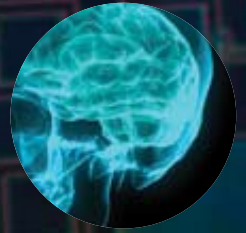


2008
Annual Report

NATIONAL ACADEMY OF ENGINEERING



ENGINEERING THE FUTURE

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Letter from the President


Engineering is critical to meeting the fundamental challenges facing the U.S. economy in the 21st century. To grasp the great opportunities of our times and to meet those challenges—from economic competition to energy, from health care to education, from security to infrastructure—federal policy and action must be informed and enabled by a vibrant science and engineering enterprise. The U.S. national comparative advantage is a strong science and technology base coupled with a free market economy and a diverse, democratic society, which has allowed our economy to lead the world in the face of global competition. But we know we have yet to feel the full force of competition from rising developing countries. Jobs will follow innovation wherever in the world it is found, and innovation will follow basic research wherever it is conducted. To maintain our competitive advantage, we must invest in R&D, adopt public policies that support innovation, and educate our children for the productive, technology-based, well-paid jobs that will grow our knowledge economy.

In 2006, NAE formed a committee to identify some key grand challenges for engineering for the 21st century, challenges of great importance that warrant serious R&D investment and that the committee believed could be met in the next few decades—if we set our minds and resources to doing so—and that would lead to a marked improvement in our quality of life. The committee established an interactive website that enabled the public at large to join in the project by suggesting and then prioritizing challenges. In February 2008, the committee announced 14 Engineering Grand Challenges fitting into four broad categories: energy, sustainability, and global climate change; medicine, health informatics and health care delivery systems; reducing our vulnerability to natural and human threats; and advancing the human spirit and capabilities. The project has created a stir in the blogosphere and has been reaching and engaging young people. Several engineering schools and departments have mounted project courses based on the Grand Challenges for Engineering.

In anticipation of the U.S. presidential election, NAE, along with the National Academy of Sciences and the Institute of Medicine, issued a report in September 2008, *Science and Technology for America's Progress: Ensuring the Best Presidential Appointments in the New Administration*, urging the new administration to use the best available scientists, engineers, and doctors to help manage issues such as climate change, alternative energy, and veterans' health. The report, sent to both presidential candidates, explains the importance of filling 80 key science and technology positions soon after the election. It also urges members of the scientific, engineering, and medical communities to serve in these positions if asked and suggests how the administration can make it attractive for well-qualified people to do so. The report recommends that immediately after the election, the president-elect's highest S&T priority should be to select an adviser on science and technology who will help identify and recruit the best candidates for key appointments, participate in budget decisions, and provide guidance in the event of a crisis. In December 2008, U.S. President-elect Barack Obama asked six National Academies members to serve in his administration, including NAE member John P. Holdren as Assistant to the President for Science and Technology and Director



Charles M. Vest



of the Office of Science and Technology Policy. He also selected Grand Challenges committee member Jane Lubchenco to be administrator of the National Oceanic and Atmospheric Administration.

In June 2008, NAE published *Changing the Conversation: Messages for Improving Public Understanding of Engineering*, which recommends that the engineering community begin using more effective messages in a coordinated communications strategy. This project, sponsored by the National Science Foundation with additional support from the Georgia Institute of Technology, used market research techniques to test messages for their effectiveness. The results showed that positioning engineering as an enterprise that makes a difference in the world is much more likely to encourage young people to consider engineering careers than emphasizing the challenges of the math and science skills they will need. Attracting capable students to engineering education and engineering careers is essential to the continued vitality of our economy. The messages that tested best for improving public understanding of engineering are: *engineers make a world of difference; engineers are creative problem solvers; engineers help shape the future; and engineering is essential to our health, happiness, and safety.* The report recommends strategies and tools for more effective outreach by the engineering community.

NAE continues to engage in activities that support NAE's mission of building and enhancing relationships with engineering communities worldwide and providing a global perspective to relevant NAE and NRC studies. In 2008, we continued our bilateral Frontiers of Engineering (FOE) programs with Germany, Japan, and India. In addition, thanks to a generous grant in 2008 from The Grainger Foundation, NAE initiated a bilateral FOE program with China. The first meeting will be held October 19–21, 2009, at Hunan University in Changsha, China.

The pages that follow provide more detail on the broad scope and depth of NAE work performed in 2008. These activities have been conceived and executed to pursue our goal of providing objective, independent advice to the federal government and the engineering community and to proactively “promoting the technological welfare of the nation.” This annual report also lists our members and friends whose generous contributions help NAE continue to make meaningful contributions to the well-being of the nation. We are deeply grateful for their support.

It is no secret that we live in challenging times. The collapse of the equity markets, the frightful decline in the viability of the banking sector, and the attendant decline of the U.S. and global economies pose problems for all of us as technology leaders and as individual citizens. This is clearly a moment in history when there is a great urgency to make the case early and often that science and engineering are vital to the long-term health of the nation. NAE is making every effort to engage our members in activities that speak to the importance of engineering and promote the nation's technological welfare. Beyond that, I urge you, as individual citizens, to play an active a role in the nation's ongoing debates on science and technology public policy issues. Thank you.



Charles M. Vest
President

In Service to the Nation

Every day we face questions related to engineering and technology that are important to our nation. How can we keep our nation safe from terrorism? How can we increase diversity in the engineering workforce? What role should citizens play in decisions about technology development? How can we help journalists and others in the media provide accurate, timely information on engineering and technology? As we advance technologically and become more involved in the global community, answering these questions becomes increasingly difficult.

Since 1964, the National Academy of Engineering (NAE) has provided independent, objective advice to the nation on engineering-related topics and policies. NAE operates under the same congressional act of incorporation that established the National Academy of Sciences, signed in 1863 by President Abraham Lincoln, to respond “whenever called upon by any department or agency of the government, to investigate, examine, experiment, and report upon any subject of science or art.”

NAE has more than 2,300 peer-elected members and foreign associates, approximately 48 percent from academia, 44 percent from industry, and 8 percent from nonprofit institutions and government. NAE members are leaders in bioengineering, computer science, electronics, aerospace, earth resources, civil engineering, mechanical engineering, chemical engineering, industrial engineering, materials engineering, and interdisciplinary engineering. They serve as members of research and study committees, plan and conduct symposia and workshops, and assist in the work of the organization in many other ways. Activities include collaborative projects at home and abroad to identify and solve technological problems, assessments of the technological needs of the nation and sponsorship of programs to meet those needs, advising Congress and government agencies on engineering-related matters of national importance, and recognizing and honoring outstanding engineers for their contributions to the well-being of the nation and the world.

NAE not only responds to requests from government at the federal level, but also sponsors activities with foundations, industry, and state and local governments and funds projects through endowment funds supported by private contributions. Thus NAE is a unique organization that brings together distinguished engineers for the purpose of improving the lives of people everywhere.

NAE is a member of the National Academies, which also includes the National Academy of Sciences, Institute of Medicine, and National Research Council.

Mission Statement

To promote the technological welfare of the nation by marshalling the expertise and insights of eminent members of the engineering profession.

PROGRAM REPORTS

Engineering Education

Members of the Committee on Engineering Education (CEE), a standing committee of the NAE Office of the President, are thought leaders and experts from the business, academic, and public sectors who have demonstrated a commitment to advancing engineering education. The mission of CEE is to ensure quality, diversity, and quantity in engineering education by providing guidance and advice to policy makers, administrators, employers, and other stakeholders in the engineering education enterprise.

In 2008, an ad hoc study committee, under the joint auspices of CEE and the NAE Center for the Advancement of Scholarship on Engineering Education, completed a consensus study, “Developing Metrics for Assessing Engineering Instruction: What Gets Measured Is What Gets Improved.” Drawing on a fact-finding workshop, commissioned papers, and new research, the study committee, chaired by NAE member Judson King, director, Center for Studies in Higher Education, University of California, Berkeley, the report examines metrics that are currently used and metrics that could be implemented to measure, and help improve, the quality of teaching in engineering. The final report, which includes findings and conclusions that will benefit engineering educators and administrators, engineering professional societies, and other stakeholders in the nation’s engineering education enterprise, will be available as a PDF in the spring of 2009.

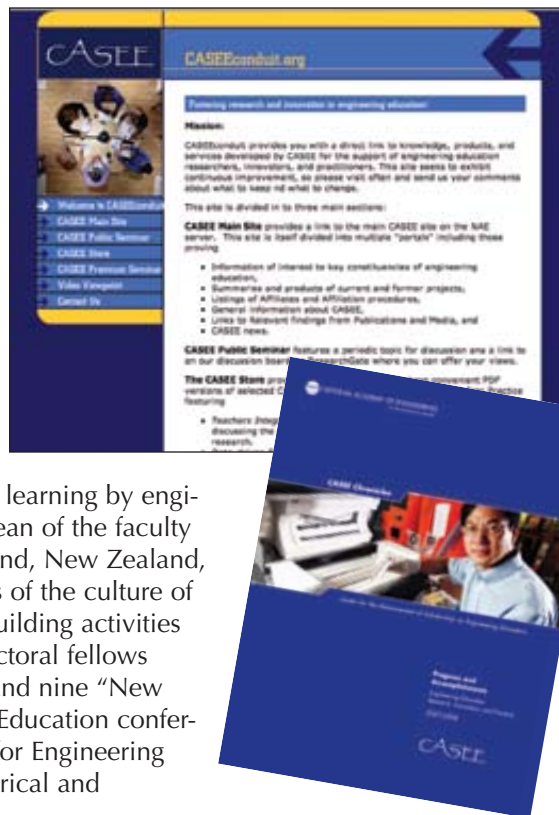
Also in 2008, an ad hoc CEE committee chaired by NAE member Eli Fromm, Roy A. Brothers University Professor and professor of electrical and computer engineering, Drexel University, finalized preparations for a spring 2009 workshop to identify ways in which the engineering curriculum might be made more relevant to engineering students in preparing them for the practice of engineering. Many programs currently design courses focused on technical content and the underlying science and mathematics that support it. However, as was pointed out in the Engineer of 2020 reports, the changing nature of engineering practice and the ways students access and use information may necessitate changes in the traditional undergraduate curriculum. The purpose of the workshop is to identify and highlight curricular revisions to meet these new requirements without sacrificing technical content.

Center for the Advancement of Scholarship on Engineering Education

The Center for the Advancement of Scholarship on Engineering Education (CASEE) collaborates with a variety of institutions and organizations to leverage opportunities for improving engineering education. CASEE’s activities fall into three categories: (1) building capacity for research and innovation in engineering education; (2) facilitating

research and developing tools; and (3) disseminating knowledge.

As part of CASEE's efforts to clarify the theoretical and practical underpinnings of engineering education, CASEE hosted two scholars in residence in 2008. Dr. Debasish Dutta, now dean of the graduate school and professor of mechanical engineering at the University of Illinois, Urbana-Champaign, provides support for an NAE committee hosting a workshop to clarify opportunities to support lifelong learning by engineers. Dr. Elizabeth Godfrey, associate dean of the faculty of engineering at the University of Auckland, New Zealand, conducted research on theoretical models of the culture of engineering education. Other capacity-building activities included providing support for six postdoctoral fellows based at institutions of higher education and nine "New Faculty Fellows" of the 2008 Frontiers in Education conference co-hosted by the American Society for Engineering Education (ASEE) and the Institute of Electrical and Electronics Engineers (IEEE).



In the second category, the major activities were the ongoing development of two companion tools, the Engineering National Survey of Student Engagement (E-NSSE) and the Engineering Faculty Survey of Student Engagement. Both of these build upon tools developed by the University of Indiana to assess the level of student and faculty engagement in high-quality educational practices and student learning outcomes aligned with engineering accreditation criteria.

