non-governmental organizations, the United Nations University, the European Commission and the Asian Development Bank. He has managed a number of large European and UK research contracts.

Pierpaolo Andriani is Professor in Complexity and Innovation Management at Kedge Business School, France. He got his BA/MSc in Physics. He started his career as scientist in industrial R&D in Italy where he was project manager for various European research and development projects in the laser industry. Then he moved to academia and received his PhD in the social sciences from Durham University, UK. His research interests are focused on the impact of complexity and evolutionary theory on innovation. His research has been published in journals such as *Organization Science*, *Journal of International Business Studies*, *Research Policy*, *Long Range Planning* and *Complexity*.

Santo Banerjee was a senior research associate in the Department of Mathematics, Politecnico di Torino, Italy from 2009 to 2011. Currently he is working as an Associate Professor (UDQ9), in the Institute for Mathematical Research (INSPeM), University Putra Malaysia, Malaysia. He is also a founder member of Malaysia–Italy Centre of Excellence in Mathematical Science, UPM, Malaysia. His research is mainly concerned with nonlinear dynamics, chaos, complexity and secure communication. He has 15 books in the field of nonlinear dynamics and complex systems, and has also published more than 90 international research articles. Currently he is involved in many international and industry projects on signal processing, biomedical measures and devices, network and cryptography. He is an editor of *EPJ plus* (Springer) and other journals with regular and special issues. For more detail, please visit <https://sites.google.com/site/santobanhome/>.

Yaneer Bar-Yam is Founding President of the New England Complex Systems Institute. He has contributed to founding the field of complex systems science, introducing fundamental mathematical rigor, real world application, and educational programs for new concepts and insights of this field. In developing new mathematical methods and in their application, he has published on a wide range of scientific and real world problems ranging from cell biology to the global financial crisis. He is the author of two books:

a textbook *Dynamics of Complex Systems* (1997, Perseus Books), and a popular book *Making Things Work* (2005, Knowledge Press), describing the use of complex systems science for solving problems in military, healthcare, education, systems engineering, international development, and ethnic violence. Professor Bar-Yam received his SB and PhD in physics from MIT in 1978 and 1984 respectively. His recent work quantitatively analyses the origins and impacts of market crashes, social unrest, ethnic violence, military conflict and pandemics.

Patrick Beautelement, formerly Research Director of The abaci Partnership LLP, has developed and implemented many practical solutions for taking advantage of the opportunities offered by real-world complexity. In this he has used a wide range of novel approaches, methods and modelling and simulation techniques – adapting them appropriately to the contexts of interest. Patrick has a successful track record of partnering with commerce, government and world-class researchers in multidisciplinary contexts and in developing toolsets which directly exploit insights from complexity research. Recent work has involved: carrying out a systematic analysis of techniques for decision-making in complex environments; developing and employing a framework for assessing the ‘real-world-readiness’ of agent-based modelling; examining the practicality of using causal and influence networks for exploring complex multi-agency / multi-stakeholder intervention situations; and implementing an adaptation tool for use by communities mitigating climate change in Africa.

Chase R. Booth graduated from Grinnell College in May 2016 with a degree in Classics, and he won the prestigious Thomas J. Watson Fellowship award for 2016. He is interested in classical art and literary representations of sex, gender, and ethnicity as well as the politics and identities of selfhood in classical antiquity.

Jane Bromley is a lecturer on the Digital and Technology Solutions degree apprenticeship programme at the Open University. Her PhD from Imperial College London was on human vision and her postdoctoral work at Bell Labs on neural networks for visual tasks. She now works with the Complex Systems and Natural Language Processing groups at the Open University and has a particular interest in the application of Deep Learning to understand human perception. She is currently applying hypernetworks to complex systems data from UK police forces. This research is funded by the Higher Education Funding Council for England.

Hannah L. Brown graduated from Grinnell College in May 2016 with a degree in Gender, Women’s and Sexuality Studies. At Grinnell, she has worked on a variety of research opportunities in interdisciplinary studies, such as complexity science and digital humanities. She aims for a career in Policy Analysis.

Julian Burton is Director of Delta7 Change Ltd. As a consultant, facilitator and visual artist, he is passionate about improving the quality of dialogue in organizations, where he believes most change happens. Visuals can be a powerful way to ground the meaning of words in everyday experience, supporting people to make better sense of change through having better conversations that can build the relationships needed for organizations to be more human, effective and successful. Julian was inspired to develop Delta7 in 1997 after first learning about complexity theory at the NECSI conference in 1997 and

then through being an artist in residence at the LSE Complexity Research Group from 1998–2004.

