NATIONAL ACADEMIES Sciences Engineering Medicine

BOARD ON LIFE SCIENCES

Enabling Scientific Insights in the Life Sciences and Biotechnology through AI

Fall 2025 Meeting of the Board on Life Sciences

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Meeting ID	**Phone Only**	(470) 250-9358
985 3107 3902	(646) 558-8656	(720) 928-9299
Passcode	(651) 372-8299	(213) 338-8477
226999	(312) 626-6799	

OCTOBER 28 and 30, 2025

Purpose

The overall goal of the Fall 2025 board meeting of the Board on Life Sciences (BLS) is to understand future opportunities and needs for using AI and other computational tools for scientific discovery in the life sciences and biotechnology, including improving and validating models, designing experimental approaches for generating data, and sustaining digital biological datasets. Board members will have opportunities to provide feedback on newly developed materials illustrating the influence of foundational research on technology development and use, and to provide guidance on key outcomes from the Spring 2025 board meeting to continue working to address current and anticipated challenges resulting from the policy actions and funding landscape for research in the United States. The board meeting will be virtual.

The specific objectives of the board meeting are:

- To highlight key opportunities and needs as AI becomes a more prevalent part of the life sciences and biotechnology research ecosystem.
- To define approximately two high-priority needs and actions that BLS should consider addressing during the next 3-5 years, as it transitions to a life sciences and biotechnology program area during the National Academies' restructuring.

1:00pm – 4:00pm ET

OCTOBER 28, 2025:

The first day of the board meeting will provide an opportunity for new and existing board members to meet each other, conduct the annual conflict of interest and balance discussion for all members, discuss the biotechnology one pagers being developed by a subset of board members, and highlight continued priorities as the National Academies begins its restructuring.

12:00pm – 4:00pm ET

OCTOBER 30, 2025:

The second day of the board meeting will focus on the use of artificial intelligence in the life sciences and biotechnology, specifically focusing on current capabilities, trends, and opportunities for accelerating discovery and knew knowledge about biological molecules and systems, design of experimental systems to generate data to inform model development and data analyses, and risks, implications, and sustainability of biological databases.

END OF MEETING

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TUESDAY, OCTOBER 28, 2025

1:00pm – 1:10pm ET **Informal Discussions**

1:10pm – 1:30pm ET **Welcome and Meeting Preview**
Kavita Berger, National Academy of Sciences, Engineering, and Medicine
Ann Arvin, Stanford University

1:30pm – 2:45pm ET **Annual Conflict of Interest and Balance Discussion**
Maggie Walser, National Academies of Sciences, Engineering, and Medicine

2:45pm – 3:00pm ET **Break**

3:00pm – 4:00pm ET **Life Sciences and Biotechnology Priorities for NASEM**
During this discussion, board members and staff will highlight critical issues in the life sciences and biotechnology about which the National Academies should address given its restructuring and recent policy actions. This discussion will prepare the staff of the new program area on the life sciences and biotechnology to develop strategic areas guiding its proactive work and internal and external collaborations. During this discussion, we also can discuss areas to prioritize as the National Academies transitions fully into its new structure.

Facilitator
Kavita Berger, National Academy of Sciences, Engineering, and Medicine

END OF DAY 1

SPRING 2025 BOARD MEETING: STAFF TAKE-AWAYS

Financial Realities

- For foreseeable future, the research community will have to do more with less funding from the federal government, especially if allowable (or, agreed upon) indirect cost rates are lower than in the past.
- Investors are shifting from early-stage funding for biotechnologies to late-stage funding because they are seeking more certainty in the products, services, and companies.
- Philanthropies and industry do not have sufficient capital to cover the decrease in federal funding for basic and applied research.
- Agencies need to obligate all of their fiscal year 2025 funds in July and early August 2025 to prevent impoundment by default.
- Continuous submission of proposals to federal agencies both allows the agencies to review and award projects with already appropriated funds and demonstrates demand for appropriated funds.

Vision

- A clear vision for the scientific community, including key areas to focus and outcomes that can be understood by policymakers is needed
- The VAST report is a strategy for transforming scientific research in the U.S. The members of VAST will work for five years to advocate for the recommendations in the report and develop more detailed recommendations that are field specific. An action plan is needed for each recommendation of the VAST report to assist with implementing the recommendations.

Congressional Activities

- Currently, no Congressional caucuses on bioeconomy or biotechnology exist. EBRC is looking into establishing one. congressional caucus on the bioeconomy or biotechnology.
- The National Security Commission on Emerging Biotechnology members introduced H.R.2756/S.1387, National Biotechnology Initiative Act of 2025 in April 2025.

Economics

- Federally funded basic and applied life sciences research produces significant economic benefits to localities, states, and the nation. Two recent reports summarize economic benefits of life sciences research in agriculture and/or pharmaceutical industries: NIH's Role in Sustaining the U.S. Economy (United for Medical Research, 2025); and The U.S. Bioscience Economy: Driving Economic Growth and Opportunity in States and Regions (Biotechnology Innovation Organization and Council of State Bioscience Associations, 2024).
- Federal investment in research is critical for American science. Fundamental research has led to the innovation and development of technologies in widespread use today (e.g., mathematical discoveries in the 1960s led to present-day development of artificial intelligence tools).

Workforce Development

- The current system of graduate education creates a situation of unclear goals for education and training (i.e., research productivity versus knowledge and skills development) and financial instability of students for extended periods of time, affecting personal choices and logistics.
- The current educational system for careers in the life sciences and biotechnology is not necessarily designed to prepare students for careers in industry, biomanufacturing, policy, and other sectors that are part of the research and development ecosystem. Many students are not necessarily aware of different career options and development pathways, skills for developing networks of experts from various fields and sectors, and internship or externship opportunities. Many existing programs do not necessarily educate students with specialized skills or knowledge from industry and other non-academic research sectors.

- The Board on Higher Education and Workforce is holding a summit this summer on a related topic, and the Board on Life Sciences has reached out to explore follow-up opportunities specifically for students in the life sciences and biotechnology.

Communication

- Few, if any, materials exist to highlight the link between basic and applied research and technology development, testing, evaluation, and application, particularly to non-expert and policy audiences.
- Building the relationship between the public and scientific community involves years of engagement and relationship building.
- Scientists may be concerned about sharing stories about the impacts from the loss of funding, education and employment opportunities, and federal employees. These stories may be personal or focused on benefits to particular patient groups (or, other beneficiaries of science).

National Security

- As the U.S. decreases its research funding, China is increasing its investments. Biotechnology investment deals originating from China is up to 30% from 0% in previous years.
- Stalled markets and federal divestment in research raise national security concerns for the U.S.
- Foreign graduate students and postdoctoral fellows are choosing to return to their home countries or go elsewhere and/or not choosing to come to the U.S. at all.