CASEE supported a variety of dissemination activities in 2008. (1) We continued to work with the American Society of Mechanical Engineers (ASME) and IEEE to increase the number of women attaining baccalaureate degrees in engineering via the Engineering Equity Extension Service (EEES). EEES uses an extension agent model to provide practical guidance to K–12 teachers and university faculty on using research-based knowledge to improve instruction, curriculum development, and "awareness building" (see page 10). (2) In June 2008, CASEE hosted a luncheon at the annual meeting of ASEE to gather information on current and desired innovations in engineering education. (3) CASEE co-sponsored the Research in Engineering Education Symposium in Davos, Switzerland, in July 2008. (4) In October, CASEE hosted the opening reception of the 2008 Frontiers in Education Conference which is co-sponsored by IEEE and ASEE. (5) In October and November 2008, CASEE held the fifth Dane and Mary Louise Miller Symposium as an entirely asynchronous on-line event showcasing innovative research and development in engineering education. (6) The fifth volume of *CASEE Chronicles*, a community update on progress by CASEE's individual and organizational affiliates, was released in November 2008. (7) A new website, <CASEEconduit.org>, was launched to provide access to multimedia content and to demonstrate progress toward the self-sustainability of CASEE operations. The new site offers informational briefs and other items for sale.

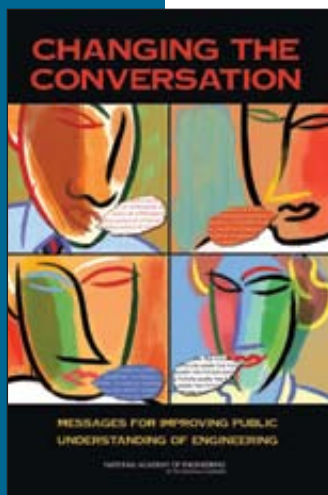
Technological Literacy

The purpose of the Program on Technological Literacy is to identify ways Americans can become better prepared to navigate our technology-dependent society. What do adults and children need to know about technology? What role should citizens play in deciding which technologies are developed and for what purposes? What changes in formal and informal education and in the policy arena are necessary to prepare citizens to be knowledgeable participants in making these decisions?

The technological literacy program, now in its tenth year, has contributed to the development of standards for the study of technology in elementary and secondary schools; carried out a variety of outreach projects for educators, policy makers, and the general public; sponsored a number of informational workshops; and overseen two consensus studies.

NAE partnered with the NRC Board on Science Education to launch a two-year consensus study of the teaching of engineering to K–12 students in the United States. The project committee, chaired by NAE member Linda Katehi, University of Illinois Urbana-Champaign, undertook a variety of meetings and other activities in the past two years and commissioned an analysis of about two dozen K–12 engineering curricula. The study is supported by a gift from NAE member Stephen D. Bechtel, Jr.; additional support is provided by Parametric Technologies Corporation, a software firm in Boston. A project report will be published in late spring 2009.

NAE received a grant from the National Science Foundation (NSF) to conduct a study of the feasibility of developing content standards for K–12 engineering education. National standards have been adopted for science, mathematics, and technology education, among many other subjects, but not for engineering. The committee for this project, chaired by NAE member Robert M. White, Carnegie Mellon University (Emeritus), will consider the pros and cons of developing standards, including the implications for STEM education policy and practices. In addition to NSF, the S. D. Bechtel, Jr. Foundation contributed funds for the project.



Public Understanding of Engineering

Developing Effective Messages

In 2007, the Committee on Public Understanding of Engineering Messages completed the research phase of a project to develop effective ways of communicating with the public about engineering. Based on focus groups and online surveys, the committee met with focus groups and used online surveys to test and refine a small number of messages. The results showed clearly that messages should focus on *creative ideas and the beneficial impacts of engineering*, rather than on *required skills or the personal benefits of an engineering career*. The 10-person committee, chaired by NAE member Don P. Giddens, Georgia Institute of Technology, released its final report *Changing the Conversation: Messages for Improving Public Understanding of Engineering* in June 2008. The messaging study was funded by the National Science Foundation.

Media Relations

In 2008, the NAE media relations office continued to work with news outlets around the world—responding to inquiries from journalists, pitching stories about NAE activities, and suggesting general engineering-related story ideas. Our work directly resulted in coverage about NAE members and/or NAE projects in outlets ranging from public radio to *The New York Times* to *The Wall Street Journal* to the *Chronicle of Higher Education* and elsewhere.

In the past year, NAE continued to work with the Radio and Television News Directors' Foundation and the U.S. Department of Homeland Security on the nationwide workshop series, "News and Terrorism: Communicating in a Crisis." In 2008, workshops on biological attacks (Charlotte, North Carolina), on chemical attacks (Tampa, Florida), and on a nuclear bomb attack (San Diego, California), were attended by journalists, public officials, technical experts, and private-sector representatives. Each event featured a "tabletop" exercise, custom-designed for each city and topic, moderated by a former network TV news correspondent.

The purpose of the workshops is to identify gaps in effective communication and response during terrorism events that involve complex technical issues and to explore ways to close those gaps. The exercises bring to the surface many difficult issues, such as the best way to deliver potentially alarming information to the public and the balance between speed and accuracy in reporting. The workshops also bring together professionals in different fields who don't often have personal contact and encourage the development of relationships that could be crucial in a time of crisis. Post-workshop survey results show that a large majority of participants find the workshops useful and plan to use the results of their workshop experience to bolster the emergency preparedness of their organizations. More workshops are planned for 2009.

Public Relations

NAE continued to make its presence felt on WTOP, the most listened-to radio station in the Washington, D.C. region, and on Federal News Radio. Forty-second "Engineering Innovation" segments, which are broadcast weekly, feature interesting ideas or advancements from across the spectrum of engineering disciplines. An NAE website on the series <www.nae.edu/radio> is updated every week with scripts, audio files, and links to related information. Podcasts of the radio spots are also available to millions of subscribers on iTunes.

The media relations office continues to distribute a biweekly e-newsletter called "Spotlight on Engineering" that reaches more than 10,000 subscribers. The newsletter features information on engineering and technology-policy items emanating from the National Academies, events and items of interest, and engineering news items from around the world, with links for further reading and information about each entry.

Grand Challenges for Engineering

The NAE's Grand Challenges for Engineering—findings of an international panel of some of today's leading technological thinkers—were unveiled simultaneously at a news conference and on the project website in February. The website <www.engineeringchallenges.org> includes easy-to-read descriptions of the 14 challenges, along with videos and pictures, and is open to input from the public. Worldwide news coverage of the unveiling ranged from *New York Times* blogs to MSNBC.com to the *Financial*

Times to CNN. In October, the NAE Annual Meeting technical session, “Grand Challenges for Engineering: Moving to Action,” featured talks on practical ways of drawing public and political attention on the challenges. The opening speaker, NAE President Charles M. Vest, was followed by Grand Challenges for Engineering committee chair and former U.S. Secretary of Defense William J. Perry, who summarized the findings. A discussion moderated by former ABC News and CNN anchor Aaron Brown followed. Panelists included committee member and NAE member Ray Kurzweil, committee member and columnist for *US News & World Report*, Bernadine Healy, Pulitzer-prize-winning *New York Times* columnist and author Thomas Friedman, CBS News correspondent Daniel Sieberg, committee member and NAE foreign associate Alec Broers, NAE member Paul Kaminski representing the Obama campaign, and former Hewlett-Packard CEO Carly Fiorina representing the McCain campaign.



Center for Engineering, Ethics, and Society

In 2008, the first year of activity for the NAE Center for Engineering, Ethics, and Society (CEES), CEES sponsored a tribute to NAE member Harry E. Bovay Jr. at the February 2008 meeting of the Association for Practical and Professional Ethics (APPE). A gift from Mr. Bovay enabled the founding of CEES and continues to provide core support for CEES activities. During the tribute, the CEES director and Bovay Professors at Cornell and Texas A&M universities described their programs and suggested future directions for engineering ethics activities. Mr. Bovay, who attended the meeting, addressed the audience about the importance of ethics in building bridges for human well-being.

During 2008, CEES also sponsored two workshops. “Ethics Education and Scientific and Engineering Research: What’s Been Learned? What Should Be Done” was held at the Keck Building on August 25 and 26. Twenty-five invited speakers and discussants attended the ethics education workshop, along with a number of NSF observers. “Engineering, Social Justice, and Sustainable Community Development,” the first public workshop in the planned biennial series on “Engineering Ethics and Engineering Leadership,” was held at the NAS Constitution Avenue Building on October 2 and 3, co-sponsored by APPE. This public workshop attracted an audience of about 80 people and precipitated lively discussions. Both workshops were supported by the National Science Foundation, and materials from both are posted on the CEES website at www.nae.edu/ethicscenter. Summaries will be published, and follow-up activities will include presentations at professional meetings, articles in journals, and future CEES programs.

CEES sponsors the Online Ethics Center (OEC) at www.onlineethics.org, a highly ranked web-based resource for academic and practicing engineers and others working

to improve engineering ethics and engineering ethics education. The list of current OEC advisory group members is available on the website.

The next meeting of the eight-member CEES advisory group is scheduled for March 18 and 19, 2009. The agenda will include a review of the first year, priorities for the next several years, and planning for the next workshop in 2010. A top priority will be the development of programs on ethical issues associated with emerging technologies and collective professional responsibilities.

Diversity in the Engineering Workforce

The Diversity in the Engineering Workforce Program was established to promote a U.S. engineering workforce that includes well educated, talented individuals from diverse backgrounds. To fulfill this mission, NAE brings together experts and stakeholders to share information, identify needs, and initiate action.

Engineer Girl! Website

The *Engineer Girl!* website <www.engineergirl.org>, a significant component of NAE's web presence, is a resource for middle-school girls interested in learning about engineering. With more than 1,600 visitors per day, this popular website is the number one listing on Google for "girls and engineering." The website is designed to be a general reference for young women considering careers in engineering, a field in which they have been, and continue to be, under-represented. *Engineer Girl!* provides career guidance for students and parents, links to other pertinent sites, games,

and interesting facts about engineering and the history of women in engineering. In spring 2008, portions of the *Engineer Girl!* website were translated into Spanish to meet the needs of the Latino community. The most popular feature on the site is "Ask an Engineer," where students can e-mail questions that are answered by practicing women engineers. Almost 200 profiles of women engineers, all of whom have agreed to answer questions from students, are now posted on the website. Most questions are about engineering career paths and undergraduate engineering programs. The theme of the *Engineer Girl!* 2008 annual essay competition was "Engineering Energy for the Future." More than 160 submissions were received. The winning essays are posted on the website.

Engineer Your Life Project

The Engineer Your Life Project is a national initiative to encourage college-bound high-school girls to consider pursuing undergraduate degrees in engineering. In addition to NAE, project participants include the American Association of Engineering Societies, American Society of Civil Engineers, the WGBH Foundation, and several



other engineering associations. In 2008, Engineer Your Life won a Parent's Choice Award. NAE hosts and maintains the project's website, <www.engineeryourlife.org>, which was developed to provide resources for students, teachers, guidance counselors, and engineers about careers in engineering. The site features profiles of young women engineers and highlights the importance of engineering and technology in solving the difficult challenges facing our planet. Information about the website is available at booths at college fairs held across the country and postcards mailed to students who score higher than 55 on the PSAT.



