

A Vision for the Future of Center-Based, Multidisciplinary Engineering Research

Committee

Maxine L. Savitz

Co-Chair

MAXINE L. SAVITZ [NAE] is the retired general manager for Technology Partnerships at Honeywell, Inc., formerly AlliedSignal. Previously, she was the general manager of AlliedSignal Ceramics Components. Dr. Savitz was employed at the U.S. Department of Energy (DOE) and its predecessor agencies (1974-1983) and served as Deputy Assistant Secretary for Conservation.

Dr. Savitz serves on the board of the American Council for an Energy Efficient Economy, and on advisory bodies for Pacific Northwest National Laboratory, Sandia National Laboratories, and Jet Propulsion Laboratory. She serves on the Massachusetts Institute of Technology visiting committee for sponsored research activities. In 2009, Dr. Savitz was appointed to the President's Council of Advisors for Science and Technology. She is a fellow of the California Council on Science and Technology. Past board memberships include the National Science Board, Secretary of Energy Advisory Board, Defense Science Board, Electric Power Research Institute (EPRI), Draper Laboratories, and the Energy Foundation. Dr. Savitz's awards and honors include: the Orton Memorial Lecturer Award (American Ceramic Society) in 1998; the DOE Outstanding Service Medal in 1981; the President's Meritorious Rank Award in 1980; recognition by the Engineering News Record for Contribution to Construction Industry in 1979 and 1975; and the MERDC Commander Award for Scientific Excellence in 1967. She is the author of about 20 publications.

David R. Walt

Co-Chair

DAVID R. WALT [NAE] is University Professor, Robinson Professor of Chemistry, Professor of Biomedical Engineering, Professor of Genetics, and Professor of Oral Medicine at Tufts University and is a Howard Hughes Medical Institute Professor. Dr. Walt is the founding scientist of Illumina, Inc., and has been a director and chairman of its Scientific Advisory Board since 1998. Dr. Walt is also the founding scientist of Quanterix Corporation and is a director and chairman of its Scientific Advisory Board since 2007. He has received numerous national and international awards and honors for his fundamental and applied work in the field of optical sensors, arrays, and single molecule detection. Dr. Walt is a co-chair of the Board on Chemical Sciences and Technology of the U.S. National Academy of Sciences. He is a member of the U.S. National Academy of Engineering, American Academy of Arts and Sciences, a fellow of the American Institute for Medical and Biological Engineering, a fellow of the National Academy of Inventors, and a fellow of the American Association for the Advancement of Science.

Nadine N. Aubry

Member

NADINE AUBRY [NAE] is University Distinguished Professor and Dean of the Northeastern University College of Engineering, is a widely known leader in the field of fluid dynamics, particularly the modeling of open flow turbulence and other complex flows and systems using advanced decomposition techniques and dynamical systems theory. She also made noteworthy contributions to the field of microfluidics. For these and other contributions to the profession, Dr. Aubry was elected as a member of the National Academy of Engineering and is a Fellow of the American Physical Society (APS), the American Society of Mechanical Engineers (ASME), the American Association for the Advancement of Science (AAAS), the American Institute of Aeronautics and Astronautics (AIAA), and the National Academy of Inventors (NAI). Other recognitions include the Presidential Young Investigator Award from the National Science Foundation (NSF) and the Ralph R. Teetor Educational Award from the Society of Automotive Engineers (SAE). She has served as Chair of the National Academies' U.S. National Committee for Theoretical and Applied Mechanics (USNC/TAM), as Chair of the US delegation to the International Union of Theoretical and Applied Mechanics (IUTAM), as past Chair of the American Physical Society Division of Fluid Dynamics and as a member of the Bureau of IUTAM. Dr. Aubry has also been serving on many APS and ASME committees, numerous NSF and National Research Council review panels, and a certain number of advisory boards and review panels in the U.S. and in foreign countries, including Austria, France, Portugal, Singapore, South Korea. She has given numerous invited lectures on her research at various universities and conferences. Before joining Northeastern, she was the Raymond J. Lane Distinguished Professor, University Professor and head of the Department of Mechanical Engineering at Carnegie Mellon University.

