

# **Extraordinary Engineering Impacts on Society: Over Seven Decades of Contributions from the National Science Foundation**

## **Committee**

### **Dan E. Arvizu**

#### **Chair**

Dan E. Arvizu, PhD is the Chancellor of the New Mexico State University System and a Professor in their Department of Mechanical and Aerospace Engineering. He took the position after serving as Director and Chief Executive of the National Renewable Energy Laboratory. Prior to that, Dr. Arvizu was Group Vice President, Energy and Environment, and Systems, CH2M HILL. He also held a number of senior positions at the Sandia National Laboratories and was a member of the technical staff at Bell Labs. Dr. Arvizu has extensive experience in materials science applications for nuclear weapons and energy systems, and development of renewable energy systems, including solar thermal, photovoltaic, and concentrating solar collectors. Among many honors, he received the 1996 Hispanic Engineer's National Achievement Award for Executive Excellence. In 2004 Dr. Arvizu was appointed by President George W. Bush, and subsequently in 2010 reappointed by President Barack Obama, to serve six-year terms on the National Science Board (NSB), the governing body of the National Science Foundation. He was twice elected NSB Chairman by his peers, becoming the first Hispanic to hold that position. Dr. Arvizu earned his BS from New Mexico State University, and his MS and PhD from Stanford University, all in mechanical engineering. He was elected a member of the National Academy of Engineering in 2014 “[f]or leadership in the renewable and clean energy sectors, and for promoting national balanced energy policies”.

## **Edward H. Frank**

### **Member**

Edward H. Frank, PhD is co-founder and CEO of Brilliant Lime, Inc. and Cloud Parity, both social/mobile software firms. Previously, he was a vice president at Apple, Inc. and corporate vice president research and development at Broadcom. Earlier, Dr. Frank co-founded and led the engineering group for Broadcom's Wireless LAN business, which is now one of the company's largest business units. Dr. Frank joined Broadcom in 1999 following its acquisition of Epigram, Inc., where he was the founding CEO and Executive Vice President. From 1993 to 1996, he was a co-founder and Vice President of Engineering of NeTpower Inc., a computer workstation manufacturer. From 1988 to 1993, Dr. Frank was a Distinguished Engineer at Sun Microsystems, Inc., where he co-architected several generations of Sun's SPARCstations and was a principal member of Sun's Green Project, which developed the precursor to the Java cross-platform web programming language. Dr. Frank holds over 40 issued patents. He is a University Life Trustee of Carnegie Mellon University and a member of its Board's Executive Committee. Dr. Frank earned a BS and MS in Electrical Engineering from Stanford University and a PhD in Computer Science from Carnegie Mellon University. He was elected a member of the National Academy of Engineering in 2018 “[f]or contributions to the development and commercialization of wireless networking products”.

## **Selda Gonsel**

### **Member**

Selda Gonsel, PhD is President of Shell Global Solutions (US) and Vice President of Global Lubricants and Fuels Technology for Shell. She has served in a number of roles for that company including VP of Fuels and Engine Vehicle Technology, General Manager of Global Products and Quality, GM of Lubricants Technology Americas, and GM of Global Strategic Research and Development. Earlier, Dr. Gonsel was VP for Technology Development and Innovation at Pennzoil. While working as a research scientist there, she undertook sabbatical assignments at Imperial College London, publishing papers on antiwear and viscosity modifier lubricant additives. Her technical background is in the multidisciplinary field of Tribology (friction, wear and lubrication) including fundamental research, product development and application, technology management and leadership. Dr. Gonsel's research areas include lubricant base oil technologies, performance enhancing additives, synthetic hydrocarbons including gas to liquid technologies, materials, durability and energy efficiency. She has served as the President of the Society of Tribologists and Lubrication Engineers, is a Fellow of that society, and the recipient of its International Award. Dr. Gonsel received her BSc in Chemical Engineering from Istanbul Technical University and an MSc and PhD in Chemical Engineering from Pennsylvania State University. She was elected a Member of the National Academy of Engineering in 2017 “[f]or leadership in developing and manufacturing advanced fuels and lubricants to meet growing global energy demand while reducing CO2 emissions.”

## **William S. Hammack**

### **Member**

William S. Hammack, PhD is the William H. and Janet G. Lycan Professor of Chemical & Biomolecular Engineering at the University of Illinois - Urbana-Champaign. He is the creator and host of the popular YouTube channel "engineerguy" and has recorded numerous radio segments that describe what, why and how engineers do what they do for such outlets as American Public Media's Marketplace and Radio National Australia. Dr. Hammack's outreach work has been recognized by The National Association of Science Writer's Science in Society Award; the American Chemical Society's Grady-Stack Medal, and the American Institute of Physics' Science Writing Award. In 2021, he was awarded the National Science Board's Public Service Award, which is granted to individuals and groups that have contributed substantially to increasing public understanding of science and engineering. Dr. Hammack's books include "Why Engineers Need to Grow a Long Tail: A Primer on Using New Media to Inform the Public and to Create the Next Generation of Innovative Engineers"; and "How Engineers Create the World". Each semester, his course "The Hidden World of Engineering" is offered to a diverse mix of students majoring in commerce, architecture, photography, history, and graphic arts, and gives students an appreciation for how engineers think. He earned a BS in chemical engineering from Michigan Technological University; and MS and PhD degrees at the University of Illinois.

