ANTICIPATING RARE EVENTS OF MAJOR SIGNIFICANCE: AN UNCLASSIFIED WORKSHOP

SPEAKER BIOGRAPHIES

Robert Axtell is a professor of computational social science at George Mason University. He works at the intersection of the computational, social, behavioral and economic sciences. Professor Axtell's research group combines agent-based computing with micro-data to build large-scale models having high verisimilitude with the real-world. We have worked on a variety of policy issues, from housing to fisheries, behavioral aspects of retirement and science policy. His research has been published in leading journals like Science, Proceedings of the National Academy of Sciences, and PLOS One and reprised in Nature, as well as appearing in field journals (e.g., The American Economic Review, Computational and Mathematical Organization Theory, and Journal of Industrial Ecology) and computer science conference proceedings (e.g., Autonomous Agents and Multiagent Systems). His work has been covered by many newspapers (e.g., Wall St. Journal, Washington Post, LA Times) and magazines (e.g., Technology Review, Wired, New Scientist). He is co-author (with J.M. Epstien) of Growing Artificial Societies: Social Science from the Bottom Up (MIT Press/Brookings Institution Press), an early statement of the agent-based research program applied to questions in the social sciences. Professor Axtell spent nearly 15 years at the Brookings Institution (Washington, D.C.), as Senior Fellow in the Economics Studies and Governance Studies Programs. For the past several years he has taught at George Mason University (Fairfax, Virginia). For most of that time he was Chair of the Department of Computational Social Science at Mason while teaching agent-based modeling at both the undergraduate and graduate levels.

Christopher L. Barrett is an endowed Distinguished Professor in Biocomplexity, the founding Executive Director of the Biocomplexity Institute, and Professor of the Department of Computer Science at the University of Virginia. Over the past 35 years, Barrett has conceived, founded, and led interdisciplinary complex systems research projects and organizations, established national and international technology programs, and co-founded organizations for federal agencies including: the Department of Defense, the Department of Energy, the Department of Homeland Security and the Department of Transportation. Barrett received the 2012–2013 Jubilee Professorship in Computer Science and Engineering at Chalmers University in Sweden and is a member of the 2010 Royal Colloquium for the King of Sweden. He was a distinguished international professor at the Royal Institute of Technology in Stockholm. He has received Distinguished Research, Service, Advisory and Security Awards from the U.S. Navy, Los Alamos National Laboratory, and the Alliance for Transportation Research. He has served as advisor to U.S. government agencies, the Commonwealth of Virginia, the European Commission, and others. He is the author and co-author of over 100 peer-reviewed papers and presentations. He holds seven patents and has ten pending. Barrett holds a PhD in Bioinformation Systems/Engineering Science and MS in Engineering Science from California Institute of Technology and a U.S. Navy Aerospace Experimental Psychology, Medical Service Corps Post PhD Certification.

Seth D. Baum is Co-Founder and Executive Director of the Global Catastrophic Risk Institute, a nonprofit and nonpartisan think tank. He is also a Research Affiliate of the Centre for the Study of Existential Risk at University of Cambridge and an Associate Editor of the journal Science & Engineering Ethics. He leads an interdisciplinary research agenda of risk, ethics, and policy analysis of catastrophic risks, focusing primarily on artificial intelligence and nuclear war. Baum received degrees in Optics, Applied Mathematics, and Electrical Engineering before completing a Ph.D. in Geography from Pennsylvania State University and a post-doctoral fellowship in Psychology at Columbia University.

T. Charles Clancy is senior vice president, general manager of MITRE Labs, and chief futurist. He is responsible for sparking innovative disruption, accelerating risk-taking and discovery, and delivering real-time technology capabilities and execution through the company's laboratories, solution platforms, and MITRE Fellows program. He leads technical innovation to anticipate and meet the future demands of government sponsors and industry and academic partners.Clancy is an internationally recognized expert on topics at the intersection of wireless, cybersecurity, and artificial intelligence.