Opportunities

- The Administration has begun to focus on positive actions and initiatives, allowing for new opportunities to develop and pitch big ideas that are responsive to critical challenges that the Administration is highlighting (e.g., longevity, chronic diseases, critical minerals). Focus on how scientists can help address critical issues.
- The current situation provides a new opportunity to reform the scientific enterprise to improve benefits of research to the public and science. Minimize incremental change in favor of more drastic, transformative changes, including on timeline from applications to awards, proportion of funding for early-stage and/or high risk/high reward research, resource availability and consolidation, and multi-disciplinary collaboration.
- The current policy environment provides a new opportunity for streamlining regulations to enhance certainty and enhance incentives for translating basic and applied research to applied and commercializable products and services.
- The need for onshoring and securing supply chains provides opportunities for investment in basic and applied biotechnology research and development (e.g., a CHIPS for biotechnology).
- The current funding situation presents opportunities to reimagine graduate education, focusing on student-centered approaches, support services such as mental health, independent and steady funding for students, experience in various sectors to prepare students for different careers in science (e.g., academic and industry research, policy, law, business), flexibility and adaptability as a core part of the educational philosophy, community-building practices to support training and career development, and normalization of discussions about failures and lessons.
- Continued development of artificial intelligence tools presents new opportunities to enhance research and education

Priority Actions

Based on the discussion during the meeting, board members and staff highlighted several actions for further development and implementation.

Shorter-term, Discrete Activities

- Develop stories of impact and associated media highlighting the basic research innovations leading to bio-based or bio-inspired products and services in everyday use. Use such materials to communicate the value and potential of basic science in service of the national interest by highlighting to

policymakers the key contributions of research in technology development and derisking. Explore materials and content that can be developed and used in local communities to communicate the value and potential of basic science to improve lives and inspire kids and families to consider themselves as part of the innovation ecosystem (e.g., a science extension program).
- Prepare an annual Top 5 or Top 10 list of innovative and interesting biotechnology and life sciences advances.
- Compile recommendations from past relevant National Academies' reports, identify which have been implemented, which remain outstanding, and which are no longer relevant.

Mid-term Activities

- Identify commercial opportunities for bio-based products that fill a particular need or gap, such as securing the domestic supply chain for critical products and services. Overcome current gaps in understanding bioeconomy opportunities.
- Identify models for integrating artificial intelligence and other computational analyses skills into various life science and biotechnology disciplines, particularly those disciplines that do not have a strong computational component. Examples of existing programs include Schmidt Sciences postdoctoral fellows.

Longer-term, Enterprise-wide Activities

- Reimagine the research and training ecosystem to increase innovation and public benefit of research and provide effective education and career opportunities to students. Identify existing or new models that overcome or otherwise address constraints on workforce development and federal support for sponsored research. Explore opportunities for continuous improvement of research and education (i.e., learning systems approach).
- Reenvision graduate training to expose students to various professions in science including policy, industry, and business, and to teach soft skills such as emotional intelligence, team science, leadership, and collaboration. Analyze opportunities for gaining experience through active engagement with various sectors including with industry via mechanisms such as public-private partnerships.
- Reimagine institutional infrastructure to drive research innovation and translational research. Evaluate models of distributed and centralized facilities and capabilities for biotechnology and life sciences research and development and for start-ups established through innovations from university-based research.

BOARD ON LIFE SCIENCES STRATEGIC AREAS

Vision
Facilitate the development and use of evidence and experience in the life sciences and biotechnology to inform decision-making for the betterment of society and the environment.

Mission
Work with a variety of U.S. and international experts toward advancing transdisciplinary life sciences and biotechnology research and development and addressing critical and emerging technical, policy, and societal issues associated with the life sciences and biotechnology research and their applications.

Objectives
- Provides evidence and experience-informed advice to increase scientific knowledge through various approaches (e.g., hypothesis-driven, data-driven, use-inspired design and development, observation) and translation of this knowledge to action.
- Navigates the need for authoritative knowledge, curated data for analyses, and adaptation and flexibility to use technologies and data to advance science and inform policy.
- Evaluates the critical infrastructure, governance landscape, workforce needs, and resources needed to meet current and future needs in life sciences and biotechnology research and development.
- Addresses critical ethical, policy and governance, diplomacy, safety, security, and environmental issues associated with life science and biotechnology research and their applications.
- Includes voices and knowledge in U.S. and international discourse related to research, development, and application of life sciences and biotechnology advances.
- Provides objective analyses about current scientific, societal, and policy landscape and future trends in life sciences and biotechnology research and development for a diversity of technical and non-technical audiences.

Strategic Areas
The Board on Life Sciences generally works across the basic, applied, and emerging life sciences and biotechnology research and development spectrum, anticipating and addressing scientific trends, their applications, and their implications to various societal issues. Informed by recent life sciences and biotechnology trends, the Board on Life Sciences has identified five strategic areas in which we proactively work:

- ***Adaptive and inclusive life sciences and biotechnology research and development enterprise*** that supports innovation in basic, applied, and emerging life sciences and biotechnology research, in their application to address various needs, and in strategies for assessing and anticipating their broader implications to society.
- ***Transdisciplinary life sciences and biotechnology research and development*** (i.e., bio + X) that transform how living systems are studied and how biological knowledge and materials are used for non-life sciences purposes and for the bio-based economy.
- ***Digital and connected life sciences research enterprises*** that enable data-driven scientific inquiry, computational and cloud-based experimentation and analysis approaches, and computational design and modeling of physical molecules and life sciences systems.
- ***Analysis, prevention, and reduction of 21st century biological risks*** enabled by the transformative advances in the life sciences and biotechnology and by the changing security landscape involving biology.
- ***Foundational life science and biotechnology research and development for health*** that enhance current understanding of complex interconnections among humans, animals, plants, microbes, and the environment, and actions to characterize and reduce detrimental health effects within all living systems.

BOARD MEMBERS

Ann M. Arvin (Chair) is the Lucile Packard Professor of Pediatrics (Infectious Diseases) and Microbiology & Immunology, Emerita, and Vice Provost/Dean of Research, Emerita at Stanford University and subsequently was a senior vice president research, Vir Biotechnology Inc. until 2024. Arvin's research has focused on varicella zoster virus molecular virology, human herpesviruses, and viral immunology and vaccines. She was chief of the Infectious Diseases Division at Packard Children's Hospital from1984 to 2006. She is an elected member of the American Academy of Arts & Sciences, National Academy of Medicine, American Association for the Advancement of Science, American Academy of Microbiology, the American Pediatric Society, Infectious Diseases Society of America, and Association of American Physicians. Arvin received an A.B. in philosophy from Brown University, an M.A. in philosophy from Brandeis University, and an M.D. from the University of Pennsylvania School of Medicine. She completed her residency and postdoctoral training at the University of California, San Francisco and Stanford University. She has chaired the InterAcademy Partnership Biosecurity Working Group and previously served on the Policy and Global Affairs Division Committee and the Committee on Science, Technology, and Law.

Denise N. Baken is founder and owner of Shield Analysis Technology, LLC, founder of the Institute for Biodefense Research and founding member of the National Quantum Literacy Network. Prior to founding Shield Analysis Technology, Dr. Baken was Director of Biodefense Programs for the Center for Innovative Technology. Her primary professional expertise and research interests are biological threat reduction and Red Sea region threat adversary analysis that support the development of technology-leveraging programs that identify up to Technology Level Six capabilities focused on Department of Defense Chemical Biological Defense strategy. Using the National Military Strategy as guidance, Dr. Baken's research highlights pilot opportunities for DOD to assess technology that has been identified as cutting edge or innovative, prior to committing significant resource to it. In addition, Dr. Baken evaluates technological and scientific trends in pathogen detection to identify changes in known chemical and biological threats.

