

Continuous Evaluation: Scorecard

Monitoring and evaluating progress toward gender equity in access to science and engineering education and academic careers require making appropriate measurements and comparisons. The committee has developed a proposed scorecard for measuring many of the factors relevant to equity, including climate, or “intangible” environment (see Box 6-8). The committee recommends that universities monitor their programs through annual self-audits that collect data on the education and employment of scientists and engineers disaggregated by sex and race or ethnicity. The recommended audits should be part of a larger effort to establish metrics for gender equity in academic science and engineering. Coordinating organizations should act to create uniform standards among their members and provide a central clearinghouse for publication of the results.

Federal Standards and Compliance Issues

Relevant civil rights statutes include Title IX (see Box 6-9), Title VI for students, and Title VII and Executive Order 11246 for faculty and employees. Together those laws bar discrimination on the basis of sex, race, and disability.²⁷ The federal agencies should work with higher education institutions to establish clear guidelines and measures for compliance with all civil rights statutes.

Civil rights statutes cover every aspect of student education and faculty employment. For students, these statutes cover recruitment, admission to undergraduate programs (at a minimum at public institutions), admission to graduate programs, housing arrangements, scholarships and fellowships, internships and work-study opportunities, assignment to classes, assignment of advisers, selection for teaching assistantships, and “intangible” environment.

For faculty and employees the statutes bar discrimination based on sex, race, and national origin in all aspects of employment in educational institutions and programs, including recruitment; hiring; selection of graduate fellowships or teaching assistantships if these create an employer-employee

²⁷There are distinct enforcement agencies for each statute. Title VI and Title VII are enforced by the Equal Employment Opportunity Commission, which investigates and resolves discrimination complaints and can bring lawsuits on behalf of claimants. Individual commissioners may also file charges to initiate investigations of discrimination even absent a specific complaint. Executive Order 11246 is enforced by the Office of Federal Contract Compliance Programs at the Department of Labor, which has the authority to resolve complaints and undertake compliance reviews of federal contractors. Overall, the Department of Justice acts in a coordinating role to enforce the statutes.

DEFINING THE ISSUES

BOX 6-9 Title IX

Title IX bans sex discrimination in education and covers (a) students, faculty, and employees at institutions of higher education that receive federal funds and (b) students and employees of educational programs that are offered by other institutions that receive federal funds. When it was passed, however, the law did not specify how institutions would be measured to be in compliance. The Office of Civil Rights (OCR) of the Department of Education was charged with establishing these details. After years of review and extensive public feedback, the OCR issued standards in 1979.

The Three-Prong Title IX Compliance Test

To show compliance with Title IX of the Education Amendments of 1972, institutions must meet at least one of the following tests:

1. provide participation opportunities substantially proportional to the ratio of males to females in the student body;
2. show a history and continuing practice of upgrading girls' and women's programs;
3. meet the interests and abilities of women on campus.

That policy provides flexibility in meeting compliance, but many universities and most courts have focused on the proportionality standard in Title IX compliance and litigation.^a

Every federal agency that gives funds to institutions of higher education or to other institutions that run educational programs—including all cabinet agencies (such as the Department of Education and the Department of Defense), and such agencies as the National Science Foundation, the National Institutes of Health, and the National Aeronautics and Space Administration—is obliged to enforce Title IX. Each federal agency has issued regulations delineating its enforcement responsibilities under the law, and each has the authority to investigate and resolve discrimination complaints and to initiate compliance reviews of recipients of federal aid. The Department of Justice is charged with coordination of agency efforts under Title IX and is obliged to ensure overall enforcement of the statute.

^a*Cohen v. Brown University; Horner v. Kentucky High School Athletic Association; Kelley v. Board of Trustees; Neal v. Board of Trustees of the California State Universities; and Roberts v. Colorado State Board of Agriculture.*

relationship; promotion; tenure; termination; allocation of resources, such as laboratory space, research assistants, and research funding; receipt of awards and opportunities for public recognition; terms and conditions of employment, including leave, benefits, teaching load, availability of sabbaticals, appointments as department chairs, selection for research projects, committee assignments, and office location; and “intangible” environment.

Sanctions

The current stated sanction for noncompliance with federal statutes is retraction of federal funds or cancellation of federal contracts. What the NCAA has done with regard to Title IX compliance is create an intermediate sanction to precede such action: withdrawal from competition of a member organization found to be in noncompliance. There are no analogous science and engineering “teams,” however, an option that could be considered by the NCAA-like organization is withdrawal of an institution’s ability to compete for federal funds for a given period. The pressure of civil rights enforcement tends to be indirect: institutions change behavior not because of the threat of sanctions, but rather because the law cultivates a normative environment that legitimates and motivates compliance.²⁸

Possible Unintended Consequences

Some have argued that Title IX as applied to athletics has led to the elimination of men’s sports teams in favor of women’s teams. However, it appears that institutions are more likely to add female teams and female athletes than to cut male teams and reduce the number of male athletes in response to a finding of noncompliance.²⁹ A more common strategy used by institutions that are out of compliance with the proportionality standard is to provide preference to men in college admissions, and thereby establish a lower proportion of female students.³⁰ That has the obvious effect of

²⁸WT Bielby (2000). Minimizing workplace gender and racial bias. *Contemporary Sociology* 29:120-129; B Reskin (2000). The proximate causes of employment discrimination. *Contemporary Sociology* 29(2):319-328; S Strum (2001). Second generation employment discrimination: A structural approach. *Columbia Law Review* 101(3):458-568; E Hirsh (2006.) *Enforcing Equal Opportunity: The Impact of Discrimination Charges on Sex and Race Segregation in the Workplace* (Working Paper). Department of Sociology, University of Washington.