Engineering Equity Extension Service

The purpose of the Engineering Equity Extension Service is to increase the enrollment, retention, and graduation of women as baccalaureate-level engineers. NAE, Institute of Electrical and Electronics Engineers, Inc. (IEEE), American Society of Mechanical Engineers (ASME), and Project Lead the Way (PLTW) are working together to provide training for members of these collaborating organizations in targeted areas. ASME's focus is on how mechanical engineering faculty can retain students in their programs; in 2008, ASME made site visits to mechanical engineering departments. IEEE is working with members who visit pre-college classrooms to improve outreach to students from all backgrounds; in 2008, IEEE held a series of training workshops on effective outreach. PLTW provides training to master teachers who then work with PLTW teachers in their communities on teaching strategies that encourage students from diverse backgrounds to consider taking pre-college engineering courses. Training by all of these groups is designed to engage traditional players in the engineering community and work within existing structures to move toward gender equity in current programs. The training methods and results are disseminated through the NAE website, a variety of web-based resources, and workshops.

The Engineering Equity Extension Service is unusual in that it brings expertise in both gender studies and research on science and engineering education to bear on the academic preparation of students from middle school through the sophomore year of college. The project includes assessments of the impact of in-class social environments and instructional styles on the attrition rate of female students and the importance of the out-of-class environment for recruiting and retaining young women in engineering programs. The NAE Center for the Advancement of Scholarship on Engineering Education (CASEE) is leading NAE's effort on this project.

Frontiers of Engineering

Frontiers of Engineering (FOE) is a symposium series that brings together emerging engineering leaders from industry, academe, and government laboratories to discuss pioneering technical work and leading-edge research in various fields of engineering and

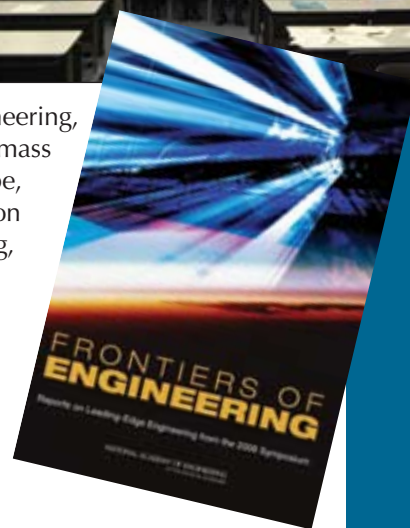
industrial sectors. The goals of the symposia are: (1) to introduce outstanding young engineers (ages 30–45) to each other and promote the establishment of contacts among the next generation of engineering leaders and (2) to facilitate collaboration and the transfer of techniques and approaches across engineering fields to sustain and build U.S. innovative capacity.

The annual U.S. Frontiers of Engineering (U.S. FOE) Symposium brings together approximately 100 engineers from across the country. FOE also has four bilateral programs: (1) German-American Frontiers of Engineering (GAFOE), in partnership with the Alexander von Humboldt Foundation; (2) Japan-America Frontiers of Engineering (JAFOE), in partnership with the Japan Science and Technology Agency and the Engineering Academy of Japan; (3) Indo-American Frontiers of Engineering (IAFOE), in partnership with the Indo-U.S. Science and Technology Forum; and (4) China-America Frontiers of Engineering (CAFOE) in partnership with the Chinese Academy of Engineering. Each bilateral symposium is attended by approximately 30 engineers from the partner country and 30 from the United States.

Four symposia were held in 2008. In February, the IAFOE Symposium was held at the Beckman Center in Irvine, California. The topics were infrastructure engineering, clean energy for base-load power, bioengineering and health care, and chemicals and automotive manufacturing. In April, the GAFOE Symposium also was held at the Beckman Center. The topics were nanotechnology for medical therapies, micromanufacturing/microprocess engineering, energy harvesting, and advanced imaging technologies. The U.S. FOE Symposium, in September, was hosted by Sandia National Laboratories at the University of New Mexico in Albuquerque. The topics were drug delivery systems, emerging nanoelectronic devices, cognitive engineering, and understanding and countering the proliferation of weapons of mass destruction. The JAFOE Symposium was held in November in Kobe, Japan. The topics were advances in automation and instrumentation for biotechnology and health care, the future of sequence modeling, alternative energy, and advanced sensor technology.

Thanks to a generous grant received in 2008 from The Grainger Foundation, NAE has added a bilateral FOE program with China; the first meeting will be held in October 2009. The FOE program is also working on a bilateral program with the European Union to begin in 2010.

FOE encourages continuing interaction among participants in FOE symposia through ongoing outreach activities. Yearly proceedings, such as *Frontiers of Engineering: Reports on Leading-Edge Engineering from the 2007 NAE Symposium on Frontiers of Engineering*, which was published in February 2008, are mailed to past U.S. FOE participants. Other outreach activities include U.S. and bilateral FOE alumni newsletters that encourage alumni to keep in touch and share information about their work and current status and an FOE website that includes a searchable database, a directory of all FOE alumni, and access to the presentations from the U.S. FOE meeting.



In addition, the Alexander von Humboldt Foundation and the Indo-U.S. Science and Technology Forum provide support for ongoing collaborations among participants in the GAFOE and IAFOE symposia, respectively.

Armstrong Endowment for Young Engineers-Gilbreth Lectures

The Armstrong Endowment for Young Engineers–Gilbreth Lectures, a related but independent program, selects outstanding engineers from among FOE speakers to give presentations at the NAE Annual Meeting in Washington, D.C., and the NAE National Meeting in Irvine, California.

In 2008, four speakers delivered Gilbreth lectures at the National Meeting. Dr. Lloyd Watts, founder and CEO of Audience, Inc., spoke on “Commercializing Auditory Neuroscience.” Dr. Rebecca Wright, associate professor of computer science at Rutgers University, spoke on “Privacy in a Networked World.” Dr. Jeff Bilmes, associate professor of electrical engineering at the University of Washington, spoke on “The Vocal Joystick.” Dr. Hans Koenigsmann, vice president and chief engineer of avionics, guidance, and control at Space Exploration Technologies, spoke on “Commercial Space—Against the Odds?”

Two speakers delivered Gilbreth lectures at the Annual Meeting. Dr. Mohan Manoharan (pictured with Dr. Vest), head of research at GE-Bangalore, spoke on “Nanotechnology and Industrial Research.” Dr. Cynthia Breazeal, associate professor media arts and sciences at the Massachusetts Institute of Technology, spoke on “Designing Socially Intelligent Robots.”

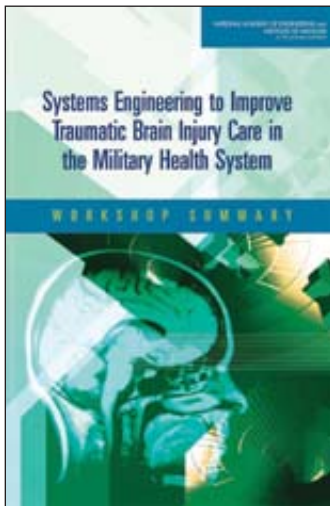


Engineering and Health Care

Building a Better Delivery System, a 2005 National Academy of Engineering (NAE)/Institute of Medicine (IOM) study, provided a thorough examination of opportunities for using systems engineering and information technology to redesign health care-delivery processes and systems to improve the quality and efficiency of health care.

In 2008, NAE completed two follow-on collaborative activities with IOM. The first, jointly administered by the NAE Program Office and the IOM Board on Veterans and Military Health and funded by the U.S. Department of Defense, identified near and longer term opportunities for using operational systems engineering (OSE) tools and methods to improve the care of patients with traumatic brain injury (TBI) in the Military Health System (MHS). One of the most prevalent and difficult injuries suffered by military personnel in Iraq and Afghanistan, TBI is an extremely complex medical problem. With a wide range of severity levels and presenting symptoms, TBI patients require coordinated, often prolonged care by people in many different settings, specialties, and organizations.

A 14-member committee of engineering and health care experts was co-chaired by NAE member Norman Augustine (retired CEO, Lockheed Martin Corporation) and



IOM member Jerome Grossman (JFK School of Government, Harvard University). Following Dr. Grossman's sudden death in April 2008, he was succeeded by Denis Cortese (chief executive officer of Mayo Clinic). The committee organized a two-day workshop that brought together 50 experts in OSE, biomedical engineering, TBI care, and military health care.

The goal of the workshop, the first in a series, was to identify promising areas for near-, medium-, and long-term applications of OSE tools and information technologies for modeling, analyzing, designing, and improving the care and management of TBI patients at the tactical and strategic levels, as they move from battlefield to field hospital to U.S.-based military health care facilities to TRICARE networks (defense/civilian health care interfaces) and U.S. Department of Veterans

Affairs facilities. In response to a number of issues raised by military health care professionals before the meeting, the workshop participants were divided into five groups (the detection and screening of TBI conditions; the development of new TBI knowledge; communication and coordination of TBI care; measuring and forecasting the demand for TBI care; and the capacity, organization, and resource allocations for TBI care) and asked to suggest how these issues might be addressed using OSE techniques.

The workshop summary synthesizes the results of the workshop. The introduction (Chapter 1) reviews the potential of OSE for improving the quality of health care and places the challenge of TBI care in the broad context of quality and cost challenges to MHS health care. Chapters 2 through 5 are individually authored summaries of the workshop presentations and discussions on the medical aspects of TBI, examples of applications of OSE tools and methods relevant to TBI care, and a case study of a change in an academic health system from expert-based medical practice to expert-managed system-supported practice. Chapter 6 presents suggestions for 10 illustrative "analysis plans," that is, designs for potential OSE studies, analyses, and applications developed by the working groups to illustrate potential applications of OSE tools and methods to specific TBI care challenges. The workshop summary was released as an on-line prepublication in November 2008 and will be published in March 2009.

The second follow-on project was led by the IOM Roundtable on Evidence-Based Medicine. A planning committee chaired by NAE member William Rouse (Georgia Institute of Technology) designed a two-day workshop, "Engineering a Learning Health Care System," that was held on April 28–29, 2008. The purpose of the workshop was to bring together leading engineers, health professionals, and scholars to explore the challenge of building a "learning" health care system, that is, a system in which learning and improving are incorporated into the fabric of health care processes. Participants explored options for capitalizing on the knowledge and skills of engineers to improve the efficiency and quality of health care operations and to identify areas of engineering (e.g. systems engineering, information technology, standards development, and operations research) that can inform the development of decision support, feedback mechanisms, and infrastructure for such a system. A summary of the workshop will be published in the fall of 2009.

Technology and Peace Building

In December 2007, NAE held a one-day workshop to explore how information technology (IT) might be used to prevent conflicts and promote peace around the world. The workshop steering committee was chaired by NAE member Jack Gibbons (Resource Strategies). NAE members Vint Cerf (Google, Inc.) and Raj Reddy (Carnegie Mellon University) were committee members. The one-day event included presentations by a variety of IT innovators working in conflict zones and representatives of organizations, such as the United Nations, that have specific needs for tools for promoting peace. Participants included Peter Cherry (SAIC), Deborah Estrin (UCLA), Bran Ferren (Applied Minds), Michael Hawley (MIT), Irwin Jacobs (Qualcomm), Alan Kay (Viewpoints Research Inc.), Colin Rule (E-Bay/PayPal), Nigel Snoad (Microsoft), and Steve Wozniak (Jazz Technologies). A workshop summary, including suggestions by attendees for next steps, was published in July 2008. The workshop was funded by the U.S. Institute of Peace.