Cheryl R. Blanchard

Member

CHERYL R. BLANCHARD [NAE] is the chief executive officer and a member of the Board of Directors of MicroCHIPS, Inc. Blanchard has extensive experience in the medical device and biologics sectors. From 2002 to 2014, Blanchard served in roles of increasing responsibility at Zimmer, Inc., a medical device company focused on musculoskeletal products. Her roles at Zimmer included leadership of research and development, clinical, quality and regulatory affairs, and health economics. She was also a member of Zimmer's executive committee and developed and led the biologics business at Zimmer through disciplined execution of an R&D pipeline coupled with significant partnering and business development activities. Previous to Zimmer, Blanchard built and led the medical device practice at Southwest Research Institute while also serving as an adjunct professor at the University of Texas Health Science Center, both in San Antonio, TX. She has a B.S in Ceramic Engineering from Alfred University and an M.S. and Ph.D. in Materials Science and Engineering from the University of Texas at Austin.

Robert D. Braun

Member

ROBERT D. BRAUN [NAE] is the David & Andrew Lewis Professor of Space Technology at Georgia Institute of Technology and has over 25 years of experience in performing design and analysis of planetary exploration systems as a member of the technical staff of the NASA Langley Research Center and the Georgia Institute of Technology. His research has focused on systems' aspects of planetary exploration, where he contributed to the design, development, test and operation of several robotic space flight systems. He has been an active participant in the development of advanced methods for multidisciplinary design and optimization. Dr. Braun developed the Collaborative Optimization architecture while at Stanford from 1991-1996. This architecture was shown to have significant computational and operational benefits in the optimization of large, distributed design problems. Since completing the initial research in this area, several university and industry groups have applied this technique in solving a diverse set of engineering challenges. From 2000-2001, he led and integrated NASA's advanced engineering environment development program. Dr. Braun received a B.S. in Aerospace Engineering from Penn State in 1987, M.S. in Astronautics from the George Washington University in 1989, and Ph.D. in Aeronautics and Astronautics from Stanford University in 1996. He has received the inaugural AAS Space Technology Award (2014), 2012 Alvin Seiff Memorial Award, the 2011 AIAA von Karman Astronautics Award, 1999 AIAA Lawrence Sperry Award, the NASA Distinguished Service Medal, two NASA Exceptional Achievement Medals, two NASA Inventions and Contributions Team Awards, and nine NASA Group Achievement Awards. He is a member of the National Academy of Engineering, Vice Chair of the NRC Space Studies Board, Editor-In-Chief of the AIAA Journal of Spacecraft and Rockets, an AIAA Fellow, and the author or co-author of over 275 technical publications in the fields of atmospheric flight dynamics, planetary exploration, multidisciplinary design optimization, and systems engineering. He presently serves on Advisory Boards for the Jet Propulsion Laboratory, the Space Systems Sector of the Charles Stark Draper Laboratory and the Planetary Society.

Curtis R. Carlson

Member

CURTIS R. CARLSON, founder and CEO of Practice of Innovation, LLC,, was president and CEO of SRI International from 1998 to 2014 and is a prominent innovator and pioneer in developing innovation best practices. He has helped create more than two dozen new companies, including Siri, which was bought by Apple and is now on the iPhone. The value creation process he developed, "Five Disciplines of Innovation," Innovation for Impact, is used world-wide, including by companies, universities, and government agencies in the United States, Sweden, Finland, Chile, Singapore, Japan, Denmark, Brazil, and Taiwan. A physics graduate of Worcester Polytechnic Institute (WPI) and a Ph.D. graduate in geophysical fluid dynamics from Rutgers University, he worked at RCA, GE, and then the Sarnoff Corporation. While at Sarnoff, Dr. Carlson led teams that developed the U.S. HDTV standard and a system to assess broadcast digital-video image quality, both of which were awarded engineering Emmy awards. He is fellow of the National Academy of Inventors. He received Suffolk University's first Global Leadership in Innovation and Collaboration Award. He was honored with the Medal of Excellence Award by Rutgers University's School of Engineering and the Dr. Robert H. Goddard Award from WPI for his professional achievements. For his role in advancing the performance and image quality of information displays, he received the Society for Information Display's Otto H. Schade Award. He has received four honorary doctor awards, including from the Malaysian Technical University. He was a member of President Obama's National Advisory Council on Innovation and Entrepreneurship, Taiwan's scientific advisory board, and the U.S. Air Force Scientific Advisory Board. Currently, he is a member of the scientific advisory board for the Singapore National Research Foundation, the advisory council for NSF, and a trustee at WPI. With William Wilmot, he wrote the BusinessWeek Top-10 book, Innovation: The Five Disciplines for Creating What Customers Want.