²⁹DJ Anderson and JJ Cheslock (2004). Institutional strategies to achieve gender equity in intercollegiate athletics: Does Title IX harm male athletes? *American Economic Review Papers and Proceedings* 94(2):307-311.

³⁰J Monks (2005). Title IX Compliance and Preference for Men in College Admission (Working Paper 80). Ithaca, NY: Cornell Higher Education Research Institute, http://www.ilr.cornell.edu/cheri/twp/cheri_wp80.pdf.

exacerbating imbalances between men and women and should be carefully considered in the crafting of standards for evaluation and compliance in science and engineering.

CALL TO ACTION

“Institutions of higher education have an obligation, both for themselves and for the nation, to develop and utilize fully all the creative talent available.”

—Nine-University Statement on Gender Equity, 2005³¹

America’s competitiveness in today’s global economy depends on fully developing and using all the nation’s scientific and engineering talent. However, substantial barriers still exist to the full participation of women, not only in science and engineering, but also in other academic fields throughout higher education.

That women are capable of contributing to the nation’s scientific and engineering enterprise but are impeded in doing so because of gender and racial or ethnic bias and outmoded “rules” governing academic success is a *call to action*. Creating environments that promote the professional success of all people, regardless of their sex, race, or ethnicity, must be a top priority for all institutions and individuals concerned with maintaining and advancing the nation’s scientific and engineering enterprise.

Transforming academic institutions so that they will foster the career advancement of women scientists and engineers at all levels of their faculties is a complex task of identifying and eliminating institutional barriers. Individual institutional efforts have had dramatic effects but sustained change across higher education is unlikely unless there is a transformation of the process by which students and faculty are educated, trained, recruited, evaluated, tenured, and retained.

Our analysis shows that policy changes are sustainable only if they create a “new normal,” a new way of doing things. Increasing the number of women and underrepresented minority-group faculty substantially will require leadership from faculty, individual departments, and schools; rigorous oversight from provosts and presidents; and sustained normative pressure from external sources. The first step is to understand that women are

³¹Nine-University Statement on Gender Equity (2006), http://www.berkeley.edu/news/medialreleases/2005/12/06_geneq.shtml.

DEFINING THE ISSUES

BOX 6-10 Elephants in the Room^a

I'm going to offer you a set of recommendations that will cost you nothing but courage. They can also be used more broadly well beyond the hallowed halls, and thus impact the "cross-institutional interlock," or as I would say as an electrical engineer, "the system."

- First of all, we should have zero tolerance for bullying behavior. It should not be acceptable in the workplace or anywhere else. If you are an academic leader, you should confront faculty and others who are abusive to students, staff, and other faculty, particularly senior faculty.

- Tenure is not a license to kill. How many of you have seen on an academic campus, senior people with tenure over and over abuse people who are lower than them in the power structure, and nobody ever does anything? Why does that happen? Why do we let that happen? It's unacceptable.

- If you have issues with dealing with conflict and you are an academic leader, take a class. Get help. Seek support. It's not so difficult. We are conflict avoiders in the academy. People don't want to confront each other, but we have to. *It's our job.* It's in the position description. We can learn from conflict. We do learn from conflict.

- Confront people's biases.
- Support your local senior feminist colleagues, male and female. It's lonely at the top. Support them in their endeavors for social justice.

We must confront and act on these "elephants in the room"^b as much as we must also change recruitment processes, become more family-friendly, ensure presence of role models, create new models for evaluation and promotion, and revamp the academic salary structure for staff and faculty.

^aClosing comments by Denice Denton, *National Academies' Convocation on Biological, Social, and Organizational Components of Success*, December 9, 2005, Washington, DC.

^b"Elephants in the room" is an English idiom for an obvious truth that is being ignored, for various reasons. It is based on the ironic fact that an elephant in a small room would be impossible to ignore. It sometimes is used to refer to a question or problem that very obviously stands to reason, but which is ignored for the convenience of one or more involved parties. The idiom also implies a value judgment that the issue *should* be discussed openly. See http://en.wikipedia.org/wiki/Elephant_in_the_room.

as capable as men of contributing to the science and engineering enterprise. Second, the science and engineering community needs to come to terms with the biases and structures that impede women in realizing their potential. Finally, the community needs to work together, across departments, through professional societies, and with funders and federal agencies to bring about gender equity.