Technology for a Quieter America

Noise—unwanted or harmful sounds—has an impact on quality of life. An estimated 10 million Americans have some degree of noise-induced hearing loss, and about 30 million are exposed to dangerous levels of noise every day. Statistics show that the most common community complaints are related to unwanted noise, almost always a by-product of engineered systems, including everything from aircraft and heavy equipment to toys and consumer electronics. In the last 30 years, efforts in the United States to address noise-related concerns have been uneven at best. Other regions in the world have taken the lead in developing noise standards—for example, for construction equipment and consumer products—some of which may limit the export of American products.

Significant advances have been made in understanding how individuals react to and are impacted by noise, and a growing body of evidence shows that high noise levels can delay learning of reading and mathematics at the elementary and middle-school levels. However, because the metrics for assessing noise levels are not always the most up-to-date technologies, it has been difficult to develop solutions in a rational, systematic way.

In May 2006, NAE initiated a three-year study, “Technology for a Quieter America,” to review state-of-the-art noise-control engineering and identify gaps in research that should be addressed with technological, economic, and policy factors in mind. During the past two years, a 14-member umbrella committee chaired by NAE member George Maling, Institute for Noise Control Engineering, supported by five subcommittees and focused working groups have explored three major categories of issues related to noise-control engineering and public concerns: applications of current technologies; research and development initiatives; and intra-governmental and public relations programs.

Three final fact-finding workshops were held in 2008 on new technologies for a quieter America, engineering controls and common descriptors for hazardous noise, and metrics

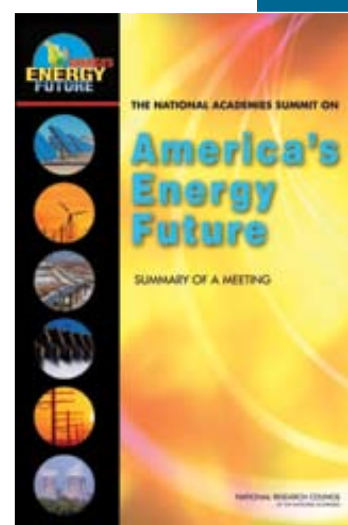


for assessing community noise. The final consensus report, which will include findings and recommendations for policy makers, engineering educators, and industry, will be published in summer 2009.

America's Energy Future: Technology Opportunities, Risks and Tradeoffs

A foundational study requested by Congress was launched in 2007 to inform the national debate on how science and technology can help transform the nation's energy future. Now nearing completion, *America's Energy Future: Technology, Opportunities, Risks and Trade-offs* will provide authoritative estimates of current and potential contributions and costs of existing and new energy supply and demand technologies. This study is intended to provide a foundation for a portfolio of subsequent studies by the National Academies and others on setting priorities for energy research and development, the development of strategic energy technologies, policy analysis, and related subjects focused on transforming the nation's patterns of energy supply and use.

Chaired by former Princeton University President Harold Shapiro, the 25 member America's Energy Future Committee, which includes 18 NAE, NAS, and IOM members, began work in September 2007. The committee is organized into working groups addressing a full spectrum of current and prospective energy technologies, including energy efficiency in buildings, transportation, and industry; coal-fired power generation; nuclear power; renewable energy; oil and natural gas; bio-fuels and other alternative fuels; and electric power transmission and distribution. The committee analyzed the impacts and projected costs of implementing each technology and categorized them in three time frames according to when they are expected to be commercially viable and in widespread use: (1) technologies that are currently available and could be substantially deployed by 2020; (2) technologies that have "accelerated availability," that is, they could be deployed in a limited way by 2020 and, with accelerated research and development, in a substantial way by 2035; and (3) technologies that have long-term possibilities but are not expected to contribute substantially to our energy portfolio before 2035.



The foundational study will culminate in five reports that collectively present an authoritative perspective on the opportunities and challenges for the nation's energy options. The first report, an account of The National Academies Summit on America's Energy Future, was published in November 2008. The remaining reports will be published in early 2009.

Terrorism and the Electric Power-Delivery System

This joint study by NAE and the National Research Council Board on Energy and Environmental Systems formally began in 2005 under the leadership Dr. Granger Morgan of Carnegie Mellon University. Members of the study committee were drawn from the public-utility, academic, private-sector, and regulatory communities. Funding was provided by the U.S. Department of Homeland Security (DHS). The purpose of the study is to identify vulnerabilities in the U.S. electricity-transmission system to terrorist attack and to recommend ways to minimize those vulnerabilities. Following a security review by DHS, the report was classified in 2008. A public version of the report will be prepared in 2009, pending additional funding from DHS.



U.S.-China Cooperation on Electricity from Renewables

As the largest and second largest energy consumers in the world, the U.S. and China have a tremendous opportunity to shift the world's reliance on fossil fuels to a more sustainable infrastructure based on renewable energy. Both countries have enjoyed recent surges in the use of renewables, but power generation from renewables has yet to meet even 10 percent of primary energy demand in either country. NAE, the NRC Policy and Global Affairs Division, the Chinese Academy of Sciences (CAS), and

the Chinese Academy of Engineering (CAE) are conducting a joint study to assist both countries in developing strategies to scale up renewable power production and to identify prospects and recommend priorities for bilateral research and technology cooperation. This study is the latest phase of an ongoing cooperative program with the Chinese Academies of Sciences and Engineering that dates back to the late 1990s. The purpose of this study, which is being conducted by U.S. and Chinese committees of leading scientific and technical experts, is intended to aid both national governments, their relevant agencies and ministries, and private industries in assigning priorities for cooperative activities in developing and using electricity from renewable energy. The study will pursue three separate but related goals:

- assessing resource potential in China and the United States for grid-scale electricity generation
- exploring near-term market opportunities for mature technologies

- recommending priorities for further collaboration, with a focus on reducing costs, improving efficiency and grid connectivity, and improving energy storage technologies

The study will focus heavily on three major resources (wind, solar, and biomass) for grid-scale electricity generation. In addition, technologies with longer time horizons, such as enhanced geothermal and tidal power, will be taken into consideration. This study will build on the *America's Energy Future* panel report, which is assessing the technology risks and trade-offs for various renewable energy technologies.

NAE member Dr. Larry Papay chairs the U.S. committee, which traveled to China in December 2008 to meet with the Chinese committee. During their first joint meeting, committee members toured energy research institutes, technology production facilities, demonstration power plants, and government offices in and around Guangzhou and Beijing, China. The second joint meeting will be held in March 2009 in Hawaii, which has plans to significantly scale up renewable power generation. Planned visits include the governor's office, a geothermal power plant, wind farm, and several energy research institutes.

U.S.-China Symposium on Science and Technology Strategic Policy

NAS and NAE, in cooperation with the Chinese Academy of Sciences (CAS), held the first Symposium on Science and Technology Strategic Policy, in Washington, D.C., on April 14 and 15, 2008. The symposium was organized to provide overviews of S&T development strategies and policies in the United States and China, to discuss important issues of common concern, especially energy and the environment, and to share experiences about providing S&T advice to government. The presidents of NAE, IOM, and NAS, who all attended the meeting, suggested that bilateral symposia be held on a biannual basis to provide a high-level forum for open exchanges on strategic science and technology (S&T) issues. The program for a second symposium, which will be held in China in 2010, has yet to be decided.

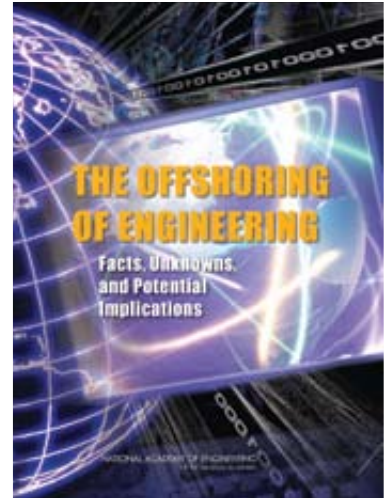
Offshoring of Engineering

The project on Offshoring of Engineering: Facts, Myths, Unknowns, and Implications was completed in July 2008 with publication of the final report. The report includes the committee's synthesis and findings, presentations from a workshop held in October 2006, and six commissioned papers on the offshoring of engineering in specific industry sectors: software, automobiles, pharmaceuticals, personal computer manufacturing, construction engineering and services, and semiconductors.

The committee found that offshoring of engineering activities has increased significantly in recent years in many industries and that it will continue to expand in scale and sophistication. Offshoring benefits many U.S.-based companies and contributes to the creation and retention of U.S. engineering jobs in several industries. However,

the impact of offshoring on careers across the entire spectrum of the U.S. engineering workforce is uneven. The study committee concluded that the subject of offshoring requires further study. In addition, help should be available to engineers who have been negatively affected.

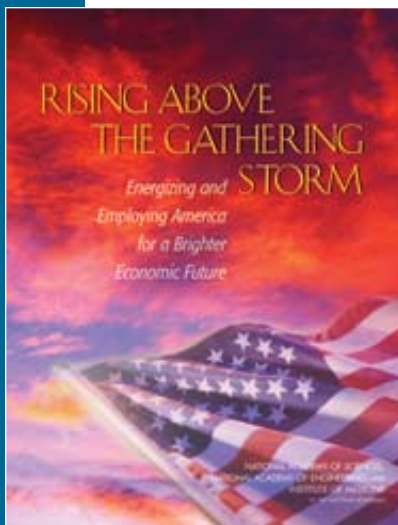
The report was the subject of a piece in *PE Magazine* and was the subject of a discussion during a panel at the fall 2008 meeting of the American Council of Engineering Companies. The 10-member study committee, chaired by NAE member William J. Spencer, included eight NAE members and two outside experts. Support for the project was provided by the National Science Foundation, United Engineering Fund, and NAE Fund.



Gathering Storm Still Frames the Policy Debate

Although the United States leads the world in science and technology development and the U.S. economy is based largely on scientific and technological innovation, danger signs on the horizon suggest that U.S. leadership might be threatened. For example, U.S. students consistently score below the international average in math and science, and, for the cost of hiring an engineer in the United States, a company can hire eight young professional engineers in India. In addition, U.S. industry spends more on tort litigation than on research. These and other factors indicate that America's advantages are eroding.

This was the overarching conclusion in *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, a landmark report from the National Academies released in 2005. The distinguished committee that wrote the report was chaired by NAE member Norman Augustine, retired head of Lockheed Martin, and included Nobel laureates and prominent business, government, and academic leaders, nine of them NAE members. The committee issued a strong warning that the United States is losing its global competitive edge in research and technology and that, unless we take concrete steps to reverse that trend, U.S. prosperity will decline as a result.



The committee made four recommendations with 20 specific implementation actions for improving K–12 science, technology, engineering, and math (STEM) education, attracting the best and brightest students to STEM higher education, increasing support for research, and improving the environment for innovation. *Gathering Storm* prompted both the executive and legislative branches of government into declaring that science and math

education and basic science research should be top priorities, and President Bush incorporated many of the recommendations into his 2006 State of the Union Address. Legislative efforts continued for the next few years. In August 2007, these efforts culminated in the passage and signing into law of the America COMPETES Act, which includes almost all of the recommendations in the report.

Although subsequent appropriations have fallen far short of fully funding all of the programs authorized by America COMPETES, key policy makers have continued to make the case. The National Academies organized a convocation in April 2008 to commemorate the release of the report. The participants, from Congress, the administrations, and private sector, represented a wide range of perspectives. NAE President Charles Vest served on the convocation organizing committee along with Norman Augustine and National Math and Science Initiative CEO Tom Luce. As the Obama administration took office in January 2009, opinion leaders such as *New York Times* columnist Thomas Friedman, continued to stress the relevance of the *Gathering Storm* report in debates about the economic stimulus legislation.

