

Optimizing Investments for Urban Sustainability Infrastructure
July 13, 20, and 27, 2022

Agenda
July 20th, 2022

Please navigate to the [event page](#) to watch the livestream of this event.

July 20th, 11:00 – 5:00 ET

SESSION 3: Decision-Making for Infrastructure Investments

11:00 am – 2:15 pm

This session explores the state-of-the-art tools and practices available for optimizing and improving the infrastructure investment process, as well as the challenges practitioners face when bridging the gap between theory and implementation. A series of keynotes frame the broader issues surrounding decision-making for infrastructure investment, and then a speaker will present an overview of the mathematical methods that can support quantitative problem-solving. A panel of experienced experts will discuss the challenges and opportunities in multi-objective decision-making, followed by a group of speakers who address the practical barriers and processes for bringing optimal decisions to fruition.

- 11:00 am **Keynote Address #1**
➤ *Costa Samaras*, White House Office of Science and Technology Policy
- 11:20 am **Keynote Address #2**
➤ *Richard de Neufville*, MIT
- 11:40 am **Keynote Address #3**
➤ *Safiya Noble*, author of *Algorithms of Oppression* and at UCLA
- 12:00 pm **Overview: Optimization in Problem-Solving**
➤ *David Shmoys*, Cornell University

-----**12:20 pm BREAK**-----

- 12:35 pm **Multi-Objective Decision-Making**
Moderator: *Robert J. Lempert*, RAND Corporation
Speakers:
- *Elise Miller-Hooks*, George Mason University
 - *Patrick Reed*, Cornell University
 - *David Banks*, Duke University
 - *Victor Zavala*, University of Wisconsin-Madison

Guiding Questions:

- What does it mean to optimize infrastructure investments? Or what is an optimal investment?
- How do decision makers use mathematical tools?
- How does optimization fit with the larger political or community agenda?

1:25 pm

Bridging the Gap Between Optimization and Action

Moderator: *Sue McNeil*, University of Delaware

Speakers:

- *Lauren Davis*, North Carolina A&T State University
- *Cris Liban*, Los Angeles County Metropolitan Transit Authority
- *Marie Lynn Miranda*, University of Notre Dame

Guiding Questions:

- What is the gap between optimization and action?
- How do we build decision makers' and community awareness of the value of mathematical models?
- What strategies are effective to overcome decision makers' fear of "black box" decision making?
- What are the challenges in integrating infrastructure investments with other community priorities?
- What additional things beyond "optimality" do decision-makers need to consider?

-----2:15 pm BREAK-----

Mini-Session 1: Building Confidence in Data and Institutions

2:45 – 5:00 pm

In this session, speakers and panelists will highlight institutional challenges to gathering trusted data such as community skepticism, privacy concerns, and evaluating data for inclusion and comprehensive representation.

2:45 pm

Building Confidence in Data and Institutions

Moderator: *Jeanne Holm*, City of Los Angeles

Speakers:

- *Rishee Jain*, Stanford University
- *Richard Wang*, MIT
- *Karen Abrams*, City of Pittsburgh
- *Michael Cremin*, MnDOT Asset Management Program Office

Guiding Questions:

- How do we know we have the right data? How do we know if our data is sufficiently accurate?
- What communication strategies are effective to build decision makers' and community members' confidence in the data that supports decision making?
- Community engagement is one approach to building confidence in institutions. What does it take to have effective community engagement? Are there other effective strategies?
- How should organizations and governments balance the need for data with constituents' rights to privacy?

4:15 pm

Keynote Address

- *Shelby Switzer*, Beeck Center for Social Impact + Innovation at Georgetown University and US Digital Service at the White House

-----**4:45 pm ADJOURN**-----

Presenter Biographies

Costa Samaras, Ph.D.



Costa Samaras serves in the White House Office of Science and Technology Policy (OSTP) as Principal Assistant Director for Energy and OSTP Chief Advisor for Energy Policy. As part of the OSTP senior leadership team, Costa works with the OSTP Director, the Deputy Director for Energy, and other OSTP senior staff in coordinating Federal activities on topics such as U.S. energy science and technology policy, the suitability of energy technologies for meeting U.S. energy and climate goals, opportunities for energy RDD&D investments, and advancing Federal government-wide initiatives to further diversity, equity, and inclusion of the U.S. scientific and energy sector workforce. Prior to joining OSTP, he was an Associate Professor in the Department of Civil and Environmental Engineering and Director of the Center for Engineering and Resilience for Climate Adaptation at Carnegie Mellon University.

Richard de Neufville, Ph.D.



