NATIONAL ACADEMIES Sciences Engineering Medicine

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

Agenda
July 13th, 2022

Please navigate to the event page to watch the livestream of this event.

July 13th, 11:00 – 5:00 ET

11:00 am **Introduction & Welcome**
- *Deputy Mayor Jeanne Holm*, City of Los Angeles
  Committee Chair

11:10 am **Keynote Address**
- *Mayor Eric Garcetti*, City of Los Angeles

11:25 am **Challenges & Concerns of the Mayoral Office**
In this session (presented by *Deputy Mayor Jeanne Holm*), we hear the perspectives of mayors around the globe as they grapple with the following questions:

1. *How are you using data, analytics, and quantitative tools to measure and solve complex problems?*
2. *What are the most useful metrics that help you make decisions surrounding infrastructure and sustainability?*
3. *What are some of your "dream" metrics? If you could get quantitative information about anything, what would it be?*
4. *What does sustainability mean to you, and how do you measure it?*
5. *What skills would you want new employees to have in order to better support your city in the future?*
6. *What are the greatest barriers to gathering and analyzing the data your city needs and using quantitative decision support tools to make investment decisions?*
7. *How is your office preparing for rising material costs and interest rates in funding for infrastructure investments?*

11:45 am **Local Infrastructure Decision-Making: Goals, Ground Rules, and Criteria**
Moderator: *Leah Brooks*, George Washington University
Speakers:

- *Kirk Steudle*, Econolite and Former Director of the Michigan Department of Transportation
- *Jordan Fischbach*, The Water Institute of the Gulf

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Two speakers introduce the constraints and challenges of decision-making for local infrastructure. Kirk Steudle will highlight the challenges of choosing between projects once the funding is in hand, and Jordan Fischbach will discuss decision-making under uncertainty with a focus on water applications.

SESSION 1: Relevant Data, Analytics, and Metrics for Infrastructure and Sustainability

12:15 - 2:30 pm

This session addresses the data and tools communities need to address sustainability and infrastructure decisions, as well as the metrics and measures that capture the state of the various systems that support local infrastructure.

12:15 pm **Keynote Address**

- *Loren Hopkins*, City of Houston Health Department

12:30 pm **Relevant Community Data**

Speakers:

- *Brittany Sellers*, City of Orlando
- *Kyle Buck*, Environmental Protection Agency
- *Joseph Salvo*, University of Virginia

Guiding Questions:

- What data are relevant to sustainability?
- What data are relevant for understanding the current infrastructure?
- Who decides what data are relevant?
- How do you connect the data to the quality of services provided?

1:00 pm **Q&A**

Moderator: *Kathy Ensor*, Rice University

1:15 pm **Metrics & Measures of Performance**

Speakers:

- *Bill Robert*, Spy Pond Partners
- *Anita Chandra*, RAND Corporation

Guiding Questions:

- When you look at performance, what are you measuring?
- How do you measure infrastructure performance?
- How do you use data to do post-mortem assessments of previous investments?
- What parameters are important and what are we trying to optimize? How do these values support decision-making?

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1:45 pm **Joint Q&A**
Moderator: *Sarah Slaughter*, Built Environment Coalition

----------2:30 pm BREAK----------

SESSION 2: Funding & Investment Mechanisms for Infrastructure

3:00 – 5:00 pm

This session begins with a conversation on public investment theory and cost-benefit analysis for infrastructure and public works investment. A second panel of practitioners and policy-makers will discuss practical challenges such as "the color of money" and matching the right funding to the right project. Speakers from both panels will engage in a joint conversation about theory versus practice.

3:00 pm **Investment Decisions**
Speakers:

- *Destenie Nock*, Carnegie Mellon University
- *Joseph Cordes*, George Washington University
- *Richard Ciccarone*, Merritt Research Services

3:40 pm **Funding & Investment in Practice**
Speakers:

- *Will Pickering*, Pittsburgh Water and Sewer Authority
- *Mayor Samuel Parham*, City of Petersburg, VA
- *Jennifer Sanders*, Dallas Innovation Alliance

4:20 pm **Theory vs. Practice: A conversation**
Moderator: *Monica Sanders*, The Undivide Project & Georgetown University

----------5:00 pm ADJOURN----------

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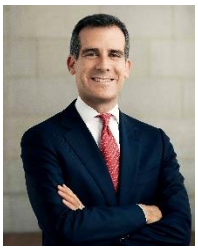
Presenter Biographies