Tanya Berger-Wolf is a Professor of Computer Science Engineering, Electrical and Computer Engineering, and Evolution, Ecology, and Organismal Biology at the Ohio State University, where she is also the Director of the Translational Data Analytics Institute. Berger-Wolf is a director and co-founder of the AI for wildlife conservation non-profit Wild Me and the Imageomics Institute. Prior to coming to OSU in January 2020, Berger-Wolf was at the University of Illinois at Chicago (2005-2020). As a computational ecologist, her research is at the unique intersection of computer science, wildlife biology, and social sciences. Her work has been featured on TED.com, UN/UNESCO, and popular press. She has received numerous awards for her research and mentoring, including University of Illinois Scholar, UIC Distinguished Researcher of the Year. Berger-Wolf is a member of the several global AI and science efforts, including CNRS International Scientific Advisory Board of the AI for Science, Science for AI Centre and the Global Partnership on AI (GPAI) AI on Biodiversity working group, and was part of the organizing committee for the First NASEM U.S.-Africa Frontiers of Science, Engineering, and Medicine Symposium (2022). Berger-Wolf holds a Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign.

Frederic Bertley, President and CEO of The Center of Science and Industry (COSI), affectionately known as "Dr. B", is a scientist, scholar, immunologist and educator. His research in infectious diseases and vaccine development, as well as his commitment and innovation in STEM education have led him to programs and partnerships throughout the United States, Caribbean, South America, Africa, Europe, and Asia. His innovation has led to the development of award-winning programs including The Color of ScienceTM, EiPICTM, Science Meets SocietyTM, and hands-on STEM education kits. Under his leadership, COSI received the prestigious 2023 IMLS National Medal. Specifically, Bertley's work on the importance of science communication has led to several awards, including six EmmysTM for the PBS television show he hosts, "QED with Dr. B", and the animated series "Dr. B in 3". Dr. B has presented at distinguished institutions nationally and internationally including The United Nations, The White House, the National Academy of Sciences, NASA, US DOE, as well as at conferences and institutions of higher education in Europe, Asia, Africa, South America and the Caribbean. Bertley graduated from McGill University where he earned a B.Sc. studying Physiology, Mathematics, the History of Science, and a Ph.D. in Immunology. He completed a postdoctoral 3 fellowship at Harvard Medical School and MIT in DNA vaccine development.

Patrick M. Boyle formerly was the Chief Science Officer and the Head of Codebase at Ginkgo Bioworks, a Boston-based synthetic biology company that makes and sells engineered organisms. The Codebase team leads Ginkgo's customer facing programs and develops the company's "Codebase" portfolio of reusable biological assets. Ginkgo's Codebase includes thousands of novel strains, enzymes, genetic parts, and diverse genetic repositories, including millions of engineered DNA sequences. During the COVID-19 pandemic, Patrick has been responsible for coordinating Ginkgo's COVID response programs in the area of therapeutics and vaccines. Much of this work has focused on optimizing the

production of raw materials for nucleic acid vaccines, including Moderna's mRNA-1273 COVID-19 vaccine. Patrick also participates in a number of efforts related to the broader development of synthetic biology and biosecurity. This includes a fellowship at the Johns Hopkins University Center for Health Security, as well as two consensus studies for the National Academies of Sciences, Engineering, and Medicine: "Biodefense in the Age of Synthetic Biology" (2018) and "Safeguarding the Bioeconomy" (2020). Prior to Ginkgo, Patrick received his PhD from Harvard Medical School in 2012, developing synthetic biology applications in bacteria, yeast, and plants in the lab of Dr. Pamela Silver. He received an SB in biology from the Massachusetts Institute of Technology in 2006.

Patrick Brown is an active emeritus professor in the Department of Biochemistry, Stanford University School of Medicine. He founded Impossible Foods and served as its CEO from 2011-2022. He is also founder and current president of the Impossible Foundation and co-founder of the Public Library of Science (PLOS). As a post-doctoral fellow with Mike Bishop and Harold Varmus at UCSF, he identified the mechanism by which HIV and other retroviruses incorporate their genes into the genomes of the cells they infect. Pat's Stanford research group invented the DNA microarray – a technology that enabled scientists and physicians to read and interpret the activity of all the genes in a genome, enabling more effective diagnosis and treatment of cancer. In 2010, he recognized that replacing the use of animals as a food technology would be essential to arrest global heating and reverse the collapse of ecosystems and biodiversity; and has devoted his subsequent efforts to that goal.

Dr. Brown is a member of the US National Academies of Sciences and Medicine and recipient of the National Academy of Sciences Award in Molecular Biology, the Curt Stern Award from the American Society for Human Genetics, the American Cancer Society Medal of Honor and the UN Champion of the Earth award. Pat received his MD and PhD from the University of Chicago School of Medicine and completed a pediatrics residency at Chicago's Children's Memorial Hospital.

Mauro Costa-Mattioli is the Founding Principal Investigator of Altos Labs and Adjust Professor in the Department of Neuroscience in Baylor College of Medicine. He has elucidated central mechanisms underlying neurological dysfunction. Specifically, he discovered that the protein homeostasis network dubbed the integrated stress response (ISR) is a universal regulator of long-term memory formation, and its activation the main causative mechanism underlying cognitive dysfunction in a wide range of memory disorders. His work has impacted the neurobiology of memory and industry efforts to develop drugs that target the ISR to promote brain health. More recently, he serendipitously discovered that specific microbes in the gut could modulate brain function in a very powerful way in both animal models and human individuals. Dr. Costa-Mattioli has received numerous awards, including the international Eppendorf & Science Prize in Neurobiology, the Searle Scholar award, the Whitehall Scholar Award, the International society for neurochemistry's young investigator award, the Michael E. DeBakey excellent in research award, the UCSF presidential award, and he serves in several editorial boards. Dr. Costa-Mattioli did his bachelor's degree in biology at the University of the Republic in Montevideo (Uruguay), his PhD from the University of Nantes (France) and his post-doctoral fellowship at McGill University in Montreal (Canada). In 2008, he joined the Department of Neuroscience at Baylor College of Medicine (BCM), where he was a Professor, Cullen Endowed Chair in Neuroscience, and Director of the Memory & Brain Research Center until 2022.