Delta7 has since grown into a change consultancy that has partnered with many organizations such as Coutts Bank, BAE Systems, Rolls Royce, NHS, BT, MOD and Network Rail who wanted a highly innovative approach to employee engagement, culture change and leadership development. Their visual dialogue process helps to bridge the gap between strategy and implementation by creating space for employees and leaders to come together to make sense of change, connect strategy to action and take ownership of the parts each has to play in successful implementation. Prior to 1997 Julian had a career as a medical illustrator, landscape painter and web designer. His nine-year-old son has described his work best: “my dad makes pictures of problems so people can talk about them”.

Giuseppe Carignani is an engineer and a professor at Technical High School Malignani (Udine, Italy, EU). He holds a Master’s degree in civil engineering and a PhD in industrial and information engineering. He is presently (2017) a PhD candidate for a second PhD in management at the University of Udine.

He had an eclectic career as a consultant in diverse areas of engineering and management, including industrial and civil design and prototyping, software development, New Product Development, supply chain management, innovation management, and quality management.

His research interests are focused on the evolutionary theories of technological innovation and their implications for management and organizations, the practice of web-enabled open innovation, and teaching technological creativity. His research is published in peer-reviewed edited books, proceedings and journals, including the *Academy of Management Proceedings*, the *International Journal of Entrepreneurship and Innovation Management*, and *Research Policy*.

Brian Castellani is Professor of Sociology and Head of the Complexity in Health and Infrastructure Group, Kent State University, USA (cch.ashtabula.kent.edu). His work focuses on the development of computational and complexity science methods and their application to health, healthcare and infrastructure. Topics include allostatic load, community health and resilience, grid reliability, health trajectories and well-being across time, medical professionalism and addiction. He is specifically known for his development of the SACS Toolkit, a case-based, mixed-methods, computationally-grounded platform for modelling complex systems. For more information, see www.personal.kent.edu/~bcastel3/brian%20castellani.html.

G. Christopher Crawford is an Assistant Professor of Strategy and Entrepreneurship at Ohio University in Athens, Ohio. After working in industry for two decades and founding his own consulting company, Dr Crawford received his PhD in entrepreneurship from the University of Louisville in 2013. His dissertation, “Causes of Extreme Outcomes in Entrepreneurship,” received a \$20,000 Kauffman Dissertation Fellowship Award. Dr Crawford’s recent work has been published in the *Journal of Business Venturing*, *Small Business Economics*, and *Journal of Management Inquiry*. His research interests include: new venture strategy, creation, and growth; complexity science and agent-based simulation modelling applications to entrepreneurship; and understanding the mechanisms

that generate power law distributions and outliers in social systems. Dr Crawford won the 2015 National Federation of Independent Business Award at the Babson College Entrepreneurship Research Conference and was the keynote speaker at the 2016 Strategic Management Society Conference extension in Bolzano, Italy, with a presentation titled “The Emergence of Outliers in Social Systems: A Rockstar Theory.” His \$205,000 National Science Foundation grant will use the maximum-likelihood estimation methods outlined in this book, along with agent-based modelling, to build and test a universal theory about the emergence of new order (for example, outlier ventures, breakthrough technology, disruptive innovations, or extreme events).

Christopher Day currently works at the United Nations in New York to support peace-keeping field missions and political field missions. His previous assignments include work in Uganda and Afghanistan in collaboration with the United Nations, the German Gesellschaft fuer Internationale Zusammenarbeit and the German Centre for International Migration and Development. Prior to entering the field of peace keeping and international development, he worked in the private sector as a managing editor, communications expert and consultant. Christopher holds an Executive Master’s degree in consulting and coaching for change – a programme jointly run by HEC Paris and Saïd Business School, University of Oxford. His areas of interest are social innovation, leadership and organizational change. He is Senior Research Associate in the Complexity Research Group at the London School of Economics and Political Science, UK.

Carl J. Dister is a Principal Systems Engineer at ReliabilityFirst with 30 years of systems engineering experience. Mr Dister’s experience is in the design and analysis of highly reliable electromechanical devices and complex systems. Mr Dister is a graduate of Cleveland State University with a Bachelors of electrical engineering and University of Wisconsin-Madison with a Masters of electrical engineering and is a Certified Systems Engineering Professional (CSEP) with INCOSE.

Robin Durie is Senior Lecturer in Politics at the University of Exeter. His early research focused on the phenomenology of time. He edited and co-translated an edition of Bergson’s notorious book on special relativity theory, including the debate in Paris between Bergson and Einstein. He then edited a collection of essays by theoretical physicists and philosophers looking at fundamental problems of time and temporality. This formed the basis for his work on complexity theory, where his research has focused on fundamental ontological questions concerning the relational dynamics of complex systems. His work has subsequently contributed to projects ranging from transformative community regeneration, to creating a culture of co-creative publicly engaged research, to the evolution of culture within societies of robots.

Elizabeth G. Eason graduated from Grinnell College in May 2017 with a degree in Mathematics and Statistics. She worked on a variety of mathematical-based research projects centred around topics such as gender and epistemology. She now works as a Pricing Analyst on the Research & Development team at Nationwide Mutual Insurance Company in Des Moines, Iowa, USA.