Jim C. Chang

Member

JIM C. I. CHANG is currently adjunct professor in the Department of Electric and Computer Engineering at North Carolina State University, and visiting chair professor at National Cheng Kung University in Taiwan. He received his Ph.D. in theoretical and applied mechanics from Cornell University. He retired as chief scientist of the Army Research Laboratory (ARL). Prior to joining ARO in 1998, Dr. Chang served as director of the Aerospace and Materials Science Directorate of the Air Force Office of Scientific Research, chief scientist of the Naval Air Systems Command, manager of advanced materials, structures and space systems at NASA, and branch head of the structural integrity branch of the Naval Research Laboratory.

Martha N. Cyr

Member

MARTHA N. CYR is the director of K-12 Outreach at Worcester Polytechnic Institute and is a nationally recognized authority on K-12 educational outreach. She joined WPI in 2003 after serving as director of the Center for Engineering Educational Outreach at Tufts University, where she had also taught engineering for nine years. Cyr received a Bachelor of Science degree in mechanical engineering from the University of New Hampshire and a Master of Science and PhD in the field from WPI. She also worked as a thermal engineer for Data General Corporation and held a NASA Graduate Student Researchers Program fellowship for three years working on computational thermal fluids research on the impact of liquid pooling on the energy transfer within a heat pipe in microgravity. At WPI, she oversees one of the nation's largest and most comprehensive university-based K-12 STEM (science, technology, engineering, and mathematics) outreach programs, which includes programs targeted at students in elementary, middle, and secondary schools; programs that seek to engage girls and students from underrepresented minorities in STEM disciplines; and programs that provide training and classroom resources for teachers. Working with researchers at other universities under a \$1 million award from the National Science Foundation National Digital Library Program, Cyr helped develop TeachEngineering, an extensive online resource for K-12 educators who teach engineering. At Tufts, she was also principal investigator on a \$1.5 million NSF award that funded the Tufts Engineering the Next Steps (TENS) Project and a \$1.75 million award from the NSF Teacher Enhancement Program for a pre-college engineering project for teachers.

Mike Gregory

Member

MIKE GREGORY is Head of the Manufacturing and Management Division of the University Engineering Department and of the Institute for Manufacturing (IfM). Following an early career in industry he was the founder member of the team which established the Manufacturing Engineering Tripos, a senior undergraduate programme covering, marketing, design, production, distribution and service with very close industrial engagement. Subsequent developments in research and collaboration with industry reflected this broad view of manufacturing and led to the establishment of the IfM in 1998. Linking science, engineering, management and economics and integrating education, research and practice the IfM now has over 230 staff and research students and a further 100 undergraduate and Masters students. Mike Gregory's work continues to be closely linked with industry and government and he has published in the areas of manufacturing strategy, technology management, international manufacturing and manufacturing policy. External activities have included membership of various government and institutional committees. He served as executive director of the Cambridge MIT Institute from 2005- 2008 and was Springer Visiting Professor at UC Berkeley in 2008/9. He chairs the UK Manufacturing Professors Forum and is a member of the UK Government's Manufacturing Analytical Group on Manufacturing. He is a Fellow of Churchill College Cambridge.