## **Eboney Hearn**

### **Member**

Eboney Hearn, EdM is the Executive Director of the Office of Engineering Outreach Programs (OEOP) at the Massachusetts Institute of Technology (MIT). In that capacity she oversees the strategic implementation of outreach programs offered through the MIT School of Engineering, focusing on bringing underrepresented and underserved students to the engineering and science fields. Prior to joining the OEOP, Ms. Hearn served as Assistant Dean for Graduate Education, Diversity Initiatives at the MIT Office of Graduate Education. Earlier, she was Program Director of the Diversity Initiative at the Eli and Edythe L. Broad Institute of MIT and Harvard. Prior to coming to MIT, Ms. Hearn taught mathematics at public middle- and high schools in Boston for five years. Before that, she was a manufacturing engineer at IBM, where she led several manufacturing processes in circuit board printing and co-patented a novel photolithography process. Ms. Hearn is a member of the MIT Diversity Think Tank, the Diversity Advisory Committee of the Keystone Symposia on Molecular and Cellular Biology, and the Steering Committee of the UMass Amherst Researchers, Educators, and Business Leaders Network. She holds an undergraduate degree in Chemical Engineering from MIT, and an EdM from Harvard University.

## **Laura A. Lindenfeld**

### **Member**

Laura A. Lindenfeld, PhD is Dean of the School of Communication and Journalism and Executive Director of the Alan Alda Center for Communicating Science at Stony Brook University. As the Alda Center Director, she oversees an organization that has trained over 18,000 scientists worldwide and introduced over 50,000 people to the Alda Method. The Center provides international leadership in conducting and connecting research and practice to advance clear science and medical communication. She has sought to help people understand how they can support effective stakeholder engagement, build strong interdisciplinary teams, and communicate science more effectively. In her capacity as Dean, she oversees a School that prepares undergraduate and graduate students for dynamic careers in media industries. Dr. Lindenfeld's research has been supported by the National Science Foundation, the National Oceanic and Atmospheric Administration Sea Grant Program, the U.S. Department of Education, and the U.S. Department of Food and Agriculture. She has published over 50 peer-reviewed articles, chapters, and reviews in a range of journals including Science Communication, Environmental Communication, and Sustainability Science, Communication and Critical/Cultural Studies. Dr. Lindenfeld holds an MA from the Rheinische Friedrich-Wilhelms-Universität Bonn and a PhD in Cultural Studies from the University of California, Davis.

## **Theresa A. Maldonado**

### **Member**

Theresa A. Maldonado, PhD, PE is the systemwide Vice President for Research & Innovation at the University of California Office of the President. Previously, she served as Dean of Engineering at The University of Texas at El Paso. Dr. Maldonado's academic career spans 31 years, including research administration appointments at four other universities: The University of Texas - Rio Grande Valley, Texas A&M University, Texas A&M Health Science Center, and The University of Texas at Arlington. She also served in system-level roles as Associate Vice Chancellor for Research at the Texas A&M University System, as Deputy Director of the Texas A&M Engineering Experiment Station, and as founding director of the Texas A&M Energy Institute. Dr. Maldonado has extensive experience at the federal level in advancing engineering research, education, and commercialization initiatives. Beginning January 2011, she served four years as a division director in the Engineering Directorate at the National Science Foundation. Her initial appointment at NSF was in 1999, when she served two years as a program director in the Engineering Research Centers program and represented the Engineering Directorate on several NSF-wide committees. Before entering academia, Dr. Maldonado was a member of technical staff at AT&T Bell Laboratories. She earned the BEE, MSEE, and PhD degrees in Electrical Engineering from the Georgia Institute of Technology. Dr. Maldonado is a registered Professional Engineer in Texas.

## **Louis A. Martin-Vega**

### **Member**

Louis A. Martin-Vega, PhD is Professor and former Dean of Engineering at North Carolina State University. He joined the university in 2006 after serving as Dean of Engineering at the University of South Florida. His academic career also includes administrative and academic appointments at Lehigh University, Florida Institute of Technology University of Florida and University of Puerto Rico at Mayagüez. Dr. Martin-Vega's research and teaching interests are in production and manufacturing systems, logistics and distribution, operations management, engineering education and broadening participation in the field of engineering. Dr. Martin-Vega has also held several prestigious positions at the National Science Foundation, including acting head of its Engineering Directorate and director of its Division of Design, Manufacture and Industrial Innovation. His efforts at NSF lead to the creation of the foundation-wide Grant Opportunities for Academic Liaison with Industry (GOALI) program as well as many other initiatives that enhanced industry-university research collaboration and greater inclusion of women and underrepresented minorities in engineering education and research. He is a Fellow of the American Association for the Advancement of Sciences, the Institute of Industrial and Systems Engineers and the Society of Manufacturing Engineers. Dr. Martin-Vega earned his BS in industrial engineering from the University of Puerto Rico at Mayaguez, an MS in operations research from New York University and ME and PhD degrees in industrial and systems engineering from the University of Florida. He was elected a Member of the National Academy of Engineering in 2021 “[f]or support of engineering and engineering education through industry-academic collaboration and opportunities for underrepresented groups.”