Krista M. English MBA PhD(c), is the Co-Principal Investigator of the Complexity Science Lab at the School of Population and Public Health in the Faculty of Medicine at

the University of British Columbia and the Associate Director of the WHO Collaborating Centre for Complexity Science for Health Systems. Her interests focus on using complexity science to understand how research knowledge is translated for health system decision-making. Ms English has worked at the British Columbia Centre for Disease Control since 2005 and most recently as Associate Director of the Centre's Division of Mathematical Modeling. She is an applied researcher whose work in health systems and policy design has supported the advancement of the discipline through innovative programme design and strategic collaborations. Her research interests more generally relate to public health policy design, health promotion, knowledge translation, ethics, equity, social determinants of health, global health, and topics at the intersection of complex systems, health systems and decision-making.

Joyce Fortune is Emeritus Professor of Technology Management at the Open University, UK. Her main teaching and research interest is the use of systems thinking to promote learning from failure and to predict failures, particularly in the area of project management. She has published three books and numerous papers on systems failures. She has also undertaken research in other topics such as technology adoption in healthcare and taught quality management for more than two decades. She is currently working on a piece of research funded by the Higher Education Funding Council for England that is using systems thinking and complexity science to look at the policing of organized crime.

Michael Gabbay is a Senior Principal Physicist in the Applied Physics Laboratory at the University of Washington. His current research involves the development and application of mathematical models and computational simulations of network dynamics, focusing on social and political systems. Dr Gabbay's work seeks to advance both basic and policy-relevant research. He has conducted empirical research using political rhetoric, human subjects experiments, and analyst input and has applied his models and methods towards understanding and anticipating the behaviour of real-world militant networks and government leadership groups. His publications on political networks have appeared in both academic and policy-oriented venues. Dr Gabbay has also conducted research in the dynamics of nonlinear oscillators, nonequilibrium pattern formation, and signal processing. He received his PhD in physics from the University of Chicago and a BA in physics from Cornell University.

Jeffrey A. Goldstein, PhD, is a Full Professor at the Willumstad School at Adelphi University, New York, USA. Professor Goldstein is well-known as a pioneer in the application of the sciences of complex systems to social and organizational dynamics. He also does research and publishes in the areas of the philosophy of science and the philosophy of mathematics. Since 2004, he has been an editor-in-chief of the only journal fully devoted to these themes, *Emergence: Complexity and Organization*. He is also one of three trustees of the empirical research, complexity-based journal *Nonlinear Dynamics, Psychology, and Life Sciences*. Professor Goldstein is the author/editor of 17 books, and hundreds of book chapters, scholarly monographs, and journal papers. Professor Goldstein has been invited to lecture and hold seminars/courses/workshops at major universities and institutions throughout the world. He is also a consultant to many public and private organizations in the US and abroad.

James K. Hazy is Full Professor at Adelphi University in New York where for ten years he has been teaching entrepreneurship, strategy, and leadership. He has published over 50 articles in such venues as *The Leadership Quarterly*, *Leadership*, and *Nature's Frontiers in Psychology* winning numerous awards including two *Academy of Management Best Paper Awards* and the *Bender Body-of-Work Award*. He co-wrote the Amazon Top-100 Management Science book: *Complexity and the Nexus of Leadership* (2010, Palgrave Macmillan) and co-edited two other volumes.

For 25 years before joining the academy, Dr Hazy held leadership positions in industry including EVP for an Ernst & Young business unit and Financial VP at AT&T. He was also a former Board member and treasurer for Goodwill Industries International. He has earned a doctorate with “distinguished honors” from George Washington University, an MBA “with distinction” from The Wharton School, and a BS in mathematics from Haverford College.

Kate Hopkinson is Director of Inner Skills Services Ltd, a company she set up in 1995, which offers management and organization development consultancy drawing on her innovative methodology, *Landscape of the Mind*. She has worked with a wide range of household names, from blue chip commercial companies, to the public sector and not-for-profit organizations. Kate’s academic background is in psychology. She also holds a Master’s degree in management learning. Her publications include two papers in *The British Journal of Psychiatry*, as well as articles in management and business journals. From 2000 to 2015 she was a senior research associate with the Complexity Research Group at London School of Economics, where she contributed to projects and workshops, and gave seminars.

Kate’s film on *Landscape of the Mind, An Introduction to Inner Complexity*, is available via her website (www.innerskills.co.uk). Kate’s expertise centres around leadership, especially navigating successfully in uncertainty and constant turbulent change; and reaping the Divergence Dividend – which involves recognizing and utilizing significant hidden assets. A member of the British Psychological Society, she has been a designated expert on cognitive science for the European Union. Kate is currently taking Inner Skills to the next level, setting up hubs – centres of excellence in applying *Landscape of the Mind* – in the commercial, public, and not-for-profit sectors. She will be training consultants to work via these hubs as *Landscape of the Mind* Facilitators and Practitioners, in their respective fields.