William C. Harris

Member

WILLIAM HARRIS is the president and chief executive officer of Science Foundation Arizona (SFAz). Prior to joining SFAz, Dr. William C. Harris was in Ireland serving as director general of Science Foundation Ireland (SFI), a new Irish agency that helped facilitate tremendous growth in Ireland's R&D sector during Harris' tenure. Immediately prior to going to Ireland, Dr. Harris was vice president of research and professor of chemistry and biochemistry at the University of South Carolina (USC). There, he oversaw research activities throughout the USC system, several interdisciplinary centers and institutes, the USC Research Foundation and sponsored research programs. Dr. Harris served at the U.S. National Science Foundation (NSF) from 1978 to 1996, including as the director for mathematical and physical sciences (1991-1996). He was responsible for federal grants appropriation of \$750 million. He also established 25 Science and Technology Centers to support investigative, interdisciplinary research by multi-university consortia. Earlier in his career, he catalyzed the Research Experience for Undergraduates program in the chemistry division and it became an NSF-wide activity. In 2005, Dr. Harris was elected a member of the Irish Royal Academy, and received the Wiley Lifetime Achievement Award from California Polytechnic State University. He has authored more than 50 research papers and review articles in spectroscopy and is a fellow of the American Association for the Advancement of Science. Dr. Harris earned his undergraduate degree at the College of William and Mary, and received his Ph.D. in chemistry from the University of South Carolina.

Philip M. Neches

Member

PHILIP M. NECHES [NAE] is the founder of Teradata Corporation. Dr. Neches served as the Chief Technology Officer at idealab! in 1999. Dr. Neches served as a vice president and chief technology officer at Multimedia Products and Services Group, AT&T Corporation from 1994 to 1996, senior vice president and chief scientist at NCR Corporation from 1989 to 1994 and led both the repositioning of their computer product family and the product plan for a merger at AT&T. He founded Teradata Corporation in July 1979, where he served as vice president and chief scientist from 1979 to 1988. Dr. Neches began his career as a manager of Systems Evaluation Group at Transaction Technology Inc., where he led analysis of consumer banking networks, including the first large-scale deployment of automated teller machines in the United States. He has been an independent consultant and advisor at a number of public and private information technology companies since September 1996. He serves as chairman and member of the Advisory Board at Foundation Ventures, LLC. He serves as a member of the Advisory Board at Evolution Venture Partners LLC. He serves as Member of the Advisory Board of Tizor Systems, Inc. He has been a Director of International Meta Systems, Inc. since November 1996. He has been a Member of Board of Advisors at Simulmedia, Inc. since November 4, 2013. Dr. Neches serves on the Board of Directors of PeopleLink, Inc. He also serves on the Advisory Board of EarthLink, TACODA LLC, Luxtera, Inc., and the Technology Group of Merrill Lynch. Dr. Neches serves on Caltech's Board of Trustees and sits on its Audit, Investment, Business and Finance, Development, JPL, and Executive Committees, and chairs the Technology Transfer Committee. He served as a director of Expand Beyond Corporation and Vendquest Inc. He served as director of Evolving Systems Inc. from August 19, 2005 to January 3, 2011. He served as a director of International Rectifier Corporation from October 2006 to November 7, 2007. He served as a director of DemoGraFx and MediaMap. He is one of America's leading technologists and has more than 30 years of leadership in the field. Dr. Neches received his formal training at the California Institute of Technology, where he completed his B.S. degree with Honors in 1973, M.S. in Engineering Science in 1977, and Ph.D. in computer science in 1983.

Monica Olvera de la Cruz

Member

MONICA OLVERA DE LA CRUZ [NAS] is the Lawyer Taylor Professor of Materials Science and Engineering; Professor of Chemistry; Professor of Chemical and Biological Engineering; Professor of Physics and Astronomy; director of the Center for Computation and Theory of Soft Materials; and co-director of the Center for Bio-Inspired Energy Science. Monica Olvera de la Cruz obtained her B.A. in physics from the UNAM, Mexico, in 1981, and her Ph.D. in physics from Cambridge University, UK, in 1985. She was a guest scientist (1985-86) in the National Institute of Standards and Technology, Gaithersburg, MD. She joined Northwestern University in 1986, where she is the Lawyer Taylor Professor of Materials Science & Engineering, Professor of Chemistry, and of Chemical & Biological Engineering. She is the director of the Center for Computation and Theory of Soft Materials and co-director of the Center for Bio-Inspired Energy Science. From 2006-2013 she directed the Materials Research Center at Northwestern. From 1995-97 she was a staff scientist in the Commissariat à l'Énergie Atomique, Saclay, France, where she also held visiting scientist positions in 1993 and in 2003. She has developed theoretical models to determine the thermodynamics, statistics and dynamics of macromolecules in complex environments including multicomponent solutions of heterogeneous synthetic and biological molecules, and molecular electrolytes.