Mayor Eric Garcetti



Eric Garcetti is a fourth-generation Angeleno and the 42nd Mayor of Los Angeles. Born and raised in the San Fernando Valley — the son of public servants and the grandson and great-grandson of immigrants from Mexico and Eastern Europe — Mayor Garcetti's life has been shaped by a deep commitment to the core values of justice, dignity, and equality for all people. The Mayor's government service began on the L.A. City Council, where he spent four terms as Council President before being elected Mayor in 2013 and winning re-election in 2017 by the widest margin in the history of Los Angeles. Beyond his time at City Hall, Mayor Garcetti has served his country as an intelligence officer in the United States Navy Reserve, and taught at the University of Southern California and Occidental College. The Mayor received his B.A. and M.A. from Columbia University, and studied as a Rhodes Scholar at Oxford University, and later at the London School of Economics. He is also a jazz pianist and photographer.

Kirk Steudle

Kirk T. Steudle is Senior Vice President of Econolite Systems, focused on integrating technology into transportation, and excellence in Intelligent Transportation System design, deployment, operations, and maintenance, including its subsidiary CAVita. Mr. Steudle retired from State of Michigan service in Oct 2018 after a 31-year career and served as Director of the Michigan Department of Transportation (MDOT) from 2006-2018. He also served as the Interim President and CEO of the American Center for Mobility from August 2018 until March 2019. Steudle is a noted expert in surface transportation and a nationally recognized leader in the integration of technology into transportation and the development of connected vehicle technology, served as chair for the Intelligent Transportation Society of America, ITSA, Board of Directors in 2015 and a member of the Program Advisory Committee to the USDOT. His resume includes chairing the Transportation Research Board, TRB, executive committee in 2014 and serving as the 2011-2012 president to the American Association of State Highway and Transportation Officials, AASHTO. He is the current President of the Engineering Society of Detroit and is a Board member of the Center for Automotive Research. Steudle is a graduate of Lawrence Technological University, where he received a Bachelor of Science Degree

in Construction Engineering. He also serves on the Board of Trustee's for the University and was inducted into its Hall of Fame in 2012.

Jordan Fischbach, Ph.D.

Jordan R. Fischbach, Ph.D., is the Director of Planning and Policy Research at The Water Institute of the Gulf. Before joining the Water Institute, Fischbach was codirector of the RAND Climate Resilience Center, a senior policy researcher at the RAND Corporation, and an affiliate faculty member at the Pardee RAND Graduate School. Since 2010, Fischbach has led a wide range of policy research efforts focused on climate adaptation, urban resilience, water resources management, coastal planning, and post-disaster recovery. He also serves as a co-investigator for the NOAA Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA) center, which has the goal to support the effective utilization of climate science and the building of adaptive capacity and resilience to climate variability and change in the Mid-Atlantic region.

Loren Hopkins, Ph.D.

Dr. Loren Hopkins leads the Data Services and Data Science and Statistics programs at the Houston Health Department, serves as the City of Houston Chief Environmental Science Officer, and is a Professor in the Practice in the Department of Statistics at Rice University. In this dual capacity, she conducts applied research and uses the results to inform policies at the City of Houston to improve the health of the community.

Brittany Sellers, Ph.D.

Brittany Sellers is the Assistant Director of Sustainability and Resilience in the City of Orlando's Green Works Office, where she is advancing and supporting policies and programs designed to meet the City's ambitious sustainability and climate goals, as well as creating the City's first resilience plan. She received her bachelor's degree in psychology from Flagler College and earned her master's and PhD in human factors psychology from the University of Central Florida, where her research focused on the influencing sustainable behaviors through a combined approach of motivation and design.

Kyle Buck, Ph.D.

Kyle Buck is a human geographer with the EPA's Office of Research and Development in Gulf Breeze, FL. His background is in chronic disease epidemiology and the impact of community disparities on resilience and sustainability outcomes. His work with the EPA has included the development of models and frameworks to assess the human-environment interface, including natural hazard risk assessments, a child well-being application, and residential segregation impacts on sustainability. His current research focuses on model development that links community infrastructure to household and

neighborhood sustainability/resilience outcomes and the interpretation of social characteristics in the context of community revitalization efforts.

Joseph Salvo, Ph.D.

