

External Review of Environmental, Biosafety, and Biosecurity Considerations for Synthetic Cell Research and Development

Committee

Peter A. Carr

Co-Chair

Peter Carr is a Senior Scientist at RTX BBN Technologies, where he is building a research and development portfolio at the intersection of synthetic biology and national security. Prior to joining BBN, Carr worked from 2001-2023 at the Massachusetts Institute of Technology (MIT), first as a research scientist at the MIT Media Lab and then as a senior staff scientist at MIT Lincoln Laboratory. His research interests include genome engineering, combatting infectious disease, DNA synthesis and error correction, biomanufacturing, biocontainment, and biodefense, and his research efforts have included developing new technologies for DNA synthesis and assembly and the engineering of an organism with a new genetic code. He has advised the U.S. government on the promise and perils of synthetic biology in various capacities, was a founding member of the Synthetic Biology Center at MIT and has served many roles with the International Genetically Engineered Machine (iGEM) competition, currently serving as Special Advisor to iGEM Judging. Carr received his bachelor's degree in Biochemistry from Harvard University, and his Ph.D. in Biochemistry and Molecular Biophysics from Columbia University. Carr was a member of the 2018 National Academies study committee on Biodefense in the Age of Synthetic Biology.

Carr owns stock in Amgen, a biopharmaceutical and biotechnology company.

Felicia Wu

Co-Chair

Felicia Wu is the John A. Hannah Distinguished Professor of Food Safety, Toxicology, and Risk Assessment, and one of ten 2023 University Distinguished Professors, at Michigan State University. She served as the 2023-2024 President of the Society for Risk Analysis and is a governor-appointed Commissioner of Agriculture for the state of Michigan. Wu works at the nexus of agriculture, biotechnology, food safety, nutrition, and public health to improve national and global health outcomes. Her research ranges from assessing impacts of climate change and transgenic Bt corn production on aflatoxin risks, improving resilience of food systems against shocks, and reducing presence of mycotoxins, heavy metals, and pathogens in food worldwide. She is a member of the Joint FAO/WHO Expert Committee on Food Additives, the WHO Food-Based Dietary Guidelines Committee, and an elected Fellow of the Society for Risk Analysis. Wu earned her Ph.D. in Engineering and Public Policy at Carnegie Mellon University, and AB and SM in Applied Mathematics/Medical Sciences at Harvard University. She has previously served on NASEM's Committee on Sustainability Considerations for the Future of Animal Agriculture Science Research and as a National Academies speaker on food safety of lab-grown foods.

Kate Adamala

Member

Kate Adamala is McKnight Presidential Fellow Associate Professor at the University of Minnesota. Her research focuses on synthetic cell engineering, with the aim of understanding chemical principles of biology, using artificial cells to create new tools for bioengineering, medicine, and foundational research. The interests of Adamala's lab span questions from the origin and earliest evolution of life, using synthetic biology to colonize space, to the future of biotechnology and medicine. Her biosafety and biosecurity work focuses on frameworks for safeguarding emerging synthetic biology technologies, with particular focus on synthetic cell and cell-free platforms. Adamala is a Polymath Fellow of the Geneva Center for Security Policy, leader of the BioBOLD Initiative, and co-founder and coordinator of the international synthetic cell engineering consortium Build-a-Cell. She received her Ph.D. in biophysics from the University Roma Tre, and postdoctoral training in neurobiology at MIT.

Adamala has co-authored policy briefs and made public statements on various issues related to safety and security of synthetic cell engineering. She is co-founder and board director of the Biotic foundation, a non-profit supporting synthetic cell engineering.

Maria Chavez

Member

Maria Chavez is president of BioCurious, a community biotechnology lab where she has volunteered since 2011. Chavez has been the co-organizer of the Global Community Bio Summit for the past six years where she has spoken publicly on biosafety, and is co-organizer of the Bio Summit Leadership Fellows program. She serves on the board of the Momental Foundation, a grantmaking foundation whose grants support independence in early-career scientific research. She also serves on the board of the Real Vegan Cheese Project, has led two International Genetically Engineered Machine (iGEM) teams, was a member of the Open Insulin Project, and has been in a leadership position for multiple community lab science projects. Chavez has a BS/IT in Programming and Operating Systems and an MBA in Global Management, both from the University of Phoenix.