Dr. Richard de Neufville is Professor of Engineering Systems at MIT. He wrote the book on "Flexibility in Engineering Design" (MIT Press 2011) with Prof. Stefan Scholtes of Cambridge University and teaches that subject in the MIT Systems Design and Management Program. He has authored 6 other textbooks and supervised over 250 dissertations and theses. As founder of the graduate Technology and Policy Program, he received the Sizer Award for the Most Significant Contribution to MIT Education. He served as an Airborne Ranger officer in the US Army Corps of Engineers and as a White House Fellow for US President Johnson.

Safiya Noble, Ph.D.



Dr. Safiya U. Noble is an internet studies scholar and Professor of Gender Studies and African American Studies at the University of California, Los Angeles (UCLA) where she serves as the Co-Founder and Co-Director of the UCLA Center for Critical Internet Inquiry (C2i2). She holds affiliations in the School of Education & Information Studies, and is a Research Associate at the Oxford Internet Institute at the University of Oxford where she is a Commissioner on the Oxford Commission on AI & Good Governance (OxCAIGG). In 2021, she was recognized as a MacArthur Foundation Fellow (also known as the "Genius Award") for her ground-breaking work on algorithmic discrimination, which prompted her founding of a non-profit, Equity Engine, to accelerate investment in companies, education, and networks driven by women of color. She is the author of a best-selling book on racist and sexist algorithmic bias in commercial search engines, entitled *Algorithms of Oppression: How Search Engines Reinforce*

Racism (NYU Press), which has been widely-reviewed in scholarly and popular publications. She is the recipient of a Hellman Fellowship and the UCLA Early Career Award. In 2022, she was recognized as the inaugural NAACP-Archewell Digital Civil Rights Award recipient.

Her academic research focuses on the internet and its impact on society. Her work is both sociological and interdisciplinary, marking the ways that digital media intersects with issues of race, gender, culture, power, and technology. She is regularly sought out for her expertise on issues of algorithmic discrimination and technology bias by national and international press including The Guardian, the BBC, CNN International, USA Today, Wired, Time, Full Frontal with Samantha Bee, The New York Times, and a host of network news and podcasts. Her popular writing includes critiques on the loss of public goods to Big Tech companies, as featured in Noema magazine.

Safiya is the co-editor of two edited volumes: The Intersectional Internet: Race, Sex, Culture and Class Online and Emotions, Technology & Design. She is a member of several academic journal and advisory boards, and holds a Ph.D. and M.S. in Library & Information Science from the University of Illinois at Urbana-Champaign, and a B.A. in Sociology from California State University, Fresno where she was awarded the Distinguished Alumni Award for 2018. In 2020, she was awarded the Distinguished Alumna Award from the iSchool Alumni Association, and is also the inaugural Diversity and Inclusion Award winner from the Illinois Alumni Association at the University of Illinois at Urbana-Champaign.

Dr. Noble is a board member of the Cyber Civil Rights Initiative, serving those vulnerable to online harassment. She was recently appointed as a board member for the Joint Center for Political and Economic Studies, America's Black think tank.

David Shmoys, Ph.D.



David Shmoys is the Laibe/Acheson Professor and Director of the Center for Data Science for Enterprise & Society at Cornell University. He obtained his PhD in Computer Science from the University of California, Berkeley in 1984, and held postdoctoral positions at MSRI in Berkeley and Harvard University, and a faculty position at MIT before joining the Cornell University faculty. David is a Fellow of the ACM, INFORMS, and SIAM, was an NSF Presidential Young Investigator, and was awarded the 2013 INFORMS Lanchester Prize and the 2018 INFORMS Wagner Prize. His research on algorithms for discrete optimization problems has seen application in scheduling, inventory theory, computational biology, computational sustainability, and most recently, data-driven decision-making in the sharing economy.

Elise Miller-Hooks, Ph.D.



Elise Miller-Hooks holds the Bill and Eleanor Hazel Endowed Chair in Infrastructure Engineering at George Mason University, is an advisor to the World Bank Group, and is founding Editor-in-Chief of IFORS/Elsevier's Sustainability Analytics and Modeling journal. Dr. Miller-Hooks previously served as a program director at the U.S.

National Science Foundation and on the faculties of the University of Maryland, Pennsylvania State University and Duke University. Dr. Miller-Hooks received her Ph.D. in Civil Engineering from the University of Texas – Austin and B.S. in Civil Engineering from Lafayette College. She has expertise in: multi-hazard civil infrastructure resilience quantification and protection; disruption planning and response; transportation systems engineering; sustainability; intermodal rail- and maritime-based freight transport; real-time routing and fleet management: paratransit, delivery, ridesharing and bikeways; stochastic and dynamic network algorithms; and collaborative and multi-objective decision-making.