Darryll J. Pines

Member

DARRYLL J. PINES is Dean and Nariman Farvardin Professor of Aerospace Engineering at the Clark School since January 2009. He first arrived at the Clark School in 1995 as an assistant professor and then served as Chair of the Department of Aerospace Engineering from 2006 to 2009. During a leave of absence from the University (2003-2006), Pines served as Program Manager for the Tactical Technology Office and Defense Sciences Office of DARPA (Defense Advanced Research Projects Agency). While at DARPA, Pines initiated five new programs primarily related to the development of aerospace technologies, for which he received a Distinguished Service Medal. He also held positions at the Lawrence Livermore National Laboratory (LLNL), Chevron Corporation, and Space Tethers Inc. At LLNL, Pines worked on the Clementine Spacecraft program, which discovered water near the south pole of the moon. A replica of the spacecraft now sits in the National Air and Space Museum. Pines received a B.S. in mechanical engineering from the University of California, Berkeley. He earned M.S. and Ph.D. degrees in mechanical engineering from the Massachusetts Institute of Technology.

Richard F. Rashid

Member

RICHARD F. RASHID [NAE] is chief research officer at Microsoft Research, which he founded in 1991, and between 1991 and 2013, he oversaw the worldwide operations for Microsoft Research, an organization that grew to encompass more than 850 researchers across nearly a dozen labs worldwide. His teams collaborated with the world's foremost researchers in academia, industry and government on initiatives to expand the state of the art across the breadth of computing and to help ensure the future of Microsoft's products. During his time at Microsoft, Dr. Rashid has held the positions of director, vice president, senior vice president and chief research officer. He is currently chief technology officer of Microsoft's Applications and Services Division. Rashid was presented with the Institute of Electrical and Electronics Engineers Emanuel R. Piore Award in 2008 and inducted into the National Academy of Engineering in 2003. He was also inducted into the American Academy of Arts & Sciences and received the SIGOPS Hall of Fame Award in 2008. In 2009, Rashid was given the Microsoft Technical Recognition Award for exceptional career achievements. Dr. Rashid was inducted into the Royal Academy of Engineering in 2014. He is a past member of the National Science Foundation Computer Directorate Advisory Committee, the Defense Advanced Research Projects Agency UNIX Steering Committee and the Computer Science Network Executive Committee. He is a Trustee for the Anita Borg Institute for Women and Technology, as well as a former chairman of the Association for Computing Machinery Software System Awards Committee. Rashid received master of science (1977) and doctoral (1980) degrees in computer science from the University of Rochester. He graduated with honors in mathematics and comparative literature from Stanford University in 1974.

Yannis C. Yortsos

Member

YANNIS YORTSOS [NAE] has served as Dean of the USC Viterbi School of Engineering since June 2005. He is the Chester F. Dolley Professor of Chemical and Petroleum Engineering, and holds the Zohrab A. Kaprielian Dean's Chair in Engineering. Yortsos is well known for his work on fluid flow, transport and reaction processes in porous and fractured media with applications to the recovery of subsurface fluids and soil remediation. He has been actively involved in the peer review of the Yucca Mountain Project for the disposal of high-level radioactive waste. The recipient of many honors for research, teaching and service, Dean Yortsos is a member of the U.S. National Academy of Engineering and serves as the liaison of Section 11 to the National Research Council. Yortsos received his B.Sc. from the National Technical University, Athens, Greece, and his M.Sc. and Ph.D. from the California Institute of Technology, all in chemical engineering. An invited scholar at several institutions in the United States and abroad, he joined the faculty of USC in 1978. Yortsos is an associate member of the Academy of Athens, and is the recipient of the Ellis Island Medal of Honor. He currently serves on the Executive Committee of the Engineering Deans Council as well as the Executive Committee of the Global Engineering Deans Council.

Gregory Eyring

Staff Officer