Christopher L. Cummings

Member

Christopher L. Cummings is a Research Social Scientist at the U.S. Army Engineer Research and Development Center (ERDC). He also serves as a Senior Research Fellow at North Carolina State University and Iowa State University. Previously, he served as an Assistant Professor of Strategic Risk and Health Communication at Nanyang Technological University, Singapore. Cummings brings extensive experience in risk communication, specializing in advancing public engagement in science, particularly in high-stakes contexts such as synthetic biology and convergence, biotechnology governance, and consumer product safety risk estimation. His research employs mixed-method social science approaches to examine ethical, legal, and social implications of emerging technologies. Cummings is the author of Secondary Risk Theory which enhances understanding of risk perceptions and decision-making in complex scenarios. His recent honors include the 2024 Lab Innovation of the Year Award from ERDC, the 2024 International Research and Development Award from ERDC, and the 2021 Excellence in Research and Practice Award from the Society for Risk Analysis for his work in service to various government agencies and public organizations for COVID-19 risk communication. Cummings holds a Ph.D. and M.S. in Communication from North Carolina State University and a B.A. in Communication from California State University, Chico.

Jason Delborne

Member

Jason Delborne is Associate Professor of Science and Technology Policy at the La Follette School of Public Affairs at the University of Wisconsin-Madison and was previously Professor of Science, Policy, and Society at North Carolina State University's Genetic Engineering and Society Center from 2013 to 2024. He was a 2023-2024 American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellow at the National Nanotechnology Coordination Office, was a member of the Subcommittee on Social and Behavioral Sciences of the Committee on Science of the National Science and Technology Council, and served on a Gene Drives advisory committee for the National Institutes of Health. Delborne's research focuses on public and stakeholder engagement surrounding the development and governance of emerging technologies, especially environmental and agricultural biotechnologies. His recent research projects have included the genetically engineered American chestnut tree, genetic biocontrol of aquatic invasive species in the Great Lakes region, and gene drive rodents to protect island biodiversity. Delborne was honored as an AAAS Fellow in 2021 and a University Faculty Scholar in 2019. He earned his bachelor's degree in human biology from Stanford University and his Ph.D. in environmental science, policy, and management from University of California, Berkeley. Delborne previously served on two National Academies study committees, Gene Drive Research in Non-Human Organisms: Recommendations for Responsible Conduct and Potential for Biotechnology to Address Forest Health.

David A. Dunning

Member

David A. Dunning is Walgreen Professor of the Study of Human Understanding, and Professor of Psychology, at the University of Michigan. He is also Professor Emeritus at Cornell University, where he taught for 29 years, and previously spent a year as a fellow at the Center for Advanced Studies in the Behavioral Sciences at Stanford. Dunning has served as president of the Society of Experimental Social Psychology and the Society for the Science of Motivation and was on the board and chair of the Publication and Communication Board of the American Psychological Association. Dunning has expertise in the field of experimental social psychology, focusing on the psychological processes underlying self-misjudgment and social misunderstanding, with applications to economics, medicine, organizations, and the law. His most cited work, which is supported by the National Institute of Mental Health, the National Science Foundation, and the Templeton Foundation, shows that people typically hold flattering self-opinions that cannot be justified from objective evidence. For this work Dunning received the Grawemeyer Award in Psychology in 2023. He received a Ph.D. from Stanford and his BA from Michigan State, both in psychology.

Dunning owns stock in Honeywell Intl, Johnson & Johnson, Linde PLC, and Pfizer Inc.

Emma Frow

Member

Emma Frow is an Associate Professor at Arizona State University (ASU), where she holds a joint appointment between the School for the Future of Innovation in Society and the School of Biological & Health Systems Engineering. She is also an appointed Lincoln Professor of Applied Ethics at ASU. Prior to joining ASU, she was an Assistant Professor in Science, Technology & Innovation Studies at the University of Edinburgh, UK. Frow's research focuses on the governance of emerging biotechnologies, with a particular focus on governance of the STEM research community. She has studied and worked with the synthetic biology research community in the US and Europe since 2008, including current uncompensated fieldwork at Ginkgo Bioworks. Frow has received the NSF CAREER award. She is also a Council Member of the Engineering Biology Research Consortium. Frow trained in both the natural and social sciences, having obtained a Ph.D. in biochemistry from the University of Cambridge and subsequently an MSc in science & technology studies from the University of Edinburgh.