Patrick Reed, Ph.D.



Dr. Reed's Decision Analytics for Complex Systems research group has a strong focus on the sustainability of Food-Energy-Water systems given conflicting demands from ecosystem services, expanding populations, and climate change. The tools developed in Dr. Reed's group bridge complexity science, risk management, economics, multiobjective decision making, artificial intelligence, and high-performance computing. Engineering design and decision support software developed by Dr. Reed is being used broadly in academic, governmental, and industrial application areas with thousands of users globally.

David Banks, Ph.D.



David Banks obtained an M.S. in Applied Mathematics from Virginia Tech in 1982, followed by a Ph.D. in Statistics in 1984. He won an NSF Postdoctoral Research Fellowship in the Mathematical Sciences, which he took at Berkeley, working with David Blackwell. In 1986 he was a visiting assistant lecturer at the University of Cambridge, and then joined the Department of Statistics at Carnegie Mellon in 1987. In 1997 he went to the National Institute of Standards and Technology, then served as chief statistician of the U.S. Department of

Transportation, and finally joined the U.S. Food and Drug Administration in 2002. In 2003, he returned to academics at Duke University.

Victor Zavala, Ph.D.



Victor M. Zavala is the Baldovin-DaPra Professor in the Department of Chemical and Biological Engineering at the University of Wisconsin-Madison and a computational mathematician in the Mathematics and Computer Science Division at Argonne National Laboratory. He holds a B.Sc. degree from Universidad Iberoamericana and a Ph.D. degree from Carnegie Mellon University, both in chemical engineering. He is on the editorial board of the *Journal of Process Control*, *Mathematical Programming*, *Computational Optimization and Applications*, and *Computers & Chemical Engineering*. He is a recipient of NSF and DOE Early Career awards and of the Presidential Early Career Award for Scientists and Engineers (PECASE). His research interests include statistics, control, and optimization and applications to energy and environmental systems.

Lauren Davis, Ph.D.



Dr. Lauren Davis is a professor in the Department of Industrial & Systems Engineering at North Carolina Agricultural and Technical State University. She received her B.S. in Computational Mathematics from Rochester Institute of Technology; M.S. in Industrial Engineering from Rensselaer Polytechnic Institute, and Ph.D. in Industrial Engineering from NC State University. Her research focuses on decision-making under uncertainty primarily using stochastic optimization techniques (Markov Decision Processes, stochastic programming) and simulation. Her work has been applied to solve optimal stocking, transportation scheduling and distribution decisions in for-profit and non-profit supply chains. She has more than 40 peer-reviewed journal papers and refereed conference proceedings addressing issues related to inventory management, transportation scheduling, port operations, and emergency response in areas such as food supply chains, food security, port operations, and humanitarian relief. Her work has been supported by the National Science Foundation, Department of Homeland Security, and US Department of Agriculture totaling more than \$4 million in grant funding. Additionally, her research examining hunger relief supply chains has been featured in CNN's Great Big Story and NSF's Discovery article series. She is currently the Principal Investigator for an NSF-funded National Research Traineeship grant that explores food security and hunger relief using computational data science.

Cris Liban, Ph.D., P.E.



Dr. Cris B. Liban, P.E., serves as Chief Sustainability Officer at the Los Angeles County Metropolitan Transportation Authority (LA Metro). Dr. Liban has worked at LA Metro since 2003 and has grown his agency's environmental and sustainability practice into one of the most progressive and forward-looking in the country, implementing over 150 sustainability initiatives to date. He is working to ensure that \$140B in capital projects that are programmed for the next 40 years are sustainable, climate-adapted, and resilient for the more than 10 million people of Los Angeles County. Many of these are to be completed in time for the 2028 Olympics.

Dr. Liban holds concurrent appointments in the State of California Green Bonds Development Committee, Los Angeles County Beach Commission, and the City of Los Angeles Board of Transportation Commissioners. He is currently the Chapter Lead in writing the Transportation Chapter of the forthcoming Fifth National Climate Assessment.

He held previous political appointments as a member of the USEPA's National Advisory Council for Environmental Policy and Technology and the California Climate Safe Infrastructure Working Group.

Cris is the Chair of the American Society of Civil Engineers' Committee on Sustainability where he is leading the effort to develop a global sustainable infrastructure standard; and guidance documents that incorporate climate science into both the practice of civil engineering and procurement and execution of sustainable infrastructures. He is currently the Co-Chair of the American Public Transportation Association's Sustainability Commitment Committee. He conceptualized and co-led the formation of the International Coalition for Sustainable infrastructure in 2019, which now has become a global coalition of almost 200,000 engineers and more than 10,000 cities around the world.