Diane DiEuliis was a Distinguished Research fellow at National Defense University, where she researches the impacts of emerging technologies on biodefense, biosecurity and national defense. Her expertise covers biotechnology, the US bioeconomy, dual use life sciences research, neurotechnology, and behavioral, cognitive, and social issues (including ELSI). Dr. DiEuliis teaches in biotechnology and biodefense, and lectures in foundational professional military education. Prior to joining NDU, Dr. DiEuliis was the Deputy Director for Policy and Planning, in the Office of the Administration for Strategic Preparedness and Response (ASPR), U.S. Department of Health and Human Services. Dr. DiEuliis was the Assistant Director for Life Sciences and Behavioral and Social Sciences in the Office of Science and Technology Policy (OSTP) in the Executive Office of the President across two presidencies. During her tenure at the White House, she created policy in biosecurity, synthetic biology, biotechnology, behavioral science, scientific collections, and human subjects' research. Prior to working at OSTP, Dr. DiEuliis was a program director at the National Institutes of Health (NIH), where she managed a diverse portfolio of neuroscience research in neurodegenerative diseases. She is the author of over 80 publications.

Barbara A. Han is an associate scientist and disease ecologist at Cary Institute of Ecosystem Studies in New York. Her research program builds infectious disease intelligence to improve predictive capacity for zoonotic diseases and to enable upstream surveillance and management that preempts spillover transmission and epidemic spread in humans. She has pioneered the application of machine learning and ecoinformatics approaches to predict zoonotic risk in animal species (e.g., SARS-CoV-2, Ebola, and other viruses). Her current program is funded by multiple U.S. federal agencies and

private foundations and focuses on combining AI tools with ecological and evolutionary first principles to make actionable predictions about where, when, and from what kinds of species future disease risk will arise. Dr. Han served as an expert advisor for the World Health Organization, the Wellcome Trust, United Nations Environmental Programme, the U.S. National Academies, and the National Security Council of the U.S. Government. Dr. Han completed undergraduate training at Pepperdine University and received her doctorate from Oregon State University in 2008. Prior to joining Cary Institute, she held consecutive research fellowships supported by the U.S. National Science Foundation (ecological informatics), the National Institutes of Health (machine learning), and the U.S. Department of State (Fulbright scholar).

India Hook-Barnard is Executive Director of the Engineering Biology Research Consortium (EBRC). Her primary interests are in the areas of synthetic biology, precision medicine, responsible innovation, and biosecurity. India enjoys building multidisciplinary collaborations and developing a vision and strategy to address complex challenges. She works with experts and leaders from across academia, industry, and government sectors to identify and shape scientific opportunities, technical feasibility, and policy issues. Her goal is to advance and accelerate engineering biology solutions across all application areas, drive innovation, and grow the bioeconomy for all. Prior to joining EBRC, India was Senior Advisor to the Beyond 2020: A Vision and Pathway for NIH Working Group, and Senior Vice President for Patient Outcomes and Experience at the National Marrow Donor Program. She was the Director of Research Strategy and Associate Director, Precision Medicine at the University of California, San Francisco; she helped launch and was the Executive Director for the California Initiative to Advance Precision Medicine. Earlier in her career, India worked at the National Academies of Sciences, Engineering, and Medicine (NASEM), focusing on areas of emerging science and technology, including policy issues of data governance, regulation, bioethics, biodefense, and workforce development. At NASEM, 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). As a postdoctoral research fellow at the National Institutes of Health, India studied the regulation of gene expression in bacteria and phage. She earned her PhD in Microbiology-Medicine from the Department of Molecular Microbiology and Immunology at the University of Missouri.

Yann Joly is the Director of the Centre of Genomics and Policy (CGP) and James McGill Professor at the Faculty of Medicine and Health Sciences, Department of Human Genetics, McGill University. His research lies at the intersection of scientific innovation, health law (biotechnology and emerging health technologies), and bioethics. He is the founder and Director of the Genetic Discrimination Observatory (GDO), the first international initiative of its kind. Prof. Joly has authored more than 250 peer-reviewed publications in leading legal, ethical, and scientific journals. He regularly acts as a legal advisor on research ethics committees and as a policy consultant for both public institutions and private organizations. He is a Fellow of the Canadian Academy of Health Sciences (2017) and was named Advocatus Emeritus by the Quebec Bar (2012). He is also a member of the Canadian Commission for UNESCO. Internationally, Prof. Joly serves on the Strategic Leadership Steering Committee of the Global Alliance for Genomics and Health (GA4GH). He is a former Chair (2017–2019) and steering committee member of the International Cancer Genome Consortium (ICGC), and a current member of the Human Genome Organization (HUGO) Committee on Ethics, Law and Society (CELS). Since 2022, he has been serving on the National Academies of Sciences, Engineering, and Medicine (NASEM) Committee on Formalizing Best Practices for Data Governance of Life Science Data in Central Asia.

Jennifer Martiny is a Professor of Ecology and Evolutionary Biology at UC Irvine and co-Director of UCI's Center for Microbiome Science. She is a founder and current lead of the Microbiome Centers Consortium, a national network of 40+ academic centers whose research crosscuts medical, environmental, agricultural, and engineered microbiomes. She is also a member of the Scientific Advisory Board of the National Microbiome Data Collaborative, an effort to make microbiome data more FAIR (findable, accessible, interoperable, and reusable). Her own research aims to develop and test conceptual theory for microbial communities with a particular focus on the response of soil microbiomes to global change. This work applies methods ranging from multi-omic to culturing approaches along with fieldwork and meta-analysis. Dr. Martiny is a fellow of the Ecological Society of America, the American Academy of Microbiology, and the American Association for the Advancement of Science. She received her B.S. in Ecology, Behavior, and Evolution at UC San Diego and her Ph.D. in Biological Sciences at Stanford University.

Milan Mrksich is the Henry Wade Rogers Professor at Northwestern University, with appointments in the Departments of Chemistry, Biomedical Engineering and Cell & Developmental Biology. He is also the Founding Director of the Center for Synthetic Biology and served as Northwestern's Vice President for Research. Dr. Mrksich's laboratory develops and applies methods for high-throughput experiments, and protein-based structures for therapeutic needs. He has received the Pittsburgh Analytical Chemistry Award, the American Chemical Society Cope Scholar Award and Illinois Bio ICON Innovator Award. He earned his Ph.D. in Chemistry from Caltech and a B.S. in Chemistry from the University of Illinois at Urbana-Champaign. He served as an American Cancer Society Postdoctoral Fellow at Harvard University before

beginning a faculty appointment at the University of Chicago, where he remained until he joined Northwestern University in 2011. Dr. Mrksich has been an active entrepreneur, having co-founded SAMDI Tech and ModuMab Therapeutics.

Louis J. Muglia is President and CEO of the Burroughs Wellcome Fund, an independent nonprofit research foundation accelerating discovery in the biomedical sciences. Previously, he served as Vice Chair for Research, Director of the Division of Human Genetics, Co-Director of the Perinatal Institute, and Professor of Pediatrics at Cincinnati Children's Hospital Medical Center. The goal of the Muglia laboratory has been to understand the molecular machinery comprising the biological clock that determines the timing for birth, and how this is shaped by the environment, to prevent or better treat human preterm labor and delivery utilizing genetic and comparative genomic approaches. Among Dr. Muglia's achievements are more than 280 publications and election to the American Society for Clinical Investigation and Association of American Physicians. In 2010, Dr. Muglia was elected to Fellow in the American Association for the advancement of Science. In 2013, Dr. Muglia was elected to membership in the National Academy of Medicine and in 2020, to the Finnish Academy of Science and Letters. Dr. Muglia has served as Chair of the Board of Scientific Counselors of the NICHD at the NIH and standing member of the NIH Pregnancy and Neonatology Study Section. Currently he is a member of the Climate Change and Human Health Planning Committee, National Academy of Medicine, on the Board of Directors, Science Philanthropy Alliance, and a member of the Steering Committee for the Pediatric Scientist Development Program. Dr. Muglia earned his Doctor of Medicine (1988) and Doctor of Philosophy (1986) degrees from the University of Chicago. He received a Bachelor of Science degree in biophysics from the University of Michigan in 1981.