David Gillum

Member

David Gillum is currently the Associate Vice President of Compliance and Research Administration at the University of Nevada, Reno, and formerly served as Assistant Vice President of Environmental Health and Safety at Arizona State University. Gillum is also co-owner of Tutela Strategies, LLC, a private regulatory compliance consulting company. He has more than 30 years of leadership experience in compliance, safety, and risk management across major research universities. His primary areas of expertise include biosafety, biosecurity, research compliance, and emergency preparedness, with a strong focus on dual-use research of concern, potential pandemic pathogens, synthetic biology, and biotechnology governance. Gillum is a past president of the American Biological Safety Association (ABSA) International and recipient of the FBI Director's Community Leadership Award (2018), the ABSA International Everett Hanel, Jr. Presidential Award (2024), and the Campus Safety, Health, and Environmental Management Association (CSHEMA) Innovation Award (2018). He is an Associate Editor for Applied Biosafety and actively contributes to national and international biosafety and biosecurity policy initiatives. He holds a B.A. in Chemistry from the University of Nevada, Las Vegas, an M.S. in Environmental Health Sciences from the University of Massachusetts, Amherst, and a Ph.D. in the Human and Social Dimensions of Science and Technology at Arizona State University.

Gillum has published on the governance, oversight, and regulatory implications of biotechnology and pathogen research, with a focus on biosecurity and risk assessment.

India G. Hook-Barnard

Member

India Hook-Barnard is Executive Director of the Engineering Biology Research Consortium (EBRC), a non-profit public-private partnership dedicated to advancing engineering biology to address national and global needs. Prior to joining EBRC, Hook-Barnard served as the Director of Research Strategy and Associate Director, Precision Medicine at the University of California, San Francisco, as the Executive Director for the California Initiative to Advance Precision Medicine. Additionally, Hook-Barnard served on the Schmidt Futures Task Force on Synthetic Biology and the Bioeconomy, the Center for New American Security Task Force on Biotechnology and Competitiveness, and the World Economic Forum Global Future Council for Synthetic Biology. Earlier in her career, Hook-Barnard worked at the National Academies where she directed standing committees, workshops, and six consensus reports, including *Toward Precision Medicine: Building a Knowledge Network for Biomedical Research* and *a New Taxonomy of Disease* (2011). Her primary interests are in the areas of engineering biology, precision medicine, responsible innovation, and biosecurity. Hook-Barnard is currently as a board member on the National Academies' Board on Life Sciences and serves on the scientific advisory board for Joint Genome Institute. She earned her PhD in Microbiology-Medicine from the Department of Molecular Microbiology and Immunology at the University of Missouri.

Hook-Barnard has co-authored policy papers on various issues relating to biosecurity, ethics, and standards for engineering biology research. Her current organization, EBRC, was formerly affiliated with BioMADE.

Cameron Kim

Member

Cameron Kim is Assistant Professor of the Practice in Biomedical Engineering (BME) at Duke University and Associate Director of Undergraduate Studies in BME. He also holds appointments as Associate Faculty in the Duke Science & Society Initiative and as a member of the Duke Center for Advanced Genomic Technologies. Kim's research focuses on engineering education in synthetic biology, mentoring students in molecular and cellular engineering, design thinking, and team-based problem solving to address novel challenges in gene and cell-based therapies. He serves as the research advisor for the Duke International Genetically Engineered Machine (iGEM) team, guiding students in responsible innovation and ethics-guided design of emerging biotechnologies. Kim's educational scholarship centers on cultivating character, ethical reasoning, and professional formation in engineering students, culminating in the Duke BME "Ethics Everywhere" model of integrating ethics and values into technical training. He earned his Ph.D. in Bioengineering at Stanford University, where his research focused on RNA engineering in mammalian synthetic biology.