Cris previously received in 2016 the Philippines' highest civilian honor for Filipinos living overseas, the Pamana ng Pilipino Award, from Philippines President Rodrigo Duterte. In addition, because of his singular focus on building a sustainable transportation system that is also economically and socially beneficial to all levels of society, Cris was awarded the Engineering-News Record's (ENR) 2020 Award of Excellence. He was elected as a Member of the National Academy of Construction in 2021; and a Distinguished Member of the American Society of Civil Engineers in 2022.

Dr. Liban has degrees in geology, civil engineering, and environmental science and engineering.

Marie Lynn Miranda, Ph.D.



Dr. Marie Lynn Miranda is an accomplished and recognized data science scholar and communicator with over 150 peer-reviewed publications focused on the nexus of health, education, equity, and the environment, with over \$65 million in federal, corporate, and foundation funding. Miranda specializes in spatial analytic approaches, especially targeted at understanding how the environment shapes health and wellbeing among children and those from low resource communities. Miranda is a leader in the rapidly evolving field of geospatial health informatics and has developed global cultural and scientific competence through extensive work on four continents.

Miranda founded and continues to lead the Children's Environmental Health Initiative (CEHI), a research, education, and outreach program committed to fostering environments where all people can prosper. CEHI's work leverages research, stakeholder engagement, and advocacy to effect environmental policy change. CEHI received the 2008 U.S. Environmental Protection Agency's Environmental Justice Award.

Miranda is a Phi Beta Kappa, summa cum laude graduate of Duke University, where she earned her A.B. in mathematics and economics and was named a Truman Scholar. She has a Ph.D. and M.A. from Harvard University, where she held a National Science Foundation Graduate Research Fellowship. She is a fellow of the American Association for the Advancement of Science and a member of Sigma Xi. She serves on the boards of the Doris Duke Charitable Foundation and the Environmental Defense Fund.

Rishee Jain, Ph.D.



Rishee K. Jain is an Assistant Professor of Civil & Environmental Engineering and the Director of the Urban Informatics Lab at Stanford University. His research focuses on the development of data-driven and socio-technical solutions to sustainability problems facing the urban built environment and lies at the intersection of civil engineering, data analytics and social science. He is a recipient of a CAREER award from the National Science Foundation and a Building Innovator Fellowship from the Department of Energy. Rishee earned his BS in Civil & Environmental

Engineering from the University of Texas at Austin and his MS/PhD from Columbia University as part of a joint IGERT program between civil engineering and urban planning.

Richard Wang, Ph.D.



Richard Y. Wang is Director of the MIT Chief Data Officer and Information Quality (CDOIQ) Program. He is a pioneer and leader in the research and practice of Chief Data Officer (CDO). Dr. Wang has significant credentials across government, industry, and academia. He conceived and chaired the Inaugural MIT-Army CDO Forum, and established the CDO Forum as an annual event at MIT. In addition, he has been chairing the Annual MIT CDOIQ Symposium since 2007. Dr. Wang was a professor at the MIT Sloan School of Management for almost a decade. From 2005-2009, he was appointed as a Visiting University Professor of Information Quality, University of Arkansas at Little Rock. He is an Honorary Professor at Xi'an Jiao Tong University, China.

Dr. Wang has put the term Information Quality on the intellectual map with myriad publications. In 1996, Prof. Wang organized the premier International Conference on Information Quality, which he has served as the general conference chair and currently serves as Chairman of the Board. Dr. Wang's books on information quality include *Journey to Data Quality* (MIT Press, 2006), *Information Quality: Advances in Management Information Systems* (M.E. Sharpe, 2005), *Introduction to Information Quality* (MITIQ Publications, 2005), *Data Quality* (Kluwer Academic, 2001), and *Quality Information and Knowledge* (Prentice Hall, 1999).

Prof. Wang has been instrumental in the establishment of the Ph.D. and Master of Science in Information Quality degree program at the University of Arkansas at Little Rock, the Stuart Madnick IQ Best Paper Award for the International Conference on Information Quality, the comprehensive IQ Ph.D. dissertations website, and the Donald Ballou & Harry Pazer IQ Ph.D. Dissertation Award.

Dr. Wang is the recipient of the 2005 DAMA International Achievement Award. Previous recipients of this award include Codd for inventing the Relational Data model and Chen for the Entity Relationship model.

In 2005, he received a certificate of appreciation from the Director of Central Intelligence and a thank you letter from the Director of National Intelligence. From 2009-2011, Dr. Wang served as the Deputy CDO and Chief Data Quality Officer of the U.S. Army, for which he received

letters of appreciation from the Army's Chief Information Officer, and the CIO at the Office of the Secretary of Defense.