Nathaniel Hupert, MD, MPH, is a practicing clinician and public health researcher focusing on healthcare processes and emergency response logistics. He is an Associate Professor of Healthcare Policy and Research and of Medicine at Weill Cornell Medicine, Cornell University. Using a variety of methods including Process Mining and Discrete Event Simulation, his research seeks to improve the effectiveness of care delivery in both conventional and crisis settings. He led the development of two US healthcare planning documents, the “Community Guide for Public Health Preparedness” (2004) and the “Guidebook for Hospital Preparedness Exercises” (2010). Dr Hupert was the founding Director of the Preparedness Modeling Unit at the US Centers for Disease Control and Prevention (CDC) (2008–2010). Currently, in addition to his academic position, he is Senior Advisor for both the CDC’s Division of Preparedness and Emerging Infections and the US Department of Health and Human Services (DHHS) National Healthcare Preparedness Program.

Emily S. Ihara is an Associate Professor of Social Work at George Mason University. Her research focuses on the social determinants of health inequities across the life course, particularly for older adults, racial and ethnic minorities, and other underserved populations. She is actively engaged in implementing intervention studies for individuals with Alzheimer's disease and related dementias, using agent-based modelling to address the complexity of caregiving, and assessing the role of health inequities for dialysis patients. She uses multiple quantitative and qualitative methods in her work, and has gained a solid foundation in agent-based modelling through her selected participation in the Institute of Systems Science and Health, sponsored by the Office of Behavioral and Social Science Research (OBSSR) and the National Institutes of Health (NIH). Dr Ihara is a graduate of UC Berkeley (AB), UCLA (MSW), and The Heller School for Social Policy and Management at Brandeis University (PhD, MA).

Damian G. Kelty-Stephen received his PhD in psychology from the University of Connecticut-Storrs and continued his work as postdoctoral fellow at Harvard University's Wyss Institute for Biologically Inspired Engineering. He is currently an Assistant Professor in Psychology at Grinnell College where he had formerly served for four years as visiting faculty.

William G. Kennedy is a Research Assistant Professor with the Krasnow Institute for Advanced Study at George Mason University working in the areas of cognitive science and computational social science. He has earned a BS from the US Naval Academy (majoring in mathematics), a MS from the Naval Post Graduate School (in computer science), and a PhD from George Mason University (in artificial intelligence). He is also a retired Navy Captain (30 years of service in submarines and the Naval Reserve) and a retired civil servant (Nuclear Regulatory Commission and Department of Energy). He joined the Mason faculty in 2008 after a postdoctoral fellowship at the Naval Research Laboratory in cognitive robotics and human-robot interaction. His research interests focus on advancing computational cognitive modelling of human interactions with other intelligent agents and on integrating cognitive science and cognitive modelling into computational social science.

Sohee Kim received her PhD in public administration from the School of Public Affairs at the Pennsylvania State University at Harrisburg. Her research interests are in policy networks, governance networks, health policy implementation, and partnerships and networks in healthcare. She co-authored an article (2013 *Administration & Society*) about the urban governance network in Center City, Philadelphia and an article (2011 *NITTE Management Review*) about the effectiveness of disaster management networks in Gujarat, India.

Lesley Kuhn is an Adjunct Fellow with the School of Business at Western Sydney University, Australia, following her retirement after 27 years as an academic. Dr Kuhn's applied philosophical work concerns exploration of the contours of an epistemology that privileges curiosity, kindness and humility over foundational, fundamental and totalitarian habits of thought. With degrees in music, education, environmental science and philosophy and her doctoral work focusing on the nature of epistemology and belief, Dr Kuhn's transdisciplinary antecedence informs her research into how the complexity sciences might be drawn upon to improve understanding of the lived human condition.

Dr Kuhn has, over the past 20 years, been engaging complexity informed habits of thought in philosophical and social inquiry. Along with writing *Adventures in Complexity for Organisations Near the Edge of Chaos* (2009, Triarchy Press), Dr Kuhn has edited numerous volumes, authored more than 40 book chapters and published papers, and led more than 30 research projects.

Henrik Jeldtoft Jensen is a Professor of Mathematical Physics and Leader of the Centre for Complexity Science at Imperial College London. He works on the statistical mechanics of complex systems. He has worked on the dynamical properties of condensed matter systems and developed the Tangled Nature model of evolving ecosystems, which is currently used to develop the Tangled Finance approach. His two books on complexity science *Self-organized Criticality* (1998, Cambridge University Press) and *Stochastic Dynamics of Complex Systems* (with Paolo Sibani, 2013, ICP) has attracted very broad interest. Jensen has more recently worked on brain dynamics and structure by analysing fMRI and EEG data and he is involved in a project with the Guildhall School of Music and Drama concerning quantitative analysis of EEG time series from improvising or non-improvising classical musicians.