Before joining MITRE in 2019 as vice president for intelligence programs, Clancy served as the Bradley Distinguished Professor in Cybersecurity at Virginia Tech and executive director at the Hume Center for National Security and Technology. There, he led Virginia Tech's research and experiential learning programs in defense and intelligence.He started his career at the National Security Agency, filling a variety of research, engineering, and operations roles, with a focus on wireless communications. He has co- authored more than 250 patents and academic publications, as well as six books. He co-founded several venture-backed security startup companies that apply commercial innovation to national security challenges.

Clancy is an IEEE Fellow and sits on the AFCEA International Board of Directors' Executive Committee, the AFCEA Intelligence Committee, the Intelligence and National Security Alliance Advisory Committee, the Systems Engineering Research Center Advisory Board, the Alliance for Telecommunications Industry Solutions Next G Alliance, and the Center for New American Security Task Force on Artificial Intelligence and National Security. He also serves on advisory boards at Howard University, Norfolk State University, North Carolina A&T State University, and Virginia Tech. In 2021, WashingtonExec magazine named Clancy one of the nation's Top Climate Executives to Watch.Clancy holds a bachelor's degree in computer engineering from the Rose-Hulman Institute of Technology, a master's degree in electrical engineering from the University of Illinois at Urbana-Champaign, and a doctorate in computer science from the University of Maryland, College Park.

Terik Daly is a senior staff scientist at the Johns Hopkins Applied Physics Laboratory. He works on NASA missions that study near-Earth asteroids, including the OSIRIS-REx mission that will return an asteroid sample to Earth in 2023. He is Deputy Instrument Scientist for the Double Asteroid Redirection Test (DART), which is the nation's first planetary defense test mission and launched in November 2021. He also contributes to efforts to defend Earth against the hazards posed by asteroids and comets as part of the organizing committees for the biannual Planetary Defense Conference and tabletop exercises. Dr. Daly is the Principal Investigator for multiple NASA-funded grants that address pressing problems in planetary science.

Madeleine Clare Elish is a cultural anthropologist whose work examines the social impacts of AI and automation on society. She joined Google as a Senior Research Scientist and currently leads the Responsible AI team for Cloud AI. Previously, she co-founded and led the AI on the Ground Initiative at Data & Society Research Institute, which uses social science research to inform future design, use, and governance of data-driven systems. She also serves on the Executive Committee of the ACM Fairness and Accountability in Machine Learning computer science conference, after having served as conference General Co-chair in 2021. She has conducted field work across varied industries and communities, ranging from the Air Force, the driverless car industry, and commercial aviation to precision agriculture and emergency healthcare. Her research has been published and cited in scholarly journals as well as publications including The New York Times, Wired, The Guardian, MIT Tech Review, Vice, and USA Today. She holds a PhD in Anthropology from Columbia University and an S.M. in Comparative Media Studies from MIT.

Markus Gesmann is the co-founder of Insurance Capital Markets Research. A research house that provides quantitative research on the global specialty (re)insurance industry for insurance carriers, intermediaries and investors. Markus has spent the last 18 years in the London insurance and capital markets, heading up the analysis function at Lloyd's of London for 8 years. He is a mathematician by background and has carried out research on how Bayesian analysis and probabilistic programming can be applied in insurance to assess risk. Furthermore, Markus is the co-founder of the Insurance Data Science conference series and the London Bayesian Mixer meet-ups.

Alice Hill is the David M. Rubenstein Senior Fellow for Energy and the Environment at the Council on Foreign Relations. Her work at CFR focuses on the risks, consequences, and responses associated with climate change. Hill previously served as special assistant to President Barack Obama and senior director for resilience policy on the National Security Council staff where she led the development of national policy to build resilience to catastrophic risks, including climate change and biological threats. Prior to this, Hill served as senior counselor to the secretary of the U.S. Department of Homeland Security (DHS), in which she led the formulation of DHS's first-ever climate adaptation plan and the development of strategic plans regarding catastrophic biological and chemical threats, including pandemics. Earlier in her career, she was a supervising judge on both the Los Angeles Municipal and Superior Courts as well as a federal prosecutor and chief of the white-collar crime unit at the United States Attorney's Office in Los Angeles, California. Oxford University Press published her coauthored book, *Building a Resilient Tomorrow*, in 2019. She currently serves on the boards of the Environmental Defense Fund and Munich Re Group's U.S.-based companies. In 2020, Yale University and the Op-Ed Project awarded her the Public Voices Fellowship on the Climate Crisis. Hill's new book, *The Fight for Climate After COVID-19,* was published in September 2021.