He received a Ph.D. in Information Technology from the MIT Sloan School of Management in 1985.

Karen Abrams



Karen Abrams is the Director of City Planning for Pittsburgh, where she oversees the City's efforts to establish and sustain a consistent approach to land use that incorporates sustainability, city design, resilience, equity and opportunity. As Director of City Planning, Karen Abrams leads a team charged with undertaking initiatives such as neighborhood planning and resilient communities to performance incentives for the riverfront development and comprehensive planning. City Planning is responsible for the City Planning Commission, Art Commission, Zoning Board of Adjustment, the Historic Review Commission. Abrams previously served as program officer for equitable development for The Heinz Endowments, a role that focused on infusing equity into the foundation's redevelopment funding initiatives in the Pittsburgh region. Her work involved helping the Endowments develop and implement a range of grantmaking that supported sustainable investments in neighborhood-level projects as well as city and region-wide initiatives. Before joining the Endowments, Karen was the community and diversity affairs manager at the Urban Redevelopment Authority of Pittsburgh. Her work contributed to investments ranging from thousands of dollars for small-scale vacant lot improvements to a \$30 million U.S. Department of Housing and Urban Development Choice Neighborhood Implementation Grant. Karen earned a bachelor's degree in African and African American Studies from the University of Virginia and a Master of Science degree in sustainable systems from Slippery Rock University of Pennsylvania. She also was awarded a Loeb Fellowship at the Harvard Graduate School of Design.

Michael Cremin, P.E.



Michael is a practicing principle engineer with MnDOT's Asset Management Program Office, with a degree from University of Minnesota, and has gained 11 years of implementing asset management programs (7 years of private consulting and 4 years of state DOT) including data driven risk based decision engineering support. At MnDOT a focus on ancillary asset management maturity development for Transportation Asset Management System software utilization (240 asset class codes), Transportation Asset Management Plan

development (12 asset classes), Asset Management Strategic Implementation Plan development (72 asset classes), and Mobile Collection.

Shelby Switzer



Shelby Switzer is a Fellow at the Beeck Center for Social Impact and Innovation at Georgetown University, helping governments build/buy software collaboratively through Beeck's [Intergovernmental Software Collaborative](#), and they serve as a technical advisor and open source community manager for [Justice40](#) as a member of the [US Digital Service](#). Their career in civic technology spans a decade and includes volunteering with Code for America brigades across the country, contributing to open source and open standards projects, working at tech companies serving governments and community organizations, and leading various technology projects at the US Digital Service. They write regularly on civic technology and digital public infrastructure on their blog, [Civic Unrest](#).

Committee Member Biographies

Jeanne Holm, Ph.D. (Chair)



As a leader in open data, education, and civic innovation, Jeanne Holm empowers people to discover new knowledge and collaborate to improve life on Earth and beyond. Jeanne Holm is the Deputy Mayor for Budget and Innovation of the City of Los Angeles, addressing issues of technology, equity, digital inclusion, and fiscal transparency. She connects public-private partners for innovations ranging from improving digital equity to using data science for environmental justice to reimagining government work. She founded the Data Science Federation partnering universities and cities to create innovative solutions such as using artificial intelligence for traffic safety and machine learning to improve air quality. She was formerly the Evangelist for open data for the White House under President Obama, the leader for Africa open data for the World Bank, and the Chief Knowledge Architect at NASA. She is a Distinguished Instructor at UCLA, a Trustee of Claremont Graduate University, a Fellow of the United Nations International Academy of Astronautics, and an advisor to the U.N.'s Sustainable Development Solutions Network. She leads a startup that promotes equity, education, and social justice through technology and education programs for innovators throughout the world.

Katherine Bennett Ensor, Ph.D.



Katherine Bennett Ensor is the Noah G. Harding Professor of Statistics at Rice University where she serves as director of the Center for Computational Finance and Economic Systems (cofes.rice.edu) and creator of the Kinder Institute's Urban Data Platform (kinderudp.org). Ensor served as chair of the Department of Statistics from 1999 through 2013 and has shaped data science at Rice as a member of the campus-wide hiring committee. Her research focuses on the development of statistical and data science methods for practical problems. Her expertise is dependent data covering time, space, and dimension with applied interests in finance, energy, environment, health, and risk management. She is a fellow of ASA and AAAS and has been recognized for her leadership, scholarship, and mentoring. Ensor is the 2022 President of the American Statistical Association (ASA). She served as Vice President of ASA from 2016 to 2018 and as a member of the National Academies Committee on Applied and Theoretical Statistics from 2014 to 2020. Ensor holds a BSE and MS in Mathematics from Arkansas State University and a Ph.D. in Statistics from Texas A&M University. Ensor is a member of the Texas A&M College of Science Academy of Distinguished Former Students.