Jeffrey Johnson is Professor of Complexity Science and Design in the Faculty of Mathematics, Computing and Technology at the Open University. His research includes applications in social and economic systems, business, artificial intelligence and robotics, machine vision and neural systems, and city planning and large road traffic systems. His research into social systems is situated in policy – which he sees as designing, planning and managing the future. He has worked in mathematics, geography, design, and engineering departments and believes the same mathematical theory of multilevel systems is required for social, economic, physical and engineering systems. His current work includes developing an operational theory of narratives that can underpin computational policy support systems. He is a chartered mathematician and a chartered engineer, Executive Committee member of the Complex Systems Society, and a Board member of the UNESCO UniTwin Complex Systems Digital Campus that federates scientific research and teaching worldwide.

Benyamin Lichtenstein PhD, is Associate Professor of Entrepreneurship and Management at UMass Boston. His research specialty is the study of emergence – the creation and re-creation of new ventures, organizations, and collaborations – which he explores through complexity science. He has published four books and more than 50 articles and chapters on this theme, as well as on sustainability, entrepreneurship, and organizational change. Benyamin is a core faculty member in the Organizations and Social Change PhD Track at the College of Management; is Academic Director of the Entrepreneurship Center at UMass Boston, and is a Research Fellow at the Center for Sustainable Enterprise (SERC).

Craig Lundy is a Senior Lecturer in Social Theory at Nottingham Trent University. Prior to commencing at NTU Craig held a three-year Research Fellowship at the Institute for Social Transformation Research, University of Wollongong (Australia). He was previously employed in various teaching and research positions at the University of Exeter, Royal Holloway (University of London) and Middlesex University. The majority of Craig's research is concerned with processes of transformation – an interest that he has

pursued through cross-disciplinary projects that explore and make use of developments in complexity studies, socio-political theory and 19th/20th century European philosophy. He is the author of *History and Becoming: Deleuze's Philosophy of Creativity* (2012), *Deleuze's Bergsonism* (forthcoming) and co-editor with Daniela Voss of *At the Edges of Thought: Deleuze and Post-Kantian Philosophy* (2015), all published by Edinburgh University Press.

Bill McKelvey (PhD, MIT, 1967) is Professor Emeritus: Strategic Organizing, Complexity Science, and Econophysics at the UCLA Anderson School of Management. His book, *Organizational Systematics* (1982, University of California Press) remains the definitive treatment of organizational taxonomy and evolution. He chaired the Building Committee that produced the \$110,000,000 Anderson Complex. He has directed over 170 field study teams on six-month projects concerned with strategic and organizational improvements to client firms; co-edited *Variations in Organization Science* (with J. Baum, 1999, Sage), a Special Issue of *Emergence* (with S. Maguire, 1999), and a Special Issue of *Journal of Information Technology* (with J. Merali, 2006); edited a Special Issue of *International Journal of Complexity and Management* (2013); co-editor of *Sage Handbook of Complexity and Management* (2011, Sage); editor of a Routledge Major Works Series: *Complexity Concepts* (2012, Routledge; five-volumes, 2447 pages). He has published 95 articles and chapters since 1996 applying complexity-, power-law-, and econophysics-related topics to organization science and management.

Eve Mitleton-Kelly was Founder and Director of the Complexity Research Group, London School of Economics and Political Science, London, UK (1994–2014); is Senior Fellow in LSE IDEAS, Centre for the Study of International Diplomacy, External Affairs and Strategy; Visiting Professor at the Open University; Fellow at Cambridge University's Department of Engineering; Member of the World Economic Forum's Global Agenda Council on Complex Systems (2012–2014).

EMK has had two careers. One in the British Civil Service, Department of Trade and Industry (1967–1983) and another as an academic at the London School of Economics (since 1988). At the DTI she was involved in the negotiation of European Directives on behalf of the UK Insurance Industry and in international affairs. Earlier in her career she was involved in the writing of the first report on Computers and Privacy in the 1970s.

She has been Policy Advisor to European and USA organizations, the European Commission, the UN, several UK government departments; Scientific Advisor to six government administrations in developing a framework of governance for government based on complexity theory. She has led and participated in 49 research and other projects. Has edited and co-authored five volumes and published extensively on the application of complexity science principles in organizations and institutions. EMK is an international speaker and teacher with over 600 presentations worldwide. She has developed a methodology based on complexity science to address difficult, complex problems by identifying the multidimensional problem space and co-creating an Enabling Environment. Researchers and practitioners around the world are being trained by EMK, to use the methodology to address organizational, societal and global problems.