Karen E. Nelson joined Thermo Fisher as Chief Scientific Officer in July 2021. Prior to joining the company, she spent many years with the J. Craig Venter Institute, a leading nonprofit research institute, serving as President from 2012 to 2021. A pioneer of the human microbiome field, Karen has authored or co-authored over 220 peer-reviewed publications, edited three books, and is currently Editor-in-Chief of the journal Microbial Ecology. She is an elected member of the National Academy of Sciences and a Fellow of the American Academy of Microbiology. Karen received a Ph.D. in Animal Science and Microbiology from Cornell University, a Master's in Animal Science from the University of Florida, and a Bachelor's degree in Agriculture and Animal Science from the University of the West Indies.

Sudip S. Parikh became the 19th chief executive officer of the American Association for the Advancement of Science (AAAS) and executive publisher of the Science family of journals in January 2020. Parikh has spent two decades at the nexus of science, policy, and business. Immediately prior to joining AAAS, Parikh was senior vice president and managing director at DIA Global, a neutral, multidisciplinary organization bringing together regulators, industry, academia, patients, and other stakeholders interested in healthcare product development. He has received multiple public service awards, including recognition from the American Association of Immunologists, the National AIDS Alliance, the Coalition for Health Services Research, and the Juvenile Diabetes Research Foundation. He was awarded a National Science Foundation Graduate Research Fellowship while earning his Ph.D. in macromolecular structure and chemistry from the Scripps Research Institute in La Jolla, Calif. There, he used structural biology and biochemistry techniques to probe the mechanisms of DNA repair enzymes bound to DNA. Parikh completed undergraduate studies at the University of North Carolina at Chapel Hill.

Nathan Price is Professor and Co-Director of the Center for Human Healthspan at the Buck Institute for Research on Aging. He also is Chief Scientific Officer of Thorne HealthTech and author of The Age of Scientific Wellness. Previously he was CEO of Onegevity, an AI health intelligence company that merged with Thorne in 2021. In 2019, he was named as one of the 10 Emerging Leaders in Health and Medicine by the National Academy of Medicine, and in 2021 he was appointed to the Board on Life Sciences of the National Academies of Sciences, Engineering, and Medicine. He spent much of his earlier career as Professor and Associate Director of the Institute for Systems Biology (now on leave), co-director with biotechnology pioneer Lee Hood of the Hood-Price Lab for Systems Biomedicine and is Affiliate Faculty at the University of Washington in Bioengineering and Computer Science & Engineering. He is a Camille Dreyfus Teacher-Scholar, received the 2016 Grace A. Goldsmith award for his work pioneering 'scientific wellness', was a co-founder of Arivale, and received a Healthy Longevity Catalyst Award from the National Academy of Medicine in 2020. He has co-authored more than 200 peer-reviewed scientific publications and given over 250 talks and keynotes. He also served as Chair of the NIH Study Section on Modeling and Analysis of Biological Systems (MABS) and is a Fellow of the American Institute for Biological and Medical Engineering. Dr. Price is also the 2023 recipient of the Alexander & Mildred Seelig Award from the American Nutrition Association.

Pamela Silver is the Adams Professor of Biochemistry and Systems Biology at Harvard Medical School and a member of the Wyss Institute at Harvard University where she runs the Sustainability Futures Initiative. She was an Assistant Professor at Princeton prior to the Dana Farber Cancer Institute at Harvard Medical School where she was a Professor in

the Dept of Biological Chemistry and Molecular Pharmacology at Harvard Medical School. In 2004, she joined the newly formed Dept of Systems Biology at Harvard Medical School. Her research group seeks to use biological systems to address problems in health and sustainability. She is an elected member of the American Academy of Arts and Sciences and the National Academy of Sciences and the past Daniel's Fellow of the Radcliffe Institute for Advanced Study. She has received the Distinguished Alumni Award from UCSC, the Innovative Technology Prize (BIO), the FastCompany Innovation Award and the Joseph Henry Lecture of the Philosophical Society. She has been recognized as one of the top Global Synthetic Biology Influencers and named for one of the top 10 Breakthroughs by the World Economic Forum. She served as a member of the National Science Advisory Board for Biosecurity (NSABB).

Sara K. Yeo is an Associate Professor in the Department of Communication, Director of the STEM Ambassador Program (STEMAP), and a faculty affiliate with the Global Change and Sustainability Center and Environmental Humanities program at the University of Utah. Her recent research interests have focused on humor as a tactic for strategic science communication, expanding audiences for science, and open science in communication. Her work has been published in Public Understanding of Science, Science Communication, Risk Analysis, Journalism and Mass Communication Quarterly, and Materials Today, among others. Dr. Yeo holds a M.S. in Oceanography (University of Hawaii at Manoa) and her training in the sciences has informed her research agenda at the intersection of science, media, and politics. She also co-hosts Planet SciComm, a podcast on science communication.

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THURSDAY, OCTOBER 30, 2025

12:00pm –12:10pm ET **Informal Discussions**

12:10pm – 12:20pm ET **Welcome and Meeting Expectation**
Ann Arvin, Stanford University

12:20pm – 1:30pm ET **AI as a Discovery and Design Multiplier**

This discussion builds on recent efforts to understand the gains from use of artificial intelligence (AI) tools in life sciences and biotechnology research and development. Beyond increasing the speed and scale of data analyses, what are the opportunities and limitations of using AI to derive novel insights about biological processes, functions, and systems; identify new principles of biological organization and function enabling efforts to predictably design single molecules, molecular complexes, and entire cells to support practical applications and further scientific advances; and accelerate discovery of new phenomenon governing life and living systems that can inform both biological and engineering pursuits? Models such as Alphafold and Evo2 enable design of single molecules and associate specific functions to molecular structure, respectively. Tools such as ChatGPT and other similar models are being used analyze and generate insights from publicly available sources, though with variable degrees of quality and reliability.

This discussion will focus on current capabilities, trends, and opportunities for accelerating discovery and new knowledge about biological molecules and systems. This focus is part of a broader discourse on AI for science and within the context of biology, explores what theories may assist with understanding biological systems (e.g., concepts of molecular evolution and adaptation), how current and future AI tools might be used as discovery multipliers, specifically, advances that accelerate and enhance scientific insights and discovery. In addition, this discussion will incorporate discussions focusing on navigating various issues such as ownership of intellectual property and ownership of the discoveries. This discussion will highlight successes and challenges associated with large language models that rely on published information vs those that use curated biological data and metadata and tested principles and identify reasonably actionable outcomes.