Dr. Joseph Salvo is an Institute Fellow within the Biocomplexity Institute and Initiative at the University of Virginia. He has extensive experience in "all things census," making presentations on demographic subjects to a wide range of groups, and the management of major demographic projects involving the analysis of large data sets for local applications related to policy formulation, needs assessments, and program planning and implementation. Dr. Salvo's work has been crucial to the formation of more widespread evidence-based policy, as his expertise in census data history, methods, operations, and products makes him uniquely able to analyze demographic data and explain this information to policymakers, who are in turn able to understand and employ this data during policy formation.

For more than 25 years Dr. Salvo was the Chief Demographer for New York City, in the Department of City Planning. He is currently Senior Advisor to the National Conference on Citizenship and serves on the CNSTAT Panel to Evaluate the Quality of the 2020 Census. He was co-chair of the NAS Working Group on Data Confidentiality and 2020 Census data products, and worked on behalf of the American Statistical Association (ASA)'s Task Force conducting an analysis of 2020 Census data quality. He has given testimony before the House Sub-Committee on Oversight and Reform on multiple occasions, and served as an expert witness in litigation involving the census.

Bill Robert

Bill Robert of Spy Pond Partners has more than 25 years of experience in the transportation industry. His work focuses on transportation asset management (TAM), as well as the development and implementation of asset management and decision support systems. He is currently leading research for FHWA to identify leading indicators of safety, infrastructure and system performance. He recently served as Principal Investigator of National Cooperative Highway Research Program (NCHRP) Project 23-06 to develop guidance for asset valuation to support TAM. Also, he recently he served as Principal Investigator for NCHRP Project 19-12 on TAM financial plans, NCHRP Project 08-103 on cross asset resource allocation, and a series of four Transit Cooperative Research Program (TCRP) projects on transit asset management/state of good repair. In addition, he recently assisted in development of highway and transit asset management plans for over a dozen agencies. Mr. Robert is a

former member of the TRB committees on Asset Management, Bridge Management and Transit Management and Performance.

Anita Chandra, Ph.D.

Anita Chandra is vice president and director of RAND Social and Economic Well-Being and a senior policy researcher at the RAND Corporation. The division also manages RAND's Center to Advance Racial Equity Policy. She leads studies on civic well-being and urban planning; community resilience and long-term disaster recovery; public health emergency preparedness; effects of military deployment; equity, health in all policies and advancing a culture of health; and child health and development. Throughout her career, Dr. Chandra has engaged government and nongovernmental partners to consider cross-sector solutions for improving community well-being and to build more robust systems, implementation and evaluation capacity. This work has taken many forms, including engaging with federal and local government agencies on building systems for emergency preparedness and resilience both in the United States and globally; partnering with private sector organizations to develop the science base around child systems; and collaborating with city governments and foundations to reform data systems and measure environmental sustainability, well-being, and civic transformation. Dr. Chandra has served on a few NASEM committees, mostly focused on community resilience and disaster response.

Destenie Nock, Ph.D.

Dr. Destenie Nock is a leader in energy justice and sustainable energy transition trade-off analysis. In her role as an Assistant Professor in Civil & Environmental Engineering (CEE), and Engineering and Public Policy (EPP) she creates optimization and decision analysis tools which evaluate the sustainability, equity, and reliability of power systems in the US and Sub-Saharan Africa. She has pioneered the development of algorithms to identify hidden forms of energy poverty (e.g., forgone heating and cooling in low income households). Dr. Nock is the recipient of multiple NSF grants on energy, resilience, and energy justice. Dr. Nock holds a Ph.D. in Industrial Engineering and Operations Research from the University of Massachusetts Amherst, where she was an NSF Graduate Research Fellow, and an Offshore Wind Energy IGERT Fellow. She earned a MSc in Leadership for Sustainable Development at Queen's University of Belfast, and two BS degrees in Electrical Engineering and Applied Math at North Carolina A&T State University.

Joseph Cordes, Ph.D.

Professor Cordes is a nationally-recognized scholar on the measurement of benefits and costs of government programs. He has developed and taught a one semester course on benefit cost analysis and has directed several PhD dissertations and over 100 level graduate student projects involving the application of benefit cost analysis to wide range of public and nonprofit sector programs, including government regulations. He has also received research grants from the Department of Homeland Security on measuring costs of homeland security regulations. In 2004, he co-authored a report for the National Academy of Engineering on River Basing and Coastal Systems Planning

Within the U.S. Corps of Engineers which included a discussion of the role of benefit-cost analysis. He is a past president of the Society for Benefit Cost Analysis. Professor Cordes earned a BA (Economics) from Stanford University, and a PhD (Economics) from the University of Wisconsin Madison.