In addition, since the report was released, a number of states have organized *Gathering Storm* events and studies as part of their efforts to revitalize their economies through science and engineering-based economic development. A September 2006 convocation held by the National Academies had helped to inspire these efforts. The private sector has also taken steps, such as the launch of the National Math and Science Initiative, to implement several *Gathering Storm* recommendations for improving K–12 education on a national scale.

2008 NAE AWARDS RECIPIENTS

Charles Stark Draper Prize

Recognized as one of the world's preeminent awards for engineering achievement, this prize honors an engineer or engineers whose contributions have significantly improved the quality of life, enabled people to live more freely and comfortably, and/or permitted the access to information. Presented annually, the prize carries a \$500,000 cash award and a gold medal.



Rudolf Kalman

Rudolf Kalman “for the development and dissemination of the optimal digital technique (known as the Kalman Filter) that is pervasively used to control a vast array of consumer, health, commercial, and defense products.”

Bernard M. Gordon Prize

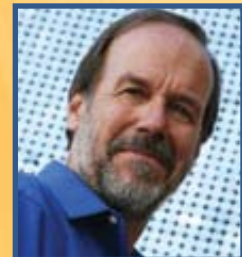


The Gordon Prize for Innovation in Engineering and Technology Education is a cash prize of \$500,000, shared between the educator(s) and the educational institution, to support continuation of the award-winning program. The winning individuals also receive a gold medal. The Gordon Prize honors technology educators whose innovative programs have strengthened the engineering workforce by cultivating students' leadership, creativity, and teamwork skills. The Gordon Prize is presented annually.

Jacquelyn F. Sullivan and Lawrence E. Carlson “for the Integrated Teaching and Learning Program, which infuses hands-on learning throughout K-16 engineering education to motivate and prepare tomorrow’s engineering leaders.” (University of Colorado at Boulder)



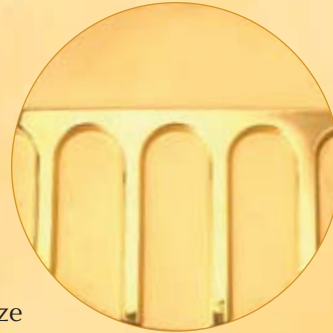
Jacquelyn F. Sullivan



Lawrence E. Carlson

Founders Award

The Founders Award is given in recognition of an NAE member or foreign associate who has exemplified the ideals and principles of NAE through professional, educational, and personal achievement and accomplishment. The Founders Award is presented at the NAE Annual Meeting in October and carries a \$2,500 cash prize and a gold medal.



Robert M. Nerem

Robert M. Nerem “for seminal contributions to the fluid mechanics of biological systems, pioneering research in tissue engineering, and leadership in bio-engineering nationally and internationally, including founding the American Institute for Medical and Biological Engineering.”

Arthur M. Bueche Award



The Bueche Award honors an engineer who has been actively involved in advancing U.S. science and technology policy, promoting U.S. technological development, and enhancing relations between industry, government, and universities. The award is presented at the NAE Annual Meeting and carries a \$2,500 cash prize and a gold medal.

G. Wayne Clough “for outstanding accomplishments advancing civil engineering and higher education, and for leadership promoting U.S. international competitiveness.”



G. Wayne Clough

For additional information about the NAE awards, please visit our website <www.nae.edu/awards>.

2008 NEW MEMBERS AND FOREIGN ASSOCIATES

In February, NAE elected 65 new members and nine foreign associates, bringing the total U.S. membership to 2,227 and the number of foreign associates to 194. Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made outstanding contributions to “engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature,” and to the “pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education.”

A list of newly elected members and foreign associates follows, with their primary affiliations at the time of the Induction Ceremony, October 5, 2008.

NEW MEMBERS

Bernard Amadei

University of Colorado at Boulder

Robert C. Armstrong

Massachusetts Institute of Technology

Arvind

Massachusetts Institute of Technology

Dennis N. Assanis

University of Michigan

Wanda M. Austin

The Aerospace Corporation

Ray H. Baughman

University of Texas at Dallas

Pallab K. Bhattacharya

University of Michigan

Paul N. Blumberg

Consultant

Gerald G. Brown

U.S. Naval Postgraduate School

Howard J. Bruschi

Westinghouse Electric Corporation

Gary S. Calabrese

Corning Incorporated

Mau-Chung Frank Chang

University of California, Los Angeles

Stephen Z.D. Cheng

University of Akron

Peter A. Cundall

Itasca Consulting Group Inc.

Robert H. Dodds Jr.

University of Illinois at Urbana-Champaign

Cynthia Dwork

Microsoft

David A. Dzombak

Carnegie Mellon University

Anthony E. Fiorato

CTLGroup

Thomas J. Fogarty

Fogarty Engineering

James D. Foley

Georgia Institute of Technology

Lee-Lueng Fu

Jet Propulsion Laboratory

Gary S. Grest

Sandia National Laboratories

Barbara J. Grosz

Harvard University

Donald J. Haderle

IBM, retired

J. Michael Harrison

Stanford University

John L. Hudson

University of Virginia

Michael W. Hunkapiller

Alloy Ventures Inc.

Enrique Iglesia

University of California, Berkeley

Jon M. Kleinberg

Cornell University

Anthony D. Kurtz

Kulite Semiconductor Products

Burn-Jeng Lin

Taiwan Semiconductor Manufacturing Co., Ltd.

Thomas A. Lipo

University of Wisconsin-Madison

Alexander C. Livanos

Northrop Grumman Space Technology

Michael J. Lockett

Praxair Inc., retired

David G. Luenberger

Stanford University

Stephen Malkin

University of Massachusetts at Amherst

W. Allen Marr Jr.

Geocomp Corporation

John C. Martin

Gilead Sciences Inc.

James A. Miller

Sandia National Laboratories

David L. Mills

University of Delaware

Shree K. Nayar

Columbia University

Chrysostomos L. Nikias

University of Southern California

Malcolm R. O'Neill

Lockheed Martin Corporation, retired

Prabhakar Raghavan

Yahoo! Research

Yahya Rahmat-Samii

University of California, Los Angeles

Marc H. Raibert

Boston Dynamics Inc.

Bhakta B. Rath

Naval Research Laboratory

Rebecca R. Richards-Kortum

Rice University

Stephen M. Robinson

University of Wisconsin-Madison

Vladimir Rokhlin

Yale University

Thomas P. Russell

University of Massachusetts at Amherst

Robert F. Sawyer

University of California, Berkeley

James A. SethianUniversity of California, Berkeley and
Lawrence Berkeley National Laboratory**Paul H. Siegel**

University of California, San Diego

R. Paul Singh

University of California, Davis

Kumares C. Sinha

Purdue University

Richard L. Sites

Google, Inc.

Frans Spaepen

Harvard University

Zhigang Suo

Harvard University

David A. Tirrell

California Institute of Technology

David R. Walt

Tufts University

Andrew M. Weiner

Purdue University

William W.-G. Yeh

University of California, Los Angeles

Roe-Hoan Yoon

Virginia Polytechnic Institute and State University

Yannis C. Yortsos

University of Southern California

NEW FOREIGN ASSOCIATES**Isamu Akasaki**

Meijo University, Japan

Ann P. Dowling,

University of Cambridge, United Kingdom

Thomas W. Healy

University of Melbourne, Australia

Akihisa Inoue

Tohoku University, Japan

Alexander I. Leontiev

Moscow State Technical University, Russia

Robin Milner

University of Cambridge, United Kingdom

Ekkehard Ramm

University of Stuttgart, Germany

Rutger A. van Santen

Eindhoven University of Technology, Netherlands

Tadashi Watanabe

RIKEN, Japan

NAE ANNIVERSARY MEMBERS

40 YEARS OR MORE

Names in bold celebrated their 40th year in 2008.

Gene M. Amdahl
Edward J. Barlow
 Leo L. Beranek
 Harold Brown
Ray W. Clough
 Karl P. Cohen
 Edward E. David
 Don U. Deere
 Alexander H. Flax
 Jay W. Forrester
 Donald N. Frey
Jerrier A. Haddad
William J. Hall
 Walter R. Hibbard
 George W. Housner*
Woodrow E. Johnson
 Charles H. Kaman
 Hans W. Liepmann
Kenneth G. McKay
 George E. Mueller
Hilliard W. Paige
 Allen E. Puckett
 Simon Ramo
 Mark K. Smith
 Lombard Squires
Dean A. Watkins
 John R. Whinnery
Robert M. White

35 TO 39 YEARS

Names in bold celebrated their 35th year in 2008.

Neal R. Amundson
 Albert L. Babb
William F. Ballhaus, Sr.
 Robert F. Bauer
 R. Byron Bird
 B. Paul Blasingame
 Sidney A. Bowhill
Norman H. Brooks

Arthur E. Bryson
Robert H. Cannon
Jack E. Cermak
Joseph V. Charyk
 Francis H. Clauser
Edgar M. Cortright
 John P. Craven
 Malcolm R. Currie
George C. Dacey
Lee L. Davenport
 Charles H. Elmendorf
Robert M. Fano
Morris E. Fine
 John S. Foster
 Robert A. Frosch
 Earnest F. Gloyna
 Roy W. Gould
 Richard J. Grosh
Nick Holonyak
Arthur E. Humphrey
 John E. Jacobs*
H. Richard Johnson
 James R. Johnson
 Christopher C. Kraft
 T. William Lambe
Thomas M. Leps
 Robert G. Loewy
 Harvey F. Ludwig
 J. Ross Macdonald
 Thomas L. Martin
 John J. McKetta
 Brockway McMillan
Joseph H. Newman
Robert J. Parks
 William J. Perry
 Max S. Peters
David S. Potter
 Calvin F. Quate
 Eugene D. Reed
Harold A. Rosen
Ian M. Ross
Rustum Roy
Robert W. Rummel
 Mark Shepherd
Anthony E. Siegman

*Recently deceased

Cedomir M. Sliepcevich
 Louis D. Smullin
Ivan E. Sutherland
 Morris Tanenbaum
Myron Tribus
Howard S. Turner
 Edward Wenk
 Albert C. Wheelon
Lotfi A. Zadeh

30 TO 34 YEARS

Names in bold celebrated their 30th year in 2008.