Facilitator
Tanya Berger-Wolf, The Ohio State University

Discussion Leaders
James Zou, Stanford University
Andrew White, FutureHouse, University of Rochester
Brian L. Hie, Arc Institute and Stanford University
Soha Hassoun, Tufts University

Discussion Questions

1) What scientific tasks (e.g., analysis, insight generation, prediction) currently are ready to be studied using AI?
2) What part of scientific discovery is inherently human? What part can be done or aided by AI?
3) What are the barriers to effectively using AI in scientific discovery?
4) How are AI and ML used to inform generation of insights or hypotheses, focusing on life sciences and biotechnology research?
5) What challenges exist in the use of AI for scientific discovery?

1:30pm – 1:45pm ET **Break**

1:45pm – 2:45pm ET ***In Silico* – Experimental Feedback Loop: Experimental Systems for Verifying and Improving Artificial Intelligence-Enabled Biological Tools**

This discussion will focus exploring the feedback between using AI-enabled biological tools and developing experimental systems for generating the data to validate the outputs of the tools and for improving the design and analytic capabilities of the tools for life sciences research. This session will focus on AI-enabled biological tools and experimental approaches aiming to generate new insights into biological phenomenon, enable predictable engineering of biological molecules and systems, and reveal new applications that benefit society in different ways. AI-ready data generated from experimental systems may inform model improvements and/or may highlight gaps in model capabilities. These data also may serve as inputs for analyses with the goal of generating outputs that could lead to new scientific knowledge about biological molecules and systems, and also use of knowledge to inform the development of synthetic data that then, can be used to design new models. This discussion will explore whether and how existing and developing theories about how biological molecules and systems function predict biological design, and analyze volumes of biological data. In addition, this discussion will enable further consideration about the reliance of experimental data and computational models to understand current and future biological challenges such as creation of synthetic cells. Of possible interest is the rising consideration of self-driving labs and cloud labs as examples of these AI-experiment coupling.

Facilitator

Nathan Price, Buck Institute

Discussion Leaders

Bradley A. Malin, Vanderbilt University
Stephan Saalfeld, HHMI Janelia Research Campus
Héctor García Martín, Lawrence Berkeley Lab
Erika DeBenedictis, Align to Innovate

Discussion Questions

1) What are some guiding principles for developing experimental approaches for generating data to test outputs from AI-enabled biological tools, focusing more on tools used for generating insights about biological processes, functions, and systems and for assessing functions of biological molecules, complexes and systems?
2) How might data from these approaches also be used to inform AI model development?
3) What opportunities exist to more closely link AI-enabled analyses and real-world and/or experimental findings?
4) What challenges or limitations exist to link experimental approaches with in silico studies?

2:45pm – 4:00pm ET

Existing and AI-Ready Biological Datasets: Current Threats and Future Opportunities

The example of Alphafold and protein modeling highlights the value of highly curated biological datasets in creating highly effective AI-enabled biological tools and subsequently, in use of those tools to model known molecules and design new ones. Though the protein databank does not contain sequence and structure information for all proteins, it is among the most highly curated of biological databases that exist, enabling its use in the design of computational models and the use of these models for analyzing new data. For more than a decade, scientists, policymakers, and others have highlighted the importance of biological datasets for various purposes, whether to advance scientific knowledge, diagnose disease, or detect emerging pathogens. However, the costs and infrastructure needed for generating, expanding, and maintaining highly curated, representative datasets will be significant, especially the need to secure valuable data and ensure data integrity and provenance. These challenges only grow as data from physical samples are converted into digital formats for longer storage, broader access, and easier analysis.

Since early 2025, several scientific databases have been archived and sunsetted, including some health and genomic databases, which creates new challenges for scientific advancement, applications in various fields, and access to and protection of sensitive data, which could lead to privacy and national security vulnerabilities. The National Academies held a scoping discussion in May 2025 about the sustainability and availability of biomedical databases, which informed the development of a new project concept on addressing the main challenges raised during the meeting.

This discussion will focus on AI-ready data infrastructure, specifically generating and sustaining AI-ready biological datasets and converting existing biological datasets for use in AI models to address research, health, economic growth, and other objectives.

Facilitator
Tanya Berger-Wolf, The Ohio State University

Discussion Leaders
Mónica C Muñoz-Torres, University of Colorado
Amarda Shehu, George Mason University
Kjiersten Fagnan, Joint Genome Institute

Discussion Questions

1) Given the distributed nature of experimentation, in what ways can AI-ready biological data be generated, stored, and made accessible to scientists?
2) How might these approaches differ for biological data considered to be sensitive in nature?
3) In what ways can existing datasets be made AI-ready? Or, is this not possible?
4) How might gaps in knowledge about biological phenomena (i.e., processes, functions, interactions, systems) limit generation of AI-ready biological datasets?
5) How might those gaps be filled, particularly for datasets for which knowledge about biological phenomena are not well understood?
6) When looking at existing biological and biomedical datasets, what vulnerabilities (to individuals, national security, or other) exist?

MEETING ADJOURNS

ADVANCED READING

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VIEWS BY JEMIN GEORGE, NATIONAL SCIENCE FOUNDATION

AI is transforming scientific discovery through three fundamental roles that directly align with your meeting's focus areas. This framework addresses how AI enables scientific discovery, creates feedback loops with laboratory experimentation, and demands new approaches to data management. In my opinion, AI's could play three fundamental roles in science:

1. **Catalyst for Transdisciplinary Research:** AI acts as a catalyst for transdisciplinary research, connecting otherwise disparate scientific fields. Experts are increasingly specialized—too deep in the weeds to venture into distinct fields. We're seeing sciences focus more on deeper understanding within fields at the expense of building holistic views. When properly trained on diverse data, AI can easily identify opportunities to make connections between fields, spotting patterns that would take human researchers years to find.
2. **The Automated Experimentalist:** The second role is that of an automated experimentalist—not just in the sense of an experimental physicist working with a hadron collider, but as a system that tests thousands of molecular compounds against protein targets to identify new drugs. Beyond molecular science, AI now controls plasma shapes in fusion reactors, optimizing configurations in real-time. Where trial-and-error and high-fidelity simulations play critical roles, AI-assisted programmable labs and digital twins are game-changers.
3. **Pattern Recognition and Hypothesis Generation:** AI excels at finding subtle patterns in massive datasets we'd otherwise miss. It's discovered new exoplanets in telescope data already reviewed by humans. In genomics, it identifies disease-causing genetic variations among billions of base pairs. This extends beyond pattern-finding to generating novel hypotheses worth investigating. Emerging evidence shows AI systems are generating novel, validated hypotheses that prove useful to scientists—including discoveries humans hadn't previously considered. However, whether this constitutes genuine creative hypothesis generation versus sophisticated pattern recombination remains debated, and AI still struggles with the paradigm-shifting leaps that define revolutionary science.

Of course, there are limitations. AI is only as good as its training data. AI identifies correlations but struggles with causation, and as we know, the former doesn't imply the latter. Many systems are black boxes we can't interpret, though this opacity is often mistaken for "superhuman knowledge" beyond human intuition.