Sam Mockett was introduced to complexity theory when he started working for change management consultancy Delta7 Change Ltd in August 2013. He previously worked in care for adults with learning difficulties before completing a postgraduate degree in philosophy and public policy at the LSE in 2012. His experience in the care sector exposed him to the difficulties of coping with a complex policy environment while attempting to ensure that a number of individuals with a diverse range of needs were provided for within a fractured systemic framework. While at Delta7 Sam learned this type of problem was not limited to care provision. He joined Delta7's sister company, Visual Meaning Ltd, in July 2015 and is still looking for a solution.

Göktuğ Morçöl is a Professor of Public Policy and Administration at Penn State Harrisburg. His research interests are complexity theory, metropolitan governance, business improvement districts, and research methodology. He has authored, edited, or co-edited the following books: *Challenges to Democratic Governance in Developing Countries* (2014, Springer), *A Complexity Theory for Public Policy* (2012, Routledge), *Complexity and Policy Analysis* (2008, ISCE Publishing), *Business Improvement Districts* (2008, Wiley), *Handbook of Decision Making* (2007, Taylor & Francis), *A New Mind for Policy Analysis* (2002, Praeger), *New Sciences for Public Administration and Policy* (2000, Chatelaine Press). His articles have appeared in *Public Administration Review*, *Administration and Society*, *Administrative Theory and Praxis*, *Policy Sciences*, *Public Administration Quarterly*, *Politics and Policy*, *International Journal of Public Administration*, *Journal of Urban Affairs*, *Emergence*, and others. He is an editor-in-chief of the journal *Complexity, Governance & Networks*. He served as the founding Chair of the Section on Complexity and Network Studies of the American Society for Public Administration.

Sayan Mukherjee received his MPhil and PhD degree in pure mathematics from Calcutta University (India). He has been working as an Assistant Professor at the Department of Mathematics at Sivanath Sastri College, Kolkata (India) since 2006. He is author and co-author of more than 20 scientific articles in international/national journals, books and proceedings of the conferences with reviewing committee. His research interests include complexity theory, complex networks theory and fractal and multi-fractal theory in non-linear economical, biomedical and musical time series analysis.

Sanjay Kumar Palit received his PhD degree in pure mathematics from Calcutta University (India). He has been working as an Assistant Professor of Mathematics at Calcutta Institute of Engineering and Management, Kolkata (India) since 2004. He has also worked as Guest Faculty in the Department of Electronics and Instrumentation, Jadavpur University. He is author and co-author of more than 30 scientific articles in international/national journals, books and proceedings of the conferences with reviewing committee. His research interests include dynamical systems, nonlinear time series analysis, complexity analysis, complex networks, time and frequency domain analysis of biomedical and music signals, fractals and multi-fractals, phase space analysis through recurrence plot and high dimensional data analysis.

Alexandros Paraskevas (BSc, MSc, PhD, CertTHE) is Professor in Strategic Risk Management and Chair in Hospitality Management at London Geller College of Hospitality and Tourism, University of West London. Alexandros researches the governance and management of risks/crises both in an organizational and tourism destination

context and he often uses complexity theory principles in his investigations. He has led numerous hotel industry projects in the areas of risk, crisis, disaster management and business continuity and authored several academic articles and book chapters on these topics.

A visiting scholar in Austria, Finland, Hong Kong, Mexico, Spain and Taiwan, Alexandros has worked with governments and tourism professional associations on safety and security issues and on crisis communications strategies. He has served as advisor of the International Hotel and Restaurant Association's (IH&RA) Global Council on Security, Safety and Crisis Management and is a member of ASIS (the American Society for Industrial Security professionals) and HEAT (ASIS' Council for Hospitality and Tourism). His work on risk management and business continuity with InterContinental Hotels Group (IHG) has been honoured by the Institute of Risk Management (IRM) with the 2013 Global Award for Best Partnership.

Babak Pourbohloul, PhD, is trained as a theoretical physicist (chaos theory and nonlinear dynamics) and has been active in the development and application of complex quantitative methods in public and global health systems policy design since 1999. He is an Associate Professor and Principal Investigator of the Complexity Science Lab, at the School of Population and Public Health, Faculty of Medicine, University of British Columbia. He was the founding Director of the Division of Mathematical Modeling, British Columbia Centre for Disease Control (2001–2016). He has been the Principal Investigator on several international modelling projects in the application of mathematical and computational tools to mitigate emerging infectious disease outbreaks and was designated as Director of the *World Health Organization Collaborating Centre for Complexity Science for Health Systems (CS4HS)*. He aims to develop and employ methods of complex systems analysis, through multidisciplinary collaborations, to optimize health policy design at the local, national and international levels.

Rajeev Rajaram is an Associate Professor of Mathematics and a member of the Complexity in Health and Infrastructure Group, Kent State University, USA (cch.ash-tabula.kent.edu). His primary training is in control theory of partial differential equations and he is currently interested in applications of differential equations and ideas from statistical mechanics and thermodynamics to model and measure complexity. For more information, see www.kent.edu/math/profile/rajeev-rajaram.