William G. Agnew
Egil Abrahamsen
 H. Norman Abramson
 Andreas Acrivos
 Harold M. Agnew
 Clarence R. Allen
Lew Allen
 Betsy Ancker-Johnson
 Arthur G. Anderson
 Alfredo H-S. Ang
 Nathaniel Arbiter*
Neil A. Armstrong
 Wm. Howard Arnold
 Rupert L. Atkin
 Thomas D. Barrow
 Jordan J. Baruch
 Richard H. Battin
 Leo R. Beard
 Stephen D. Bechtel
 C. Gordon Bell
 Daniel Berg
 Elwyn R. Berlekamp
 Wilson V. Binger
 Donald L. Bitzer
 Donald J. Blickwede
 Andrew H. Bobeck
 Bruno A. Boley
Francis W. Boulger
Harry E. Bovay
 Willard S. Boyle
 Lewis M. Branscomb

John E. Breen
 P. L. Thibaut Brian
 William B. Bridges
 Frederick P. Brooks
David Brown
 James R. Burnett
 Robert A. Charpie
 Stuart W. Churchill
Lloyd S. Cluff
 Louis F. Coffin
 Edward Cohen
 John W. Coltman
 Fernando J. Corbato
 Alan Cottrell
Harvey G. Cragon
 Stephen H. Crandall
 Charles Crussard
 Elio D'Appolonia
 J. F. Davidson
 Ruth M. Davis
 Robert C. Dean
 Anthony J. DeMaria
 Charles A. Desoer
 Gerald P. Dinneen
 Robert M. Drake
 Mildred S. Dresselhaus
 Ira Dyer
Rex A. Elder
 Kenneth McK. Eldred
 Leo Esaki
Von R. Eshleman
 Ersel A. Evans
 James L. Everett
Thomas E. Everhart
 James R. Fair
 Joseph Feinstein
 Steven J. Fenves
 A. J. Field
 Daniel J. Fink
James L. Flanagan
 Peter T. Flawn
 Merton C. Flemings
 Gerard F. Fox*
 E. Montford Fucik
 Douglas W. Fuerstenau
 Robert A. Fuhrman
 Elmer L. Gaden
Richard L. Garwin
 Joseph G. Gavin
 Ronald L. Geer

Ivar Giaever
 James F. Gibbons
 John J. Gilman
 Solomon W. Golomb
 Ralph E. Gomory
 John B. Goodenough
 William E. Gordon
 Paul E. Gray
John B. Gunn
 Wolf Hafele
 Robert N. Hall
 John C. Hancock
 Thomas J. Hanratty
 Arthur G. Hansen
 Grant L. Hansen*
 Cyril M. Harris
 Stephen E. Harris
 William J. Harris
 Julius J. Harwood
George N. Hatsopoulos
 William R. Hawthorne
 Ira G. Hedrick
 Robert W. Hellwarth
 Joseph M. Hendrie
 John P. Hirth
 William C. Hittinger
 Philip G. Hodge
 C. Lester Hogan*
David C. Hogg
 Charles H. Holley
 D. Brainerd Holmes
Charles L. Hosler
George W. Jeffs
 Paul C. Jennings
 Robert L. Johnson
 Donald J. Jordan*
 Jan Kaczmarek
 Eneas D. Kane
 Arthur Kantrowitz*
 William M. Kays
Herbert H. Kellogg
Jack L. Kerrebrock
 Clyde E. Kesler
 Robert W. Keyes
 Gordon S. Kino
Herwig Kogelnik
 Thomas R. Kuesel
 Ernest S. Kuh
 Christian J. Lambertsen
William W. Lang

*Recently deceased

Milton Levenson
 Salomon Levy
 Henry R. Linden
 Frederick F. Ling
 C. Gordon Little
 Alan M. Lovelace
 John Lowe
William R. Lucas
Robert W. Lucky
 Frank W. Luerssen
 John D. Mackenzie
 Artur Mager
 Frank E. Marble
 Enrique A. J. Marcatili
Nathan Marcovitz
 Hans Mark
 Edward A. Mason
 Fujio Matsuda
Walter G. May
 Perry L. McCarty
 Ross E. McKinney
James D. Meindl
 Sidney Metzger
Harold S. Mickley
 Gordon H. Millar
 James K. Mitchell
 Johannes Moe
Dade W. Moeller
 Gordon E. Moore
James J. Morgan
Walter E. Morrow
 Peter Murray
 Dale D. Myers
 David Okrent
 Kenneth H. Olsen
 Henry J. Ongerth
 Carlos S. Ospina
Simon Ostrach
 Jack S. Parker
 Norman F. Parker
C. Kumar N. Patel
Harold W. Paxton
Marc J. Pelegrin
 Stanford S. Penner
 Joseph Penzien
 Jacques Peters
 Thomas H. Pigford
James W. Plummer
 Robert Plunkett
 William N. Poundstone

Ronald F. Probst
John A. Quinn
 Lymon C. Reese
 Eric H. Reichl
 James B. Reswick
George A. Roberts
Lawrence G. Roberts
 Leslie E. Robertson
 Warren M. Rohsenow
Anatol Roshko
Dale F. Rudd
 Allen S. Russell
Alfred Saffer
 Jean E. Sammet
 Thorndike Saville
 Robert S. Schechter
Roland W. Schmitt
H. E. D. Scovil
Masanobu Shinozuka
 John H. Sinfelt
Lawrence H. Skromme
 Joe Mauk Smith
 Mete A. Sozen
 Arthur M. Squires
Roger W. Staehle
 Morris A. Steinberg
 Stanley D. Stookey
 Lawrence E. Swabb
George W. Swenson
 Morgan C. Sze
 John J. Taylor
 Ping King Tien
 John A. Tillinghast
 Klaus D. Timmerhaus
 John W. Townsend
 Milton D. Van Dyke
Georges Andre Charles Vendryes
Ivan M. Viest
Andrew J. Viterbi
 John B. Wachtman
 Johannes Weertman
James Wei
 Paul B. Weisz
 James G. Wenzel
 Robert H. Wertheim
 Richard T. Whitcomb
 David C. White
 Robert V. Whitman
 Robert H. Widmer
 Robert L. Wiegel

Maurice V. Wilkes
 J. Ernest Wilkins
 Edward Woll
 Herbert H. Woodson
 Amnon Yariv
 Alfred A. Yee
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In recognition of corporations, foundations, and other organizations that contributed to NAE in 2008

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NATIONAL ACADEMY OF ENGINEERING FUND FINANCIAL REPORT

Governed by the National Academy of Engineering Fund (NAEF) Board of Trustees, the NAEF is the tax-exempt corporation (under section 501(c)(3) of the Internal Revenue Code) that serves as a holding entity for the independent assets and operating funds of the National Academy of Engineering (NAE). The NAE operates within the charter and framework of the National Academy of Sciences (NAS).

The table on page 36 summarizes both the NAEF and outside operating revenue and expenses as well as non-operation-related transactions for the NAE for 2008 and 2007. The information on the NAEF presented in this table has been extracted from the Fund's audited financial statements also contained in this report.

During 2008, contributions for the National Academy of Engineering were solicited from corporations, NAE members, and private foundations. These funds and contracts and grants from the federal government are a major source of support for the Academy's self-initiated programs, which are described in this report.

A second source of revenue for the Academy is the allocation from the overhead charge assessed on government and privately funded contracts for National Research Council (NRC) projects; the NRC is the operating arm of the NAE and the National Academy of Sciences. This allocation is used to offset expenses incurred in the oversight function and for such other administrative operations as NAE membership services and governance.

Under a policy established by the NAEF Board of Trustees, the Academy may use a certain percent of its unrestricted invested assets for operations each year. In 2008, 2.1 percent was used for normal operating expenses and 2.6 percent was used for fund-raising expenses. This allocation, combined with annual meeting registration fees, membership dues, and investment earnings on current operating funds, make up the remainder of the Academy's operating revenue.

The Academy welcomes corporate and private gifts, which are used to help finance the research, education, and public information programs of the institution. The NAE does not, however, conduct proprietary studies for private clients or corporations.

NAE/NAEF Combined Summary of Revenues, Expenses, and Changes in Net Assets (Unaudited-Pro Forma)

(Thousands of Dollars)

	2008	2007
NET ASSETS, BEGINNING	\$72,100	\$67,630
CONTRIBUTIONS RECEIVABLE, NET	3,773	3,541
TOTAL ASSETS, BEGINNING	\$75,873	\$71,171
OPERATIONS		
Revenue		
Contributions (Unrestricted)	\$1,099	\$2,366
Dues (Annual), Fees, Miscellaneous	240	268
Indirect Allowance From Contracts and Grants	3,068	3,068
Award Specific Funds Allocation to Operations*	1,679	3,478
Program Specific Funds Allocation to Operations*	4,773	4,463
Unrestricted Allocation to Operations	2,015	2,108
Total Operations Revenue	\$12,872	\$15,751
Expenses		
Awards	\$1,708	\$3,794
Development	915	831
Management	2,274	2,365
Membership	1,390	1,335
National Academies Activities	314	293
Programs	5,926	5,785
Total Operations Expenses	\$12,527	\$14,403
OPERATIONS SURPLUS	\$345	\$1,348
NONOPERATIONAL TRANSACTIONS		
Allocation to Operations	(\$5,019)	(\$6,891)
Contribution Expense to NAS/NAE Unrestricted Support	\$0	(\$1,000)
Contributions to Reserves	2,693	4,602
Dues (Lifetime), Miscellaneous	172	124
Gain (loss) on Investments	(22,024)	4,680
Investment Earnings (Interest and Dividends)	1,656	1,937
Investment Fees	(361)	(330)
NONOPERATIONAL GAIN	(\$22,882)	\$3,122
NET ASSETS, ENDING	\$49,563	\$72,100
CONTRIBUTIONS RECEIVABLE, NET	4,140	3,773
TOTAL ASSETS, ENDING	\$53,703	\$75,873

*Restricted funds are reported in this unaudited-pro forma report as operating revenue when earned

NOTE: The audited financial statements that follow record contributions as revenue the year in which the pledge is received in accordance with generally accepted accounting principles.

NATIONAL ACADEMY OF ENGINEERING FUND
December 31, 2008 and 2007



Report of Independent Certified Public Accountants

Board of Trustees
National Academy of Engineering Fund

Audit • Tax • Advisory

Grant Thornton LLP

2010 Corporate Ridge, Suite 400
McLean, VA 22102-7838

T 703.847.7500

F 703.848.9580

www.GrantThornton.com

We have audited the accompanying statement of financial position of the National Academy of Engineering Fund (the Fund) as of December 31, 2008, and the related statements of activities and cash flows for the year then ended. These financial statements are the responsibility of the Fund's management. Our responsibility is to express an opinion on these financial statements based on our audit. The prior-year summarized comparative information has been derived from the Fund's 2007 financial statements and, in our report dated April 30, 2008, we expressed an unqualified opinion on those financial statements.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America, as established by the American Institute of Certified Public Accountants. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Fund's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used, and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the National Academy of Engineering Fund as of December 31, 2008, and the changes in its net assets and its cash flows for the year then ended, in conformity with accounting principles generally accepted in the United States of America.

McLean, Virginia
May 26, 2009

A handwritten signature in black ink that reads "Grant Thornton LLP".

National Academy of Engineering Fund
Statement of Financial Position

December 31,	2008	2007
ASSETS		
Current Assets		
Cash and cash equivalents	\$ 137,133	\$ 1,141,332
Prepaid expenses	37,387	18,830
Short-term investments	1,342,610	2,044,545
Contribution receivable	1,940,409	1,180,208
Award medals and other assets	118,000	117,380
Total Current Assets	3,575,539	4,502,295
Non-current Assets		
Contribution receivable—long-term portion, net	2,199,626	2,592,847
Investments	48,695,385	69,889,901
Total Non-current Assets	50,895,011	72,482,748
Total Assets	\$ 54,470,550	\$ 76,985,043
LIABILITIES AND NET ASSETS		
Liabilities		
Accounts payable—National Academy of Sciences	\$ 767,399	\$ 1,112,017
Commitments and Contingencies	—	—
Net Assets		
Unrestricted	18,900,759	34,439,215
Temporarily restricted	5,681,135	12,385,930
Permanently restricted	29,121,257	29,047,881
Total Net Assets	53,703,151	75,873,026
Total Liabilities and Net Assets	\$ 54,470,550	\$ 76,985,043

The accompanying notes are an integral part of this statement.