John R. Birge, Ph.D.

John Birge is the Hobart W. Williams Distinguished Service Professor of Operations Management at the University of Chicago, Booth School of Business. Previously, he was Dean of the

McCormick School of Engineering and Applied Science and Professor of Industrial Engineering and Management Sciences at Northwestern University. He also served as Professor and Chair of Industrial and Operations Engineering at the University of Michigan, where he also established the Financial Engineering Program. He is currently Editor-in-Chief of Operations Research, former Editor-in-Chief of Mathematical Programming, Series B, and former President of INFORMS. His honors and awards include the IIE Medallion Award, the INFORMS Fellows Award, the MSOM Society Distinguished Fellow Award, the Harold W. Kuhn Prize, the George E. Kimball Medal, the William Pierskalla Award, and election to the US National Academy of Engineering. He received M.S. and Ph.D. degrees from Stanford University in Operations Research, and an A.B. in Mathematics from Princeton University.

Leah Brooks, Ph.D.



Leah Brooks is Associate Professor in the Trachtenberg School of Public Policy and Public Administration at the George Washington University and Director of the university's Center for Washington Area Studies. After receiving her PhD from UCLA in 2005, she taught at the University of Toronto and McGill University, and worked at the Federal

Reserve Board of Governors. Her work to date includes examination of Business Improvement Districts and land assembly to understand the resolution of collective action problems, analysis of the Community Development Block Grant program to understand the political economy of grant giving at the municipal and sub-municipal levels, an investigation of the long-run impacts of streetcar investments in Los Angeles on urban form, and an analysis of whether and why US infrastructure costs have increased. She is currently working on understanding the long-run impacts of Washington, DC's 1968 civil disturbance and the impact of ecommerce on how retail establishments cluster. She serves on the editorial boards of the Journal of Urban Economics, the National Tax Journal, and Real Estate Economics.

Jared L. Cohon, Ph.D.



Jared Cohon (NAE) is university professor of Civil and Environmental Engineering and Engineering and Public Policy and President Emeritus at Carnegie Mellon University in Pittsburgh. At NASEM, he chairs the Board on Energy and Environmental Systems. Among previous committees on which he served, he chaired the Committee on Fuel Economy Technologies for Light-Duty Vehicles and the Committee that produced "The Hidden Costs of Energy." He was a Professor of Geography and Environmental Engineering at Johns Hopkins University from 1973 to 1992, where he also served as Vice Provost for Research from 1986 to 1992, Associate Dean of Engineering from 1983 to 1986, and Assistant Dean of Engineering from 1981 to 1983. Following his tenure at Johns Hopkins, he was Dean of the School of Forestry and Environmental Studies and Professor of Environmental Systems Analysis at Yale University from 1992 to 1997. He served as president of Carnegie Mellon from 1997 to 2013. Dr. Cohon also

served as Legislative Assistant for Energy and Environment on the staff of U.S. Senator Moynihan from 1977 to 1978. In January 1995, President Bill Clinton appointed Dr. Cohon to the Nuclear Waste Technical Review Board. In 1997, he assumed the role of Chairman of the Board, a position he held until 2002. President George W. Bush appointed him in 2002 and President Barack Obama reappointed him to serve on the Homeland Security Advisory Council. Dr. Cohon co-chaired the Commission to Review the Effectiveness of the National Energy Laboratories from 2014 to 2016. He serves on the Boards of Trane Technologies and four non-profit organizations, including the Health Effects Institute. He holds a Bachelor of Science degree in Civil Engineering from the University of Pennsylvania, and a Master's degree and Ph.D. in Civil Engineering from Massachusetts Institute of Technology.

Samuel Labi, Ph.D.



Dr. Labi is a professor of transportation and infrastructure systems engineering at Purdue University's Lyles School of Civil Engineering. He received a B.S. degree from the University of Science and Technology, Ghana in 1987, and M.S. and Ph.D. degrees from Purdue University in 1998 and 2001, respectively.