To make this envisioned AI impact on science a reality, we need better ways to ingest information and knowledge into AI systems. The current approach of training deep neural networks has fundamental limitations—retraining costs tens of millions of dollars for large models, and it's not feasible to retrain every time a fundamental discovery is made. While retrieval-augmented generation (RAG) provides value for specific use cases, it's insufficient for the continuous evolution of scientific knowledge. We need complementary approaches that enable real-time knowledge updates. Knowledge graphs are emerging as a promising solution—they're already enabling hypothesis generation in drug discovery and materials science without requiring model retraining. Organizations like ONTOFORCE are demonstrating practical implementations

where knowledge graphs integrate with AI for biomedical discovery.

Scientific breakthroughs often require creative leaps current AI can't make. While AI excels at systematic exploration within defined spaces, the paradigm shifts that define scientific revolutions—from general relativity to CRISPR—still require human insight. AI transforms science not by replacing scientists but by amplifying their capabilities across disciplines, automating routine experimentation, and revealing patterns invisible to human analysis. We need new human-AI scientific systems that leverage computational strengths while maintaining human oversight for interpretation, ethics, and creative insight.

DISCUSSION LEADERS

AI as a Discovery and Design Multiplier

Dr. Tanya Berger-Wolf is a Professor of Computer Science Engineering, Electrical and Computer Engineering, and Evolution, Ecology, and Organismal Biology at the Ohio State University, where she is also the Director of the Translational Data Analytics Institute. A pioneer in Artificial Intelligence (AI) for ecology, biodiversity, and conservation, she leads the NSF-funded Imageomics Institute and the US-Canada co-funded AI and Biodiversity Change (ABC) Global Center.

Dr. Berger-Wolf serves as a scientific advisor for many organizations, including the US National Academies Board on Life Sciences, US National Committee for the International Union of Biological Sciences (IUBS), the Global Partnership on AI (GPAI)/OECD, and The Nature Conservancy. She co-founded the AI for conservation non-profit Wild Me (now part of Conservation X Labs), creator of Wildbook, recognized by UNESCO for advancing the UN Sustainable Development Goals. Her contributions have earned numerous accolades, including recognition as the AI 100 Global Thought Leaders by H20.ai and most recently the OSU College of Engineering Lumley Interdisciplinary Research Award.

Dr. Soha Hassoun is Professor and Past Chair of the Department of Computer Science at Tufts University. She holds secondary appointments in the Department of Electrical and Computer Engineering and also in the Department of Chemical and Biological Engineering at Tufts. Soha received the BSEE degree from South Dakota State University, Brookings, SD, the Master's degree from the Massachusetts Institute of Technology, Cambridge, MA, and the Ph.D. degree from the Department of Computer Science and Engineering, University of Washington, Seattle, WA. Soha's research interest lies at the intersection of machine learning and biology, with a current focus on metabolomics and extracellular electron transfer. Soha has an NSF CAREER award, served on DARPA's Defense Science Study Group, and has an NIH MIRA award. She has served and led many technical committees and activities. She currently co-chairs the committee on widening participation for the Computing Research Association, a leading US organization that advances computing research and education.

Dr. Brian Hie is Assistant Professor of Chemical Engineering at Stanford University, the Dieter Schwarz Foundation Stanford Data Science Faculty Fellow, and an Innovation Investigator at Arc Institute, where his group conducts research at the intersection of biology and AI. He was previously a Stanford Science Fellow in the Stanford University School of Medicine and a researcher at Meta AI, and completed his Ph.D. at MIT CSAIL.

Dr. Andrew White is co-founder and head of science at FutureHouse, a San Francisco AIxBio non-profit research organization and associate professor of chemical engineering at University of Rochester. Andrew White is a researcher with peer-reviewed publications and books across the domains of large language models in chemistry, explainable artificial intelligence, statistical mechanics, and chemical engineering. He has won junior investigator awards from the National Science Foundation and National Institutes of Health along with professional and teaching awards for excellence as a chemical engineer. Andrew is an active member of the scientific community as a peer reviewer for over 30 journals, multiple national and private grant awarding institutions, and serves on multiple scientific advisory boards of companies and institutions. Andrew is also a science communicator with large followings on X and LinkedIn and has been interviewed in multiple publications such as the New York Times, Bloomberg, Nature, Financial Times, and Science. Andrew serves on multiple scientific advisory boards across biotech. He has contributed to the ongoing debate around safety of artificial intelligence as an OpenAI red teamer, speaking at multiple policy summits, and visiting the White House to advise multiple agencies on AI policy.

Dr. James Zou is an Associate Professor of Biomedical Data Science and, by courtesy, of Computer Science and Electrical Engineering at Stanford University. I work on making machine learning more reliable, human-compatible and statistically rigorous, and am especially interested in applications in human disease and health. Several of our algorithms are widely used in tech and biotech industries. I received a Ph.D from Harvard in 2014, and was a member of Microsoft Research, a Gates Scholar at Cambridge and a Simons fellow at UC Berkeley. I joined Stanford in 2016 and am excited to be a two-time Chan-Zuckerberg Investigator and the faculty director of the university-wide Stanford Data4Health hub. I'm also a member of the Stanford AI Lab. My research is supported by the Sloan Fellowship, the NSF CAREER Award, and Google, Amazon and Adobe AI awards.

In Silico – Experimental Feedback Loop: Experimental Systems For Verifying and Improving Artificial Intelligence-Enabled Biological Tools

Dr. Erika DeBenedictis is a computational physicist and molecular biologist. I'm interested in solving big problems using evolution. Today I'm a serial founder supported by The Astera Institute's Residency program.

I received a PhD in Biological Engineering from MIT in 2021 and a BS in Computer Science from Caltech in 2014. I did a postdoc in David Baker's Lab, where I worked on machine learning for protein design, and ran an academic lab at the Francis Crick Institute in London. I've also worked at the Jet Propulsion Laboratory (JPL), Sandia National Laboratories, Dropbox, and D. E. Shaw Research.

Dr. Héctor García Martín is a staff scientist at Berkeley National Laboratory. He was born in Bilbao, part of the Basque region in Spain. Hector studied physics and specialized in solid state physics at the University of the Basque Country. He obtained his Ph. D in condensed matter physics from the University of Illinois at Urbana-Champaign, where he studied Bose Einstein Condensates and scaling laws in ecology. His interest in using theoretical physics tools to make biology predictable led him to join the Department of Energy Joint Genome Institute, where he worked on studying microbial communities through metagenomics as a postdoctoral fellow. Pursuing the opportunity to improve predictive models in biology through synthetic biology, he became a group lead at Berkeley Lab in 2007, where he is part of the Joint BioEnergy Institute and the Agile BioFoundry programs. In his current role, he combines machine learning, mechanistic models, automation, microfluidics and genetic editing techniques to effectively guide the metabolic engineering process and provide some of the first examples in predictive synthetic biology.