National Academy of Engineering Fund
Statement of Activities and Changes in Net Assets

Year ended December 31,

	2008			2007	
	Unrestricted	Temporarily Restricted	Permanently Restricted	Total	Total
Revenue					
Interest and dividends	\$ 800,870	\$ 856,043	\$ —	\$ 1,656,913	\$ 1,936,978
Realized (loss) gain on investments	(3,681,942)	(3,924,120)	—	(7,606,062)	5,475,618
Contributions	871,675	3,888,540	73,376	4,833,591	7,169,218
Membership dues	243,300	—	—	243,300	261,480
Registration fees	94,850	—	—	94,850	101,885
Miscellaneous revenue	18,622	—	—	18,622	29,939
Net assets released from restrictions:					
Satisfaction of program restrictions	3,261,480	(3,261,480)	—	0	0
Satisfaction of time restrictions	133,145	(133,145)	—	0	0
Total Revenue	1,742,000	(2,574,162)	73,376	(758,786)	14,975,118
Expenses					
Program services:					
Programs	2,237,857	—	—	2,237,857	2,349,991
Member programs	345,682	—	—	345,682	336,213
Support for NRC and NAS	314,057	—	—	314,057	293,181
Awards	1,708,101	—	—	1,708,101	3,793,780
Total program services	4,605,697	0	0	4,605,697	6,773,165
Supporting services:					
Fundraising	914,841	—	—	914,841	831,508
Operations	852,275	—	—	852,275	1,872,978
Total supporting services	1,767,116	0	0	1,767,116	2,704,486
Total Expenses	6,372,813	0	0	6,372,813	9,477,651
Change in Net Assets Before					
Unrealized Loss on Investments	(4,630,813)	(2,574,162)	73,376	(7,131,599)	5,497,467
Unrealized loss on investments	(10,907,643)	(4,130,633)	—	(15,038,276)	(795,705)
Change in Net Assets	(15,538,456)	(6,704,795)	73,376	(22,169,875)	4,701,762
Net Assets, beginning of year	34,439,215	12,385,930	29,047,881	75,873,026	71,171,264
Net Assets, end of year	\$ 18,900,759	\$ 5,681,135	\$ 29,121,257	\$ 53,703,151	\$ 75,873,026

The accompanying notes are an integral part of this statement.

National Academy of Engineering Fund Statement of Cash Flows

Year ended December 31,	2008	2007
Cash Flows from Operating Activities		
Change in net assets	\$ (22,169,875)	\$ 4,701,762
Adjustments to reconcile change in net assets to net cash (used in) provided by operating activities:		
Realized loss (gain) on investments	7,606,062	(5,475,618)
Unrealized loss on investments	15,038,279	795,705
Changes in assets and liabilities:		
Contributions receivable	(366,980)	(232,034)
Award medals	(620)	54,156
Prepaid Expenses	(18,557)	(18,830)
Accounts payable–National Academy of Sciences	(344,618)	908,555
Net Cash (Provided by) Used in Operating Activities	(256,309)	733,696
Cash Flows from Investing Activities		
Proceeds from sale of investments	60,012,175	149,762,324
Purchase of investments	(60,760,065)	(149,529,804)
Net Cash (Used in) Provided by Investing Activities	(747,890)	232,520
Net Change in Cash and Cash Equivalents	(1,004,199)	966,216
Cash and Cash Equivalents, beginning of year	1,141,332	175,116
Cash and Cash Equivalents, end of year	\$ 137,133	\$ 1,141,332

The accompanying notes are an integral part of this statement.

December 31, 2008 and 2007

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

General Information

The National Academy of Engineering Fund (the Fund) is an independent non-profit organization established by the National Academy of Engineering (NAE) to collect and disburse funds for accomplishing the goals of NAE. NAE operates within the charter and framework of the National Academy of Sciences (NAS), which accounts for NAE's expenses. The operating expenditures of NAE are accounted for by offices of NAS, and are offset by reimbursement from funds received from the Fund and from contracts and grants administered by NAS. The net expenditures of NAE are paid by the Fund to balance accounts with NAS.

Basis of Accounting

The Fund's financial statements are prepared using the accrual basis of accounting.

Cash and Cash Equivalents

For purposes of the statement of cash flows, the Fund considers all investments purchased with an original maturity of three months or less to be cash equivalents, except for the cash in the investment portfolio, which will be reinvested on a long-term basis.

Short-term Investments

Temporary investments consist of money market funds that are used to fund normal operations of the Fund and are recorded at their readily determinable fair values as determined by quoted market prices.

Contributions Receivable

Unconditional promises to give are recognized as revenue and contributions receivable in the period the promises are made. Unconditional promises

to give that are expected to be collected within one year are recorded at their net realizable value. Unconditional promises to give that are expected to be collected in future years are recorded at the present value of their estimated future cash flows. The discounts on those amounts are computed using risk-free interest rates commensurate with the risk involved applicable to the years in which the promises are received. Amortization of the discounts is included in contribution revenue. Conditional promises to give are not included as support until the conditions are substantially met.

Awards Medals

The Fund maintains gold medals for various awards, which are carried at cost.

Investments

Investments, consisting of cash and money market funds, federal agency securities, treasury securities, corporate debt securities, and equity securities, are recorded at readily determinable fair values determined by quoted market price.

Temporarily Restricted Net Assets

Temporarily restricted net assets consist of amounts that are subject to donor-imposed time or purpose restrictions and income earned on temporarily and permanently restricted net assets. The Fund is permitted to use or expend the donated assets in accordance with the donor restriction.

Permanently Restricted Net Assets

Permanently restricted net assets consist of assets whose use is limited by donor-imposed restrictions that neither expire by the passage of time nor can be fulfilled or otherwise removed by action of the Fund. The restrictions stipulate that resources be maintained permanently, but permit the Fund to expend the income generated in accordance with the provisions of the agreement. Permanently restricted net assets consist of the following:

Notes to Financial Statements (Continued)

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

Draper Prize—represents an endowment given by the donor for the purpose of establishing and awarding an annual prize in honor of the memory of Charles Stark Draper. It is the Fund's intention to use the investment earnings of the endowment to cover the expenses incurred in connection with administration of the prize and in providing the honorarium awarded with the prize.

Gordon Prize—represents an endowment given by the donor for the purpose of establishing and awarding an annual prize in honor of Bernard M. Gordon. It is the Fund's intention to use the investment earnings of the endowment to cover the expenses incurred in connection with administration of the prize and in providing the honorarium awarded with the prize.

Capital Preservation and Hans Reissner—represents endowments requiring that the principal be invested and that only the income be used for general operations of NAE.

Hollomon—represents an endowment requiring that the principal be maintained in perpetuity and that the income be used to support the Hollomon Fellow.

Industry Scholar—represents an endowment to support fellowships for recently retired corporate executives to assist with strategy and management of program activities in NAE and NRC.

Senior Scholar—represents an endowment to support an outstanding member of industry or another field working as an advisor and assistant to the president of NAE in the management and execution of NAE's programmatic activities.

Young Engineer—represents an endowment to support programs aimed at engaging engineers at a younger age in the activities of NAE, and to provide an opportunity to identify nominees from industry for membership in NAE.

Wm. A. Wulf Initiative for Engineering Excellence—represents an endowment to ensure the future of programs that Bill Wulf instituted as president and provide his successor some flexibility in addressing the most pressing issues before the engineering community and the nation at any given time.

Restricted Support

The Fund reports gifts of cash and other assets as restricted support if they are received with donor stipulations that limit the use of the donated assets. When a donor restriction expires, i.e., when a stipulated time restriction ends or purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the statement of activities as net assets released from restrictions.

Allocation of Expenses

The costs of providing various programs and other activities have been summarized on a functional basis in the statement of activities. Accordingly, certain costs have been allocated among the programs and supporting services benefited.

Income Taxes

The Fund is incorporated under the District of Columbia Non-profit Corporation Act and is exempt from income taxes under Section 501(c)(3) of the Internal Revenue Code. In addition, the Fund has been determined by the Internal Revenue Service not to be a private foundation. The Fund is required to remit income taxes to the federal government and the District of Columbia for unrelated business income. For the years ended December 31, 2008 and 2007, there was no unrelated business income and, consequently, no provision for income taxes has been made.

NAEF has elected to defer the application of Financial Interpretation 48 ("FIN 48") under FASB Staff Position FIN 48-3, "Effective Date of FASB Interpretation No. 48 for Certain Nonpublic Enterprises," until the period beginning January 1, 2009.

Notes to Financial Statements (Continued)

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

NAEF accounts for uncertain tax positions and other loss contingencies, including tax-related audits, in the normal course of operations on the Statement of Financial Position. In accordance with Statement of Financial Accounting Standards No. 5, "Accounting for Contingencies," NAEF records a loss contingency for these matters when it is probable that a liability has been incurred and the amount of the loss can be reasonably estimated. Loss contingencies are routinely reviewed to ensure that appropriate liabilities are recorded on the Statement of Financial Position. Liabilities are adjusted based on estimates and judgments made by management with respect to the likely outcome of these matters, including the effect of any applicable insurance coverage for litigation matters. Estimates and judgment could change based on new information, changes in laws or regulations, changes in management's plans or intentions, the outcome of legal proceedings, settlements or other factors.

Fair Value Measurement

In 2008, the NAEF adopted SFAS No. 157, *Fair Value Measurements* (SFAS No. 157). SFAS No. 157 defines fair value, establishes a framework for measuring fair value in accordance with US GAAP, and expands disclosures about fair value measurements. Where applicable, such information has been disclosed elsewhere in the notes to the financial statements.

Use of Estimates

In preparing financial statements in conformity with accounting principles generally accepted in the United States of America, management is required to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements and revenue and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications

Certain 2007 amounts have been reclassified to conform to the 2008 presentation.

Notes to Financial Statements (Continued)

NOTE B—CONTRIBUTIONS RECEIVABLE

Contributions receivable consist of unconditional promises to give and are deemed fully collectible as follows at December 31, 2008:

	Unrestricted	Restricted	Total
Unconditional promises to give	\$ 149,750	\$ 4,335,611	\$ 4,485,361
Less: unamortized discount	—	(345,326)	(345,326)
Net unconditional promises to give	\$ 149,750	\$ 3,990,285	\$ 4,140,035
Amounts due in:			
Less than 1 year	\$ 149,750	\$ 1,790,659	\$ 1,940,409
1 to 5 years	—	2,199,626	2,199,626
	\$ 149,750	\$ 3,990,285	\$ 4,140,035

Contributions receivable consist of unconditional promises to give and are deemed fully collectible as follows at December 31, 2007:

	Unrestricted	Restricted	Total
Unconditional promises to give	\$ 258,525	\$ 3,805,709	\$ 4,064,234
Less: unamortized discount	—	(291,179)	(291,179)
Net unconditional promises to give	\$ 258,525	\$ 3,514,530	\$ 3,773,055
Amounts due in:			
Less than 1 year	\$ 258,525	\$ 921,683	\$ 1,180,208
1 to 5 years	—	2,592,847	2,592,847
	\$ 258,525	\$ 3,514,530	\$ 3,773,055

Net restricted contributions consist of \$190,106 and \$319,026 at December 31, 2008 and 2007, respectively, which is subject to time restrictions, and \$3,800,179 and \$3,195,504 at December 31, 2008 and 2007, respectively, which is subject to donor-imposed purpose restrictions.

Notes to Financial Statements (Continued)

NOTE C—INVESTMENTS

Investments at fair value consist of the following at December 31:

	2008	2007
Cash and money market	\$ 14,593,618	\$ 14,046,732
Federal agency securities	—	2,465,181
Corporate debt securities	—	2,792,500
Equity securities	17,460,899	36,931,790
Mutual Funds	1,307,709	—
Managed futures	9,208,494	6,969,998
Other	7,467,275	8,728,245
	50,037,995	71,934,446
Less: short-term investments	(1,342,610)	(2,044,545)
	\$ 48,695,385	\$ 69,889,901

Fair value measurements in accordance with SFAS 157 are as follows as of December 31, 2008:

	Amount	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Unobservable Inputs (Level 3)
Cash and money market	\$ 14,593,618	\$ 14,593,618	\$ —
Equity Securities	17,460,899	16,219,529	1,241,370
Mutual Funds	1,307,709	1,307,709	—
Managed futures	9,208,494	—	9,208,494
Other	7,467,275	—	7,467,275
	\$ 50,037,995	\$ 32,120,856	\$ 17,917,139

Level 1 inputs include quoted market prices in active markets for identical assets. Level 3 inputs are used to measure fair value to the extent that observable inputs are not available, thereby allowing for situations where there is little, if any, observable market activity for the asset at the measurement date.