Dr. Labi has served as Principal Investigator for 40 research projects sponsored by or affiliated with the U.S. Federal Highway Administration and the Indiana Department of Transportation, the National Academy of Sciences, the World Bank, Nextrans Transportation Center, and the State of Illinois Auditor General's Department. He is the author or co-author of over 96 scientific articles in technical journals, 180 conference presentations, and 2 textbooks used in universities worldwide: *Transportation Decision Making* (Wiley), and *Introduction to Civil Engineering Systems* (Wiley). His research awards include ASCE's Frank Masters Award in 2014 for outstanding and innovative work in advancing the area of transportation systems. He recently received AASHTO's 2014 award for best high-value research for investigating the impacts of a proposed legislation on truck operations (the senate subsequently passed this bill into law).

Kristin Lauter, Ph.D.

Kristin Lauter is the Director of West Coast Research Science for Meta AI Research (FAIR). She was the President of the Association for Women in Mathematics from 2015-2017. Her mathematical research focuses on the interface between machine learning and cryptography, with a focus on cloud security and health and genomic privacy. She is particularly known for her work on homomorphic encryption, elliptic curve cryptography, and post-quantum cryptography. Dr. Lauter was a researcher at Microsoft Research in Redmond, Washington, from 1999–2021 and Partner Research Manager of the Cryptography and Privacy Group from 2008–2021; her group developed Microsoft SEAL, an open source library for homomorphic encryption. In 2018 she also co-founded and led the Urban Innovation Initiative at Microsoft Research, with projects on Clean Air for All, and AI for Cities. Lauter is an elected fellow of the American Mathematical Society (AMS), the Association for Women in Mathematics (AWM), the Society of Industrial and

NATIONAL ACADEMIES

Sciences
Engineering
Medicine

Applied Mathematics (SIAM) and the American Association for the Advancement of Science (AAAS), and an elected Honorary Member of the Royal Spanish Mathematical Society (RSME). Lauter received her B.A., M.S., and Ph.D. degrees in Mathematics from the University of Chicago, in 1990, 1991, and 1996. She was a Hildebrandt Research Assistant Professor of Mathematics at the University of Michigan (1996-1999). She has published more than 100 papers and holds more than 50 patents.

Robert J. Lempert, Ph.D.



Robert Lempert is a principal researcher at the RAND Corporation and Director of the Frederick S. Pardee Center for Longer Range Global Policy and the Future Human Condition. His research focuses on risk management and decision-making under conditions of deep uncertainty. Dr. Lempert's work aims to advance the state of art for organizations managing risk in today's conditions of face-paced, transformative, and surprising change and helping organizations adopt these approaches to help make proper stewardship of the future more commonly practiced. Dr. Lempert is a Fellow of the American Physical Society, a member of the Council on Foreign Relations, a coordinating lead author for Working Group II of the United Nation's Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, a chapter lead for the Fourth US National Climate Assessment, chair of the peer review panel for California's Fourth Climate Assessment, a member of California's Climate-Safe Infrastructure Working Group, and has been a member of numerous study panels for the U.S. National Academies, including America's Climate Choices and Informing Decisions in a Changing Climate. Dr. Lempert was the Inaugural EADS Distinguished Visitor in Energy and Environment at the American Academy in Berlin and the inaugural president of the Society for Decision Making Under Deep Uncertainty (<http://www.deepuncertainty.org>). A Professor of Policy Analysis in the Pardee RAND Graduate School, Dr. Lempert is an author of the book *Shaping the Next One Hundred Years: New Methods for Quantitative, Longer-Term Policy Analysis*.

Sue McNeil, Ph.D.



Sue McNeil is professor of civil and environmental engineering and of urban affairs and public policy at the University of Delaware. She is also director of the University Transportation Center and the Disaster Research Center. Dr. McNeil was formerly director of the Urban Transportation Center and professor in the College of Urban Planning and Public Affairs and the Department of Civil and Materials Engineering at the University of Illinois at Chicago (UIC). Prior to joining UIC, she was a professor of civil and environmental engineering and of engineering and public policy at Carnegie Mellon University. Her research and teaching interests focus on transportation infrastructure management, with emphasis on the application of advanced technologies, economic analysis, analytical methods, and computer applications. Dr. McNeil is a former member of the TRB Executive Committee and the Board on Infrastructure and the Constructed

Environment. She served on the NRC committees on Review of the National Transportation Science and Technology Strategy and Study of the Regulation of Weights, Lengths, and Widths of Commercial Motor Vehicles, and chaired the TRB Committee on Transportation Asset Management from 2004 to 2010. She is a founding associate editor for the American Society of Civil Engineers' Journal of Infrastructure Systems, and currently serves as its editor-in-chief. Dr. McNeil earned bachelor's degrees in mathematics and civil engineering from the University of Newcastle, Australia, and M.S. and Ph.D. degrees in civil engineering from Carnegie Mellon University.

Monica Sanders, JD, LL.M.