Delores Knipp is a Research Professor at the Smead Aerospace Engineering Sciences Department at the University of Colorado Boulder (CU Boulder). She earned a Ph D in Atmospheric and Space Physics from the University of California, Los Angeles in 1989. Her career spans more than 30 years as an active-duty Air Force Officer and civilian professor at the US Air Force Academy where she taught physics, meteorology and astronomy, followed by more than a decade of teaching and research CU Boulder. During that time, she wrote the first space weather textbook for upper division undergraduates entitled 'Understanding Space Weather and the Physics Behind It.'

In 2005-2006 she served on National Space Weather Program Assessment Committee; in 2015-2016 she served on the National Science Foundation Portfolio Review Committee of the Geospace Section, Division of Atmospheric and Geospace Sciences. From 2014-2019 Professor Knipp was the Editor in Chief for the American Geophysical Union's (AGU) Space Weather Journal. During that time, Prof Knipp delivered the 2017 Coupling Energetics and Dynamics of Atmospheric Regions (CEDAR) Prize lecture, Nitric Oxide: How the thermosphere 'fights back' during intense storms. In 2019 she was a member Next Step Space Weather Benchmarks Working Group and co-convened the AGU Chapman Conference on Forecasting Space Weather Including Extremes. Most recently she has served as the 2019-2021 Chair of the Coupling Energetic & Dynamics of Atmospheric Regions (CEDAR) Science Steering Committee. In 2019 she joined the ranks of Fellows at the American Meteorological Society. Later that year she was awarded the 2019 International Marcel Nicolet Medal for Space Weather and Space Climate and delivered the Michael J. Buonsanto 20th Annual Memorial Lecture at MIT Haystack Observatory.

Proffesor Knipp's research focuses on the space environment and the atmospheric and solar events that disturb it. She works with students to investigate methods for: 1) specifying satellite drag; 2) describing how structures on the Sun produce disturbances in near-Earth space; 3) improving scientific use of space environment measurements from DoD, NASA and international space missions; 4) inter-comparing measurements from research and commercial satellites with an eye toward making broader use of commercial satellite 'housekeeping' data to monitor environmental conditions in near-Earth space; 5) describing the effects of extreme space weather at Earth: and 6) developing educational material related to space weather. She also studies historical space weather events to understand the impacts these events have had on society and the US military. She and her group are also working to prepare historical space

weather data sets for Machine Learning extreme-event detection.

John Organek is a senior program developer for over 30 years, with focus on leading the transformation of national-level organizations to better align with their value proposition through the challenging technical and human change efforts demanded: strategic planning, enterprise architecture, business process management and infrastructure investment portfolio management. He was an officer in the US Army Corps of Engineers for over 23 years, serving in an eclectic portfolio of leadership and staff roles including combat command, Chief of Engineer Planning, Combined Forces Command (Republic of Korea), the Army Staff, and Office of the Secretary (Army). Functional specialties: combat engineering, construction, information technology and operations research. For 6 years he was the Senior Executive Service Chief Architect for Army Business Systems supporting US Army business transformation. He applied extensive system-of-systems education in water resources, economics and regional planning to large-scale business transformation efforts for the US Army, the Republic of Korea, the NASDAQ Stock Market and the Federal Reserve.

Jeffrey J. Love has an A.B. in physics from the University of California, Berkeley, and a Ph.D. in geophysics from Harvard University. After receiving his doctorate in 1993, Jeffrey worked at the University of Leeds, England, the Atomic Energy Commission, France, and the Scripps Institution for Oceanography, La Jolla, California. In 2001, he was hired by the U.S. Geological Survey (USGS) as a research geophysicist, and he is presently the USGS Advisor for Geomagnetic Research. Jeffrey works in collaboration with colleagues on three subjects: 1. Using geomagnetic monitoring data and magnetotelluric survey data to evaluate geoelectric hazards of concern to the electric-power grid industry. 2. Statistical analysis of the rare occurrences of intense magnetic storms. 3. Analysis of historical records of past space-weather events and their impacts. Jeffrey also works to coordinate USGS projects with other government agencies through the Space Weather Operations Research and Mitigation (SWORM) working group of the National Science and Technology Council (NSTC).