Notes to Financial Statements (Continued)

NOTE C—INVESTMENTS (Continued)

Investments are further classified as follows at December 31:

	2008	2007
Unrestricted	\$ 23,420,155	\$ 33,996,846
Temporarily restricted	2,308,101	10,314,640
Permanently restricted	24,309,739	27,622,960
	<u>\$ 50,037,995</u>	<u>\$ 71,934,446</u>

Investment return consists of the following at December 31:

Dividends and interest	\$ 1,656,913	\$ 1,936,978
Unrealized (loss) gain	(15,038,276)	(795,705)
Realized gain	(7,606,062)	5,475,618
	<u>\$ (20,987,425)</u>	<u>\$ 6,616,891</u>

Notes to Financial Statements (Continued)**NOTE D—PERMANENTLY AND TEMPORARILY RESTRICTED NET ASSETS**

Permanently and temporarily restricted net assets consist of the following at December 31, 2008:

	Permanently Restricted	Temporarily Restricted
Draper Prize	\$ 8,000,000	\$ —
Gordon Prize	13,438,250	—
Capital Preservation	2,378,276	33,774
Hollomon	201,200	213,513
Great Achievements	—	47,218
Public Understanding	—	335,494
Technology and Environment	—	6,445
Frontiers Fund	—	99,371
Bueche Award	—	21,900
CASEE	—	79,734
Russ Prize	—	72,616
Engineering Ethics Center	—	25,125
Diversity in the Engineering Work Force	—	1,771
Engineering Education	—	103,709
Frontiers of Engineering – Grainger Foundation	—	2,786,850
Hans Reissner	25,624	7,160
Engineering Ethics	—	639,876
Information Technology	—	17,535
Engineering & Services	—	1,794
Homeland Security	—	8,516
Communication with Public in Crisis	—	1,917
Industry Scholar	353,038	—
Senior Scholar	1,000,000	—
Young Engineer	778,640	—
Media Relations Mettler	—	—
Noise Policy Development	—	97,260
Urban Infrastructure	—	361,542
China Project	—	—
Wm. Wulf Initiative for Engineering Excellence	2,946,229	—
Unrestricted contributions to be received in future years	—	422,426
Others	—	295,589
	<hr/> \$ 29,121,257	<hr/> \$ 5,681,135

Notes to Financial Statements (Continued)

NOTE D—PERMANENTLY AND TEMPORARILY RESTRICTED NET ASSETS (Continued)

Permanently and temporarily restricted net assets consist of the following at December 31, 2007:

	Permanently Restricted	Temporarily Restricted
Draper Prize	\$ 8,000,000	\$ 3,518,318
Gordon Prize	13,438,250	2,791,061
Capital Preservation	2,376,776	1,203,587
Hollomon	201,200	397,296
Great Achievements	—	88,927
Public Understanding	—	708,523
Technology and Environment	—	5,290
Frontiers Fund	—	4,084
Bueche Award	—	49,718
CASEE	—	222,433
Russ Prize	—	65,558
Engineering Ethics Center	—	—
Diversity in the Engineering Work Force	—	1,759
Engineering Education	—	421,677
Grainger Prize	—	225
Hans Reissner	25,624	24,417
Engineering Ethics	—	782,171
Information Technology	—	32,445
Engineering & Services	—	2,981
Homeland Security	—	8,421
Communication with Public in Crisis	—	1,917
Industry Scholar	353,038	130,342
Senior Scholar	1,000,000	82,687
Young Engineer	778,640	182,134
Media Relations Mettler	—	251
Noise Policy Development	—	146,927
Urban Infrastructure	—	404,046
China Project	—	1,077
Wm. Wulf Initiative for Engineering Excellence	2,874,353	103,694
Unrestricted contributions to be received in future years	—	752,642
Others	—	251,322
	<hr/>	<hr/>
	\$ 29,047,881	\$ 12,385,930

Notes to Financial Statements (Continued)

NOTE E—ENDOWMENT

As required by GAAP, net assets associated with endowment funds are classified and reported based on the existence or absence of donor-imposed restrictions.

During 2008, the District of Columbia enacted into law the Uniform Prudent Management of Institutional Funds Act (UPMIFA). Management of NAEF has interpreted the District of Columbia law as requiring the Fund, absent explicit donor stipulations to the contrary, to act in good faith and with the care that an ordinarily prudent person in a like position would exercise under similar circumstances in making determinations to appropriate or accumulate endowment funds, taking into account both its obligation to preserve the value of the endowment and its obligation to use the endowment to achieve the purposes for which it was donated. NAEF classifies as permanently restricted net assets (a) the original value of gifts donated to the permanent endowment, (b) the original value of subsequent gifts to the permanent endowment, and (c) accumulations to the permanent endowment made in accordance with the direction of the applicable donor gift instrument at the time the accumulation is added to the fund. The remaining portion of the donor-restricted endowment fund that is not classified in permanently restricted net assets is classified as temporarily restricted net assets until

those amounts are appropriated for expenditure. In making a determination to appropriate or accumulate, the Fund adheres to the standard of prudence prescribed by the Act and considers the following factors: (1) The duration and preservation of the endowment fund; (2) The purposes of the institution and the endowment fund; (3) General economic conditions; (4) The possible effect of inflation or deflation; (5) The expected total return from income and the appreciation of investments; (6) Other resources of the institution; and (7) The investment policy of the institution.

The fair value of assets associated with donor-restricted endowment funds may fall below the level that UPMIFA requires to retain as a fund of perpetual duration. In accordance with GAAP, deficiencies of this nature that are reported in unrestricted net assets were \$3,928,415 as of December 31, 2008.

NAEF has adopted an investment policy for the endowment fund. This investment program is based on growing the endowment fund to provide financial stability for NAEF in perpetuity. The NAEF's ability to tolerate risk and volatility should be consistent with that of a conservative growth portfolio, with investments made in companies that demonstrate consistent growth over time. Asset allocations are developed in accordance with this long-term, conservative growth strategy.

Notes to Financial Statements (Continued)

NOTE E—ENDOWMENT (Continued)

The following illustrates endowment net asset composition by type of fund and the changes in endowment net assets for the year ended December 31:

2008	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Donor-restricted endowment funds	\$ (3,928,415)	\$ 254,477	\$ 29,121,257	\$ 25,447,289
Total funds	\$ (3,928,415)	\$ 254,477	\$ 29,121,257	\$ 25,447,289
Endowment net assets, beginning of year	\$ —	\$ 8,433,537	\$ 29,047,881	\$ 37,481,418
Investment return:				
Interest and dividends	—	844,721	—	844,721
Realized loss on investments	—	(3,987,062)	—	(3,987,062)
Net depreciation	—	(7,589,439)	—	(7,589,439)
Total investment return	—	(10,731,780)	—	(10,731,780)
Amounts appropriated for Expenditure	—	(1,375,725)	—	(1,375,725)
Contributions received	—	—	73,376	73,376
Adjustment from (to) Unrestricted net assets	(3,928,415)	3,928,415	—	—
Endowment net assets, end of year	\$ (3,928,415)	\$ 254,447	\$ 29,121,257	\$ 25,447,289

Notes to Financial Statements (Continued)

NOTE E—ENDOWMENT (Continued)

The following illustrates endowment net asset composition by type of fund and the changes in endowment net assets for the year ended December 31:

2007	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Donor-restricted endowment funds	\$ —	\$ 8,433,537	\$ 29,047,881	\$ 37,481,418
Total funds	\$ —	\$ 8,433,537	\$ 29,047,881	\$ 37,481,418
Endowment net assets, beginning of year	\$ —	\$ 6,787,900	\$ 28,177,391	\$ 34,965,291
Investment return:				
Interest and dividends	—	850,157	—	850,157
Realized gain on investments	—	2,606,090	—	2,606,090
Net depreciation	—	(451,903)	—	(451,903)
Total investment return	—	3,004,344	—	3,004,344
Amounts appropriated for Expenditure	—	(1,358,707)	—	(1,358,707)
Contributions received	—	—	870,490	870,490
Endowment net assets, end of year	\$ —	\$ 8,433,537	\$ 29,047,881	\$ 37,481,418

Notes to Financial Statements (Continued)

NOTE F—DESCRIPTION OF PROGRAM AND SUPPORTING SERVICES

The following program and supporting services are included in the accompanying financial statements:

Programs—programs that address relevant issues in the engineering field including, but not limited to: *Education, Engineering Practice and the Engineering Workforce; Engineering and the Environment; Engineering, the Economy and Society; Information Technology and Society; National Security and Crime Prevention; and Public Policy and Program Reviews.*

Member Programs—organization and administration of the Annual Meeting and publication of NAE Memorial Tributes.

Support for NRC and NAS—contributions to joint activities of the National Academies, including, but not limited to, the NAS/NAE/IOM Committee on Human Rights, the NRC Office of Scientific and Engineering Personnel, and *Issues in Science and Technology.*

Awards—NAE presents five awards: the Bernard M. Gordon Prize, the Charles Stark Draper Prize, the Fritz J. and Dolores H. Russ Prize, the Arthur M. Bueche Award, and the NAE Founders Award. Activities include soliciting nominations, selection of the recipients, announcement of the recipients and presentation of the prizes.

Fundraising—provides the structure necessary to encourage and secure private financial support from individuals, foundations and corporations.

Operations—includes the functions necessary to provide an adequate working environment, provide coordination and articulation of the Fund's programs, secure proper administrative function of the Board of Trustees, maintain competent legal services for program administration, and manage the financial and budgetary responsibilities of the Fund.

NOTE G—RELATED-PARTY TRANSACTIONS

The National Academies Corporation

The National Academies Corporation (TNAC) is a non-profit corporation that was incorporated in January 1986 for the purpose of constructing and maintaining a study and conference facility, the Arnold and Mabel Beckman Center, in Irvine, California, to expand and support the general scope of program activities of NAS, NAE, the Institute of Medicine (IOM), and NRC. TNAC is organized as a tax-exempt supporting organization for NAS and the Fund. The Board of Directors and officers of TNAC include certain officers of the Fund. The Fund had no transactions with TNAC for the years ended December 31, 2008 and 2007.

National Academy of Sciences

The Fund reimburses NAS by making monthly payments based on NAE's estimated expenditures for the year. This resulted in a payable to NAS at December 31, 2008 and 2007 of \$767,399 and \$1,112,017, respectively. Payments made to NAS by the Fund for the Fund's allocated portion of the expenditures shared jointly by NAS, NAE and IOM were \$1,228,898 and \$1,124,689 for the years ending December 31, 2008 and 2007, respectively. See Note A for the relationship of related parties.

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‡ Indicates term ended June 30, 2008. Year in parentheses indicates the year term expires.

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NAE reports can be purchased from the National Academies Press, <www.nap.edu> or 1-888-624-7654, or from the National Academies Bookstore, 500 Fifth Street, N.W., Washington, D.C.

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Program Reports from 2008:

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The Bridge, the NAE quarterly journal, is available from the NAE Program office of can be read online at <www.nae.edu/thebridge>. A PDF version is also available on the website.

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