Fatimah Abdul Razak has obtained her PhD from the Imperial College London in the area of complex systems and networks. Prior to that she did the Mathematical Tripos Part III at Cambridge. She is currently a Senior Lecturer at the School of Mathematical Sciences, Universiti Kebangsaan Malaysia (UKM). Her PhD research was on investigating information theoretic measures and its usage for determining directionality on complex systems. She continues to do research on the different information theoretic measures in relation to complex systems and collective behaviour. She is also currently doing research on synchronization of Malaysian fireflies as well as looking at networks related to Malaysian Twitter data and Malaysian meteorological data using persistent homology.

Kurt A. Richardson is an engineer, physicist and publisher. As an engineer he has built data-driven web-based applications and has designed microchips for many companies including DIRECTV, Panasonic, Thuraya, SES, Lockheed Martin, SLAC, General

Dynamics, and NASA. He was also a Senior Systems Analyst for NASA on their Gamma-Ray Large Area Space Telescope (GLAST, now Fermi). As a physicist he is an active researcher in fundamental complexity theory with a particular interest in the nature of boundaries, and the relationship between form and function in complex dynamical networks. He is currently leading a project to develop customized processing chips (graph processing units) to support dynamic ultra-fast graph-based analysis. As a publisher he owns and runs Emergent Publications which specializes in publishing academic works concerning complex systems thinking. Its flagship publication is the international journal *Emergence: Complexity & Organization*.

J. Rowan Scott is an Associate Clinical Professor of Psychiatry with the University of Alberta. He is a psychotherapy supervisor in the University of Alberta Psychiatric Residency Training Program and teaches in the area of family therapy, conscious studies and interpersonal neuroscience. Dr Scott has an active outpatient general psychiatry practice with an interest in psychopharmacology, individual, couples and family therapy. He completed his medical and psychiatric training at the University of Alberta, and a postgraduate Fellowship in the area of individual, couples and family psychotherapy as well as sex therapy at McMaster University. The study and application of system models and complexity theory in psychiatric and psychotherapy contexts is a long-standing interest. The relationship between consciousness and the limits of reductive natural science has become an important focus of ongoing work. The collaboration with Dr Yakov Shapiro is a much-valued personal relationship.

Yakov Shapiro is a Clinical Professor of Psychiatry and Psychotherapy supervisor at the University of Alberta. He obtained his MD with Honors in research from the University of Alberta in 1988; a certificate of training from the Menninger Foundation in Topeka, Kansas in 1991; and became Fellow of the Royal College of Physicians in 1993. He runs an outpatient practice specializing in integrated individual/group psychotherapy and psychopharmacology, and teaches postgraduate seminars in neuroscience of psychotherapy, evolutionary psychiatry, psychodynamic psychopharmacology, and dynamical systems approaches to psychiatric formulation and treatment. He has given courses and workshops for the Alberta, Canadian and American Psychiatric Associations, American Academy of Psychoanalysis and Dynamic Psychiatry, International Association of Relational Psychoanalysis and Psychotherapy, and Society for the Exploration of Psychotherapy Integration. He is a member of the APA Psychotherapy Caucus and CPA Research Network. He has been working on complexity applications to psychiatric diagnosis, treatment and training for the past 15 years.

Jonathan Stead (FRCGP) has recently retired after 30 years as a GP. He has held an academic post as a Senior Clinical Research Fellow with University of Exeter Medical School since 1980. His special interest is in prevention and treatment of long-term conditions, particularly diabetes. He has worked with Hazel Stuteley for over a decade and together with research Fellows from the Health Complexity Group, they developed the 'Connecting Communities' programme, known as C2, using insights from complexity science as the theoretical framework to understand community transformation.

Jonathan has always mixed clinical time with health management, working in the Strategic Health Authority, and more recently Clinical Commissioning Groups. He also works with

the Royal College of General Practitioners to promote the C2 approach to community transformation, trying to encourage CCGs to commission this way of working to improve the health of those who are most disadvantaged. He is currently the national Co-Director of the C2 Learning Programme (drjwstead@gmail.com).

Hazel Stuteley: Following nurse training at Kings College Hospital London, Hazel was a practicing Health Visitor for 25 years. In 1995 she led the multi-award winning Beacon Project, reversing the decline of a deeply disadvantaged community in Falmouth. Following a year's secondment with the Department of Health in 2001, she accepted a Senior Research Fellowship at the University of Exeter Medical School and became a founder member of the Health Complexity Group, which uses insights from complexity science to understand and enable transformative community change.

Hazel is currently Director of the C2 Connecting Communities Programme at the Institute of Health Service Research, Exeter University. A recent *Health Service Journal* awards ceremony at Royal College of Physicians, listed Hazel within the top 100 most influential and innovative clinical NHS leaders in healthcare, England. An active Executive Board member of the NHS Alliance, Hazel was appointed OBE in 2001 for services to the community of Falmouth (h.stuteley@exeter.ac.uk).