Monica Sanders JD, LL.M, is founder of "The Undivide Project", an organization dedicated to creating climate resilience in underserved communities via Internet infrastructure and service centered IoT solutions. She also holds a faculty appointment at the Georgetown University Law Center and a Senior Fellow at the Tulane University Disaster Resilience Leadership Academy. Professor Sanders' homeland practical experience includes serving as a Senior Committee Counsel for both the House of Representatives and Senate Committees on Homeland Security. In those roles, she focused on oversight of disaster response and recovery programs, cybersecurity, and critical infrastructure protection. She also served as the Senior Legal Advisor for International Response and Programs at the American Red Cross, and as an attorney for the Small Business Administration during the Hurricane Maria and western wildfires responses. Previously, she studied security and defense-civilian coordination in the European Union Visitor's Program and remains involved in crisis response operations as part of the Team Rubicon USA and UNDP rosters. Twitter: @Monica_DRRProf

Karen Seto, Ph.D.

KAREN SETO (NAS) is the Frederick C. Hixon Professor of Geography and Urbanization Science at Yale University. An urban and land change scientist, she is one of the world's leading experts on contemporary urbanization and global change. She uses satellite remote sensing, field interviews, and modeling methods to understand how urbanization will affect the planet, including land change, food systems, biodiversity, and climate change. She has pioneered methods to reconstruct urban land use with satellite imagery and has developed novel methods to forecast urban expansion. She has conducted urbanization research in China for twenty years and in India for more than ten. She has extensive fieldwork experience in Asia, especially China and India, where she has conducted research for over 20 and 10 years, respectively. Dr. Seto has served on numerous national and international scientific bodies. She lead the urban mitigation chapter for the IPCC 6th (2022) and 5th (2014) Assessment Reports. She was co-editor-in-chief of the journal, Global Environmental Change. From 2000 to 2008, she was faculty at Stanford, where she held joint appointments in the Woods Institute for the Environment and the School of Earth Sciences. She has received many awards for her scientific contributions, including the Outstanding Contributions to Remote Sensing Research Award from the American

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Association of Geographers. Dr. Seto is an elected member of the U.S. National Academy of Sciences, the Connecticut Academy of Science and Engineering, and the American Association for the Advancement of Science. She received a Ph.D. in Geography from Boston University.

Sarah Slaughter, Ph.D.



Dr. Sarah Slaughter the founder and CEO/President of the Built Environment Coalition, a research and education nonprofit (501c3) focused on community resilience and sustainability. She is a subject-matter-expert on community resilience, and currently advises government agencies on strategies for improving resilience and sustainability. Dr. Slaughter is a member of the National Academy of Engineering, and the National Academy of Construction. She currently serves on the Green Building Advisory Committee (GBAC) to advise the U.S. General Services Administration and the Federal government, and is Co-Chair of the Resilient America Roundtable in the National Academies of Science, Engineering, and Medicine (NASEM). Previously, Dr. Slaughter was a Visiting Lecturer on resilience in the MIT Department of Urban Studies and Planning, the Associate Director for Buildings and Infrastructure in the MIT Energy Initiative (MITEI), and was co-founder and faculty head of the Sustainability Initiative in the MIT Sloan School of Management. Before those positions, Dr. Slaughter was founder and CEO of MOCA Systems, Inc., a software-enabled construction program management company, and before founding MOCA, she was a MIT professor in the Department of Civil and Environmental Engineering, and earlier, a professor of Civil and Environmental Engineering at Lehigh University. She has served on many several regional, national, and international advisory committees, and editorial boards of professional publications. She previously served on the Board of Directors for the Charles River Watershed Association, Retroficiency, Inc., Eastern Research Group/AEA Technology, Inc., and MOCA Systems, Inc. She received her Doctorate, Master, and Bachelor degrees from the Massachusetts Institute of Technology.

Barbara Brown Wilson, Ph.D.



Barbara Brown Wilson is an associate professor of urban and environmental planning at the UVA School of Architecture, and co-founder and faculty director at the UVA Democracy Initiative Center for the Redress of Inequity through Community-Engaged Scholarship (aka The Equity Center). Her research and teaching focus on the history, theory, ethics, and practice of planning for climate justice, and on the role of urban social movements in the built world. Dr. Wilson writes for both academic and mainstream audiences, and is the author of *Resilience for All: Striving for Equity through Community-Driven Design* (Island Press: 2018), and co-author of *Questioning Architectural Judgement: The Problem of Codes in the United States* (Routledge: 2013). Her research is often change-oriented, meaning she collaborates with community

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partners to identify opportunities to move our communities, and the field of urban planning, toward social and environmental justice.