## **Yu Tao**

### **Member**

Yu Tao, PhD is an Associate Professor of Sociology at the Stevens Institute of Technology. In her research, she analyzes issues related to human resources in science, technology, engineering, and mathematics (STEM) as well as online privacy literacy from the sociological perspective. Dr. Tao also investigates how the general public's online privacy skills are affected by their demographic characteristics, online experience, and online privacy educational tools. She is a co-editor of the book *Changing the Face of Engineering: The African American Experience*, published by the Johns Hopkins University Press in 2015, and her research has appeared in social science journals, including *Sociological Spectrum*, *Minerva*, *American Behavioral Scientist*, *Journal of Women and Minorities in Science and Engineering*, and *International Journal of Gender, Science and Technology*. Dr. Tao has served as a co-PI of three National Science Foundation grants and a consultant and co-organizer of a workshop sponsored by the Alfred P. Sloan Foundation addressing her research topics. She received her BA in English from East China Normal University, EdM in Educational Media and Technology from Boston University, and MS and PhD in Sociology of Science and Technology from Georgia Institute of Technology.

## **Jimmy Williams**

### **Member**

Jimmy Williams Jr., PhD is Distinguished Service Professor of Engineering and Public Policy and Director of the Engineering & Technology Innovation Management Program at Carnegie Mellon University. Dr. Williams came to his current position with significant and practical experience in industry. From 2012-2015, he held the position of Vice President of Global Engineering at Pall Corp, where he led a 750-member engineering unit, driving Pall's global growth initiatives across its Life Science and Industrial Products business. Prior to his position at Pall, Dr. Williams spent 10 years with Alcoa, Inc. In his role as Senior Director of Research and Development - Alcoa Technology Advantage, he led all facets of business and technology management. As a product innovator, Dr. Williams spearheaded a critical assessment of Alcoa's aero-structures business and led a team that developed an innovative cosmetic finish for Apple's Macintosh computer. Beginning in 1983, Dr. Williams led a nearly 20-year distinguished career at The Boeing Co. where he held a number of significant research and development and program management positions. Among his accomplishments there, Dr. Williams was named Boeing's Black Engineer of the Year in 2001. He earned a BS in Mechanical Engineering from Texas A&M University, an MBA in Marketing and Management from Lindenwood College, and a PhD in Engineering and Policy from Washington University.

## **Jeffrey R. Yost**

### **Member**

Jeffrey R. Yost, PhD is Director of the Charles Babbage Institute for Computing, Information, and Culture and Research Professor in the History of Science, Technology and Medicine at the University of Minnesota, Minneapolis. His primary areas of research are the business, social, and cultural and intellectual history of computing; and he is a science and technology oral history specialist. Dr. Yost also has a deep interest in political economy, societal implications of computing structuring and use, and the history of cognitive science and human-computer interaction. His current work includes a monograph on the history of computer security. On the editorial front, he was a past Editor-in-Chief of IEEE Annals of the History of Computing; and is on the editorial board of the Annals as well as the journal Information & Culture. He also is co-editor of the Studies in Computing and Culture book series for Johns Hopkins University Press. Dr. Yost is the co-author of FastLane: Managing Science in the Internet World, a book on the National Science Foundation's grant-management system that assesses its impact on cutting-edge scientific research. He earned a BA in History from Macalester College, an MA and PhD in the History of Technology and Science from Case Western Reserve University, and an MBA from the Carlson School of Management of the University of Minnesota, Minneapolis.

# **David A. Butler**

## **Staff Officer**

David A. Butler, PhD, is the J. Herbert Hollomon Scholar of the National Academy of Engineering (NAE). He also serves as Director of NAE's Cultural, Ethical, Social, and Environmental Responsibility in Engineering program. Before joining the National Academies, Dr. Butler served as an analyst for the U.S. Congress Office of Technology Assessment, was a research associate in the Department of Environmental Health of the Harvard T.H. Chan School of Public Health, conducted research at Harvard's John F. Kennedy School of Government and practiced as a product safety engineer at Xerox Corporation. He has directed numerous National Academies studies on environmental health and technology policy topics, including ones that produced "Climate Change, the Indoor Environment, and Health"; "Systems Engineering to Improve Traumatic Brain Injury Care in the Military Health System"; several volumes of "Veterans and Agent Orange", and "The Air Force Health Study Assets Research Program". Dr. Butler earned his BS and MS degrees in electrical engineering from the University of Rochester and his PhD in public policy analysis from Carnegie Mellon University. He is a recipient of the National Academies' Cecil Medal for Research.