Madhav Marathe is a Distinguished Professor in Biocomplexity, the division director of the Networks, Simulation Science and Advanced Computing Division at the Biocomplexity Institute and Initiative, and a Professor in the Department of Computer Science at the University of Virginia (UVA). His research interests are in network science, computational epidemiology, AI, foundations of computing, socially coupled system science and high performance computing. Over the past 25 years, he and his colleagues have developed scalable computational methods to study the social, economic and health impacts of large-scale natural and human initiated disasters. The tools and methods have been used in over 50 case studies to inform and assess various policy questions pertaining to planning and response in the event of such disasters. Before joining UVA, he held positions at Virginia Tech, the Los Alamos National Laboratory and was the inaugural George Michael Fellow at the Lawrence Livermore National Laboratory. He is a Fellow of the American Association for the Advancement of Science (AAAS), Society for Industrial and Applied Mathematics (SIAM), Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE).

Alon Orlitsky, planning committee member. He is currently a professor of Electrical and Computer Engineering and of Computer Science and Engineering at UC San Diego where he holds the Qualcomm Chair in Information Theory and its Applications. His research focuses on learning from scarce data and on predicting rare and even unseen events, which received several paper awards from the IEEE Transactions on Information Theory, and the NeurIPS and ICML conferences. He graduated from Stanford University with a Ph.D. degree in Electrical Engineering.

M. Elisabeth Pate-Cornell is the Burt and Deedee McMurtry Professor and Chair of the Department of Management Science and Engineering at Stanford University. Her specialty is engineering risk analysis with application to complex systems (space, medical). Her research has focused on explicit consideration of human and organizational factors in the analysis of failure risks, and recently on the use of game theory in risk analysis. Applications in the last few years have included counter-terrorism and nuclear counter-proliferation problems. She is a member of several boards, including Aerospace, Draper, and InQtel. She was

a member of the President's Foreign Intelligence Advisory Board until December 2008. She received a Ph.D. in engineering economic systems from Stanford University. Dr. Pate-Cornell was elected to the National Academy of Engineering in 1995.

Nestor Alfonzo Santamaria is an expert in adaptation and disaster risk management and currently serves as a senior advisor on risk governance for the Organisation for Economic Co-operation and Development (OECD) working for the Governance Reviews and Partnerships Division, within the Public Governance Directorate. Prior to his current position, he worked on resilience and disaster management policy in several UK ministries and for the government of London's Financial District (the City of London). Nestor has also advised on disaster management issues for the European Union, various UN agencies, the World Bank and the Inter-American Development Bank. In Latin America, Nestor has worked on political violence prevention and peacebuilding initiatives, electoral observation, human rights promotion and support to refugees/internally displaced persons.

Arvand Satyam is the Chief Commercial Officer of Pano, a purpose-driven business to address climate change-related disasters and infrastructure resilience using IoT and AI solutions & Venture Partner at Ozone Ventures. Previously, Managing Director, Global Public Sector at Cisco; led growth initiatives for $13Bn public sector business including critical infrastructure, cyber security strategy for state and national governments and public private partnerships with multinational institutions. Formerly, led telco service provider sales, strategic partnerships and venture investments for Cisco's IOT & Smart Citybusinesses. Undergraduate degree and Master's in Computer Science and Finance, University of New South Wales; alumnus, Harvard Business School; studies, Kenan-Flagler Business School, University of North Carolina (UNC). Adams Advisor, UNC. Member: Advisory Board, World Sensing, EQITII and Urbanise; Governor of Illinois's Technology Advisory Board. Investor and advisor to several companies. Has contributed to articles for the Wall Street Journal, Bloomberg Finance, the Atlantic, the New York Times, Fortune, Harvard Business School Alumni Magazine and L'Atelier. Young Leader, World Cities Summit (2016); Young Global Leader, World Economic Forum (2018). Academy judge for $1M Varkey Foundation Global Teacher Prize.