Dr. Bradley Malin is the Accenture Professor of Biomedical Informatics, Biostatistics, and Computer Science at Vanderbilt University, as well as Vice Chair for Research Affairs in the Department of Biomedical Informatics at Vanderbilt University Medical Center, where he co-directs the AI Discovery & Vigilance to Accelerate Innovation & Clinical Excellence (ADVANCE) Center. His research is in the development of computational methods and infrastructure to enable broad data sharing and development of machine learned systems for the analysis of biomedical data. He is one of the principal investigators (PIs) of two of the National Institutes of Health's flagship AI programs, AIM-AHEAD and Bridge2AI. He chaired the National Academies Workshop on AI for Scientific Discovery in 2023 and was a member of the National Academies consensus study team for the recently released report on "The Age of AI in the Life Sciences: Benefits and Biosecurity Considerations". Earlier this year, he completed a five-year appointment on the Board of Scientific Counselors of the National Center for Health Statistics of the Centers for Disease Control and Prevention (CDC) and is currently part of the U.S. Speaker Program of the U.S. State Department. Among various honors, he is an elected fellow of the National Academy of Medicine (NAM), the American College of Medical Informatics (ACMI), the American Institute for Medical and Biological Engineering (AIMBE), Institute of Electrical and Electronics Engineers (IEEE), and the International Academy for Health Sciences Informatics (IAHSI). He was also a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE) from the White House.

Dr. Nathan Price is Professor and Co-Director of the Center for Human Healthspan at the Buck Institute for Research on Aging. He also is Chief Scientific Officer of Thorne HealthTech and author of The Age of Scientific Wellness. Previously he was CEO of Onegevity, an AI health intelligence company that merged with Thorne in 2021. In 2019, he was named as one of the 10 Emerging Leaders in Health and Medicine by the National Academy of Medicine, and in 2021 he was appointed to the Board on Life Sciences of the National Academies of Sciences, Engineering, and Medicine. He spent much of his earlier career as Professor and Associate Director of the Institute for Systems Biology (now on leave), co-director with biotechnology pioneer Lee Hood of the Hood-Price Lab for Systems Biomedicine and is Affiliate Faculty at the University of Washington in Bioengineering and Computer Science & Engineering. He is a Camille Dreyfus Teacher-Scholar, received the 2016 Grace A. Goldsmith award for his work pioneering 'scientific wellness', was a co-founder of Arivale, and received a Healthy Longevity Catalyst Award from the National Academy of Medicine in 2020. He has co-authored more than 200 peer-reviewed scientific publications and given over 250 talks and keynotes. He also served as Chair of the NIH Study Section on Modeling and Analysis of Biological Systems (MABS) and is a Fellow of the American Institute for Biological and Medical Engineering. Dr. Price is also the 2023 recipient of the Alexander & Mildred Seelig Award from the American Nutrition Association.

Dr. Stephan Saalfeld is a Senior Group Leader and Head of Computation and Theory at HHMI's Janelia Research Campus, where he co-leads the AI@HHMI initiative (HHMI's $500M investment in AI-driven life sciences). He develops methods for scalable data analysis to uncover principles underlying structure and dynamics in complex biological systems. His contributions span from scalable tools and infrastructure for data acquisition, processing, and management, through machine learning-based image analysis and visualization tools, to physics-informed AI and graph neural networks

that infer the governing rules and latent properties from observed phenomena. Stephan is a passionate advocate for open science, having authored widely used open-source software packages and organized large-scale public data challenges and training initiatives. His goal at AI@HHMI is to tightly integrate AI into experimental design, execution, and analysis to accelerate scientific discovery.

Existing and AI-Ready Biological Datasets: Current Threats and Future Opportunities

Dr. Kjiersten Fagnan is the Chief Informatics Officer and Data Science and Informatics Lead at the DOE Joint Genome Institute (JGI) and is leading data integration efforts across five DOE Office of Science biological data resources. Fagnan began working with JGI in 2012 as a National Energy Research Scientific Computing (NERSC) facility bioinformatics computing consultant, after completing a petascale postdoctoral fellowship at NERSC and LBNL's Computational Research Division. As a postdoc, her research focused on stable and accurate computational methods for reacting subsurface flows, and evolved into scalable methods for scientific data analysis. In 2014 Dr. Fagnan became the JGI-NERSC Engagement Lead with a focus on adapting JGI workloads to run on supercomputing hardware and worked closely with staff to understand the data-intensive nature of JGI workloads. Dr. Fagnan was appointed CIO of the JGI in 2016, and in 2018 was hired to be the JGI's Data Science and Informatics department head. In 2018, Dr. Fagnan was part of the Gordon Bell prize winning team at the Supercomputing conference, SC'18, led by researchers at Oak Ridge National Laboratory. Dr. Fagnan has been the Distinguished Speaker at IBM Research in Almaden where she presented work related to distributed data and workflow management. Dr. Fagnan is also a co-PI for the National Microbiome Data Collaborative where she leads infrastructure and user-centered design efforts. Dr. Fagnan obtained her PhD in Applied Mathematics from the University of Washington in 2010 and an MBA from the University of California, Berkeley, Haas School of Business in 2017.

Dr. Mónica Muñoz Torres dedicates her career to developing software tools and standards for analyzing and disseminating data resources in the biomedical sciences. She is an Associate Professor of Biomedical Informatics at the University of Colorado Anschutz, and her expertise spans genomics, biocuration, knowledge representation, data harmonization, and artificial intelligence. She is the Principal Investigator for the NIH-funded Bridge to Artificial Intelligence (Bridge2AI) Standards, Practices, and Quality Assessment, and the Bridge2AI Teaming and Collaboration teams. Dr. Muñoz Torres serves as co-Lead for the Clinical and Phenotypic Data Capture Workstream in the Global Alliance for Genomics and Health, responsible for developing a suite of standards and tools to help the genomics community harness phenotypic, clinical, and family health history information to improve human health. Her research is motivated by her passion for leveraging comparative genomics to advance our understanding of human health and disease. Through translational, integrative, and semantic data science, she aims to improve socio-technological practices, build research communities, and welcome participation from all professional backgrounds to the genomics and bioinformatics fields.

Dr. Amarda Shehu is Professor of Computer Science, Associate Dean for Research, and the inaugural Vice President and Chief AI Officer at George Mason University. She leads the university's AI strategy across research, education, workforce development, and public engagement. She formerly served as Associate Vice President for Research, providing leadership for the Institute for Digital InnovAtion. She has launched multiple transdisciplinary centers, including the Center for AI Innovation and Economic Competitiveness, the Center for Infrastructure Security in the Era of AI, the

Center for Cybersecurity Research, and the Provost Transdisciplinary Center for Advancing Human-Machine Partnerships. She is also the architect of Mason's new M.S. in Artificial Intelligence degree program and chairs the university's AI-in-Government Council, advancing AI collaboration across academia, industry, and public agencies. An active AI researcher, Dr. Shehu has published over 200 peer-reviewed research articles with students and collaborators. She is an IEEE Senior Member, a Fellow of the American Institute for Medical and Biological Engineering, a member of the Virginia Academy of Sciences, Engineering, and Medicine, and a recipient of Virginia's Outstanding Faculty Award from SCHEV, the NSF CAREER Award, and multiple university honors for research, teaching, and mentoring. Her research is supported by NSF, DoD, Air Force, SBA, and other agencies.