Richard Ciccarone

Mr. Ciccarone is the President of Merritt Research Services, an Investortools Co , – a municipal bond data and research company, created in 1985. Merritt's municipal bond credit data and analytical package covers over 10,000 municipal bond borrowers. Most of the nation's largest tax-exempt fixed income institutional investors, dealers, bond insurance companies and separate account managers among others are subscribers through CreditScope. Mr. Ciccarone has held executive and analytical positions in investment management and municipal bond research as well as the oversight of Merritt Research throughout most of his career, which began in 1977. Previously, he served as Chief Research Officer at McDonnell Investment Management LLC, Co-head of fixed income and municipal asset management at Van Kampen Investments Inc. (Morgan Stanley) and head of tax-exempt research at EVEREN Securities Inc. (previously called Kemper Securities). He has authored articles for professional journals, such as the Municipal Finance Journal, and other books and on-line publications, including The Oxford Handbook of State and Local Government and the Handbook of Municipal Bonds. He was also founder, co-owner, and contributor to MuniNetguide.com. He is a member of the University of Illinois College of Urban Planning and Public Administration Dean's Advisory Council and the UIC Government Finance Research Center's External Advisory Committee. In addition, he has served as an elected trustee of the Village of Hinsdale, IL as well as a board member on several civic and educational not-for-profit organizations. He earned his B.A. degree in Political Science at Miami University (Ohio) and his MA degree from The University of Akron in public administration and urban studies.

Will Pickering

Will Pickering was named the Executive Director of the Pittsburgh Water and Sewer Authority (PWSA) in June 2020. Prior to transitioning to CEO in 2021, he served as the Deputy Executive Director and Director of Public Affairs at PWSA. Prior to joining PWSA in fall 2016, Will Pickering was Manager of Communications and Government Relations at DC Water. There, he managed the communications program and spearheaded DC Water's interactions with the federal, District, and neighboring local governments. Mr. Pickering has also held several positions in the local and federal government. He has a

Bachelor of Science in Political Science from Santa Clara University and received his Certificate in Public Management from George Washington University.

Mayor Samuel Parham

A native of Petersburg, Virginia, Mayor Samuel Parham graduated from Petersburg High School in 1993 and earned an Associate of Science degree from Richard Bland College in 1996. While attending Richard Bland College, Mayor Parham founded the Multi-Cultural Alliance, co-founded the Rotaract Club, and participated in the College Players drama club. He later attended Virginia Commonwealth University in Richmond, Virginia and earned a Bachelor of Science in Business Management in 1999. In addition to serving the Petersburg community as Mayor, he is also currently the Director of Business Operations with Colonial Cleaning Service in Petersburg, Virginia. Colonial Cleaning Service is a family owned and operated business since its beginnings in 1981. Mayor Parham has held several leadership positions in the area including Governor of the Petersburg Breakfast and Lunch Rotary Clubs and Colonial Heights Rotary Club and also President of the Petersburg Breakfast Rotary Club. Mayor Parham was first elected to Petersburg City Council in November 2014. In January 2015, he was elected by his fellow council members to serve as Vice Mayor. In January 2017, he was elected by City Council to serve as Mayor and has continued to be re-elected by Council for this position. Mayor Parham is currently serving as a board member for the Virginia Gateway Region, board member for the Battersea Foundation, Vice Chair for the Crater Planning Board, member of the Crater Workforce Chief Elected Officials Consortium, and a member of the VCU Alumni Association. Mayor Parham resides in Petersburg, Virginia with his wife and two children.

Jennifer Sanders

Jen Sanders is Cofounder and Executive Director of the Dallas Innovation Alliance (DIA), a 501c3 public-private partnership dedicated to supporting Dallas' smart cities strategy. At the DIA, she has collated a network of three dozen members and works with over 20 departments at the City of Dallas. DIA's Smart Cities Living Lab is the fastest-to-market smart cities initiative in the country. The DIA is currently working on projects related to equity, focused on mobility, digital/internet access and public safety; and launched a regional initiative in 2020, the North Texas Innovation Alliance (NTXIA). She is community-driven, serving as Past-President of the Mayor's Star Council, board member of the Suicide & Crisis Center and Better Block, among others. In 2019, she received the UN Day Global Leadership Award, has been named to Dallas Business Journal's 40 Under 40 and Top Women in Technology, State Scoop's Top Women in Technology, and Tech Week 100. She graduated from the University of Virginia.

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