Andrew Tait is Chief Technology Officer of Decision Mechanics. Decision Mechanics specializes in decision science and the design/development of related technology. With a background in artificial intelligence and operations research he is currently involved in helping organizations make use of machine learning to tease insights from their data lakes. Prior to founding Decision Mechanics, Andrew held a range of posts in business, government and academia. He blogs at decisionmechanics.com and tweets in bursts at @decisionmech.

Catherine J. Tompkins joined the faculty at George Mason University in 2003. She is currently an Associate Professor in the Department of Social Work, coordinator for the gerontology programs and the Assistant Dean for Undergraduate Studies in the College of Health and Human Services. Dr Tompkins teaches courses in both the undergraduate and graduate social work programmes. Her research areas include: family caregiving, interventions for dementia care, kinship care, and emotional well-being and retirement. She is currently on the editorial board for three journals and serves on other local and national committees, including the Fairfax County Kinship Care Committee. Dr Tompkins is a John A. Hartford Faculty Scholar in Geriatric Social Work. She received both her MSW and PhD from the University of Maryland School of Social Work.

Liz Varga is Professor of Complex Infrastructure Systems and Director of the Complex Systems Research Centre at Cranfield University, UK. Professor Varga has expertise in transdisciplinary and interdependent infrastructure systems (energy, transport, water, waste and telecoms) via her research projects, engagements with practice and feedback from dissemination. The evolution of infrastructure systems and the connection to food and housing systems are a key focus, providing nexus challenges for policy and technology in increasingly stressed cities. She applies both qualitative and quantitative methods to implement agent-based models to explore potential futures within different scenarios and governance regimes, and to assess the impact of infrastructure systems on economies,

society, the environment and more generally sustainability. In this context, she has been teaching mixed methods research to doctoral students since 2009, encompassing broad questions of research design, philosophy, and paradigm, as well as focused and targeted questions about methods and data integration, skills requirements, and critical evaluation of knowledge.

Xiaogeng Wan is a lecturer in the Department of Mathematics at Beijing University of Chemical Technology, China. She did her postdoc at the Mathematical Sciences Department at Tsinghua University, China and obtained her PhD in Mathematics from Imperial College London in January 2015 with a thesis titled “Time Series Causality Analysis and EEG Data Analysis on Music Improvisation”. Her research interest is in time series causality analysis and data analysis protein structural classification and developing geometric methods on proteins.

Peter R. Wolenski is the “Russell B. Long” Professor of Mathematics at Louisiana State University (LSU) in Baton Rouge, Louisiana. He has published over 60 peer-reviewed research articles in a variety of mathematics journals, and collaborated on many other papers of an interdisciplinary nature. He co-authored the books *Nonsmooth Analysis and Control Theory* with F.H. Clarke, Yu. Ledyae, and R.L. Stern (1998, Springer), and *Linear Mathematical Models in Chemical Engineering* with M. Hortso (2010, Wspc), and has co-edited two others.

Dr Wolenski received his PhD in mathematics from the University of Washington in 1988 under the supervision of R.T. Rockafellar. He held postdoctoral positions at Imperial College London, the International Institute for Advanced System Analysis (IIASA) (Vienna), and Centre de Recherches de Mathematiques (Montreal) before beginning his tenure at LSU in 1990, where he has been happily ensconced to the present day.

Michael E. Wolf-Branigin is Chair and Professor of Social Work at George Mason University. His research focuses on complex adaptive systems and their application to social work practice in relation to his substantive areas including behavioural health and intellectual and developmental disabilities. He worked for two decades in the addictions and disabilities fields. He received his graduate diploma in economics from the University of Stockholm, an MSW from the University of Michigan, and a PhD in research and evaluation from Wayne State University. He has consulted for governmental and non-governmental organizations in the United States and abroad. For 18 years he has been an accreditation surveyor with CARF International. He is an Accredited Professional Statistician™ through the American Statistical Association, has written about 50 peer-reviewed articles and one book, and serves on the editorial boards and reviews for several academic journals.

Katrina Wyatt is Professor of Relational Health and part of the Child Health and Health Complexity Groups at the University of Exeter Medical School. Her research covers three principal areas; the development and evaluation of complex system-based programmes, supporting and enabling patients, service users and communities to be active partners in research projects and in the provision of methodological expertise for evaluations of public health programmes. Ongoing research projects include looking at how the conditions for transformational change are created such that the changes are sustained, creating

a culture of publicly engaged research across the University of Exeter and the development and trialling of a novel childhood obesity prevention programme. The research is informed by complexity science and participatory methods are used in the design and delivery of the research such that service users, patients and carers are partners throughout the research process.