Richard M. Murray

Member

Richard M. Murray is the Thomas E. and Doris Everhart Professor of Control & Dynamical Systems and Bioengineering at the California Institute of Technology. Murray's research is in the application of feedback and control to networked systems, with applications in synthetic biology and autonomy. His research has included publishing at the intersection of synthetic biology and ethics. He is an elected member of the National Academy of Engineering (NAE), an international fellow of the Royal Swedish Academy of Engineering Sciences (IVA), and a founding member of the Defense Innovation Board. He received a B.S. in Electrical Engineering from the California Institute of Technology and both a M.S. and Ph.D. in Electrical Engineering and Computer Sciences from the University of California, Berkeley. Murray also is assisting the National Security Commission on Emerging Biotechnology in moving forward the recommendations made by the Commission in April 2025. Murray served as the chair of the National Academies consensus study on Future Biotechnology Products and Opportunities to Enhance Capabilities of the Biotechnology Regulatory System and has served as a committee member on several other National Academies studies on national security, defense research, synthetic biology, and other related topics.

Murray is a co-founder of Tierra Biosciences, a biotechnology company, and was a founding member of the Engineering Biology Research Consortium.

Roni Reiter-Palmon

Member

Roni Reiter-Palmon is Distinguished Professor of Industrial/Organizational Psychology, and Director of Innovation for the Center of Collaboration Science, at the University of Nebraska at Omaha. She is also a faculty member of the National Counterterrorism Innovation, Technology, and Education Center. Reiter-Palmon is a founding member of the International Society for the Study of Creativity and Innovation, and a member of Interdisciplinary Network for Group Research. She conducts research on individual and team creativity and innovation and malevolent creativity. At the team level, Reiter-Palmon is primarily interested in interdisciplinary teams, including engineering and design teams, healthcare teams, and science teams, and her efforts have included how AI can be incorporated into teamwork for creativity and innovation. Reiter-Palmon received the University of Nebraska system research award and was recognized for lifetime achievement by the American Psychological Association (APA). She is also a fellow at APA, recognized for her significant research achievements in applying creativity and innovation work to teams. She received her Ph.D. in I/O Psychology in 1993 at George Mason University.

Robin Scheffler

Member

Robin Wolfe Scheffler is an Associate Professor at the Program in Science, Technology, and Society at the Massachusetts Institute of Technology. Previously, he was a visiting fellow at the American Academy of Arts and Sciences. His research focuses on the history of the modern biomedical and life sciences and their intersections with American social, economic, and political life, and his work has explored the roots and impact of federal research policymaking around the development of a cancer vaccine during the War on Cancer. His current efforts, supported by the National Science Foundation, uses the development of the biotechnology industry in the Greater Boston Area as a case study for thinking about the social and spatial relationships of the bioeconomy. Scheffler obtained his Ph.D. in the History of Science and Medicine from Yale University, M.Phil in the History and Philosophy of Science from the University of Cambridge, and undergraduate degrees in History and Chemistry at the University of Chicago.

Zara Summers

Member

Zara Summers is the Chief Science Officer at LanzaTech, a global bioindustrial company, where she oversees the Science division, including Synthetic Biology, Fermentation, Global Services, and the Freedom Pines, GA division. There, she leads a team of over 200 scientists dedicated to pioneering novel biorecycling technologies that capture carbon emissions from energy-intensive industries and transforms waste carbon into sustainable fuels, chemicals, materials, and protein for everyday products. Her work at LanzaTech includes advancing a circular carbon economy through strategic partnerships with companies such as ArcelorMittal, Zara, H&M Move, Coty, On, and LanzaJet. Before joining LanzaTech, Summers spearheaded the creation of ExxonMobil's R&D Bioscience division and managed a comprehensive portfolio of bio-based programs, including strategies for nature-based solutions. Summers' expertise lies in the field of biology and engineering, with a particular focus on sustainability and environmental research. Summers holds a Ph.D. in Microbiology from the University of Massachusetts, Amherst and a BA in Biology from the California State University, Northridge.

Summers holds stock in ExxonMobil, her former employer.