The current situation is untenable and unacceptable. We must unite to ensure that all of our nation's people are welcomed and encouraged to excel in science and engineering at our colleges and universities.

Our nation's future depends on it.

Appendix A

Biographical Information

DONNA E. SHALALA (CHAIR) became professor of political science and president of the University of Miami on June 1, 2001. Born in Cleveland, Ohio, she received her AB in history from Western College for Women and her PhD from the Maxwell School of Citizenship and Public Affairs at Syracuse University. A leading scholar on the political economy of state and local governments, she has held tenured professorships at Columbia University, the City University of New York (CUNY), and the University of Wisconsin-Madison. She served in the Carter administration as assistant secretary for policy development and research at the US Department of Housing and Urban Development. From 1980 to 1987, she served as president of Hunter College of CUNY; from 1987 to 1993, she was chancellor of the University of Wisconsin-Madison. In 1992, *Business Week* named her one of the top five managers in higher education. In 1993, President Clinton appointed her secretary of health and human services; she served for 8 years, becoming the long-serving health and human services secretary. At the beginning of her tenure, the Department of Health and Human Services had a budget of nearly \$600 billion and included a wide variety of programs, such as Social Security, Medicare, Medicaid, child care and Head Start, welfare, the Public Health Service, the National Institutes of Health, the Centers for Disease Control and Prevention, and the Food and Drug Administration. Dr. Shalala has more than three dozen honorary degrees and a host of other honors, including the 1992 National Public Service Award, and the 1994 *Glamour* magazine Woman of the Year Award. In 2005, she was named one of America's Best Leaders by *US News and*

World Report and the Center for Public Leadership at Harvard University's Kennedy School of Government. She has been elected to the Council on Foreign Relations, the National Academy of Education, the National Academy of Public Administration, the American Academy of Arts and Sciences, the National Academy of Social Insurance, the American Academy of Political and Social Science, and the Institute of Medicine.

ALICE M. AGOGINO is the Roscoe and Elizabeth Hughes Professor of Mechanical Engineering and affiliated faculty at the University of California, Berkeley (UCB) Haas School of Business in its Operations and Information Technology Management Group. She directs the Berkeley Expert Systems Technology Laboratory and the Berkeley Instructional Technology Studio. She is vice chair of the UCB Division of the Academic Senate and served as chair during the 2005-2006 academic year. She has served in a number of administrative positions at UCB including associate dean of engineering and faculty assistant to the executive vice chancellor and provost in educational development and technology. She also served as director for Synthesis, a National Science Foundation (NSF)-sponsored coalition of eight universities with the goal of reforming undergraduate engineering education, and she continues as principal investigator for the National Engineering Education Delivery System and the digital libraries of courseware in science, mathematics, engineering, and technology. She has supervised 65 MS projects and theses, 26 doctoral dissertations, and numerous undergraduate researchers. Dr. Agogino is a registered Professional Mechanical Engineer in California and is engaged in a number of collaborative projects with industry. Before joining the UCB faculty, she worked in industry for Dow Chemical, General Electric, and SRI International. Her research interests include intelligent learning systems; information retrieval and data-mining; multiobjective and strategic-product design; nonlinear optimization; probabilistic modeling; intelligent control and manufacturing; sensor validation, fusion, and diagnostics; wireless sensor networks; multimedia and computer-aided design; design databases; design theory and methods; microelectromechanical systems (MEMS) synthesis and computer-aided design; artificial intelligence and decision and expert systems; and gender equity. She serves on the editorial boards of three professional journals and has provided service on a number of government, professional, and industry advisory committees. Dr. Agogino received a BS in mechanical engineering from the University of New Mexico (1975), an MS in mechanical engineering (1978) from the UCB, and a PhD from the Department of Engineering-Economic Systems at Stanford University (1984). She received an NSF Presidential Young Investigator Award in 1985. She is a member of the National Academy of Engineering and the European Academy of Science; is a Fellow of the American Association for the Advance-

ment of Science, the American Society for Mechanical Engineers, and of the Association of Women in Science; and was awarded the NSF Director's Award for Distinguished Teaching Scholars in 2004.

LOTTE BAILYN is a professor of management (in the Organization Studies Group) at the Massachusetts Institute of Technology (MIT) Sloan School of Management and Co-director of the MIT Workplace Center. In her work, she has set out the hypothesis that by challenging the assumptions in which current work practices are embedded, it is possible to meet the goals of both business productivity and employees' family and community concerns and to do so in ways that are equitable for men and women. Her most recent book—*Beyond Work-Family Balance: Advancing Gender Equity and Workplace Performance* (Jossey Bass, 2002) with Rhona Rapoport, Joyce K. Fletcher, and Bettye H. Pruitt—chronicles a decade of experience working with organizations that supports this hypothesis while showing how difficult it is to challenge workplace assumptions. She serves on the National Academies Committee on Women in Science and Engineering.

ROBERT J. BIRGENEAU became the ninth chancellor of UCB on September 22, 2004. An internationally distinguished physicist, he is a leader in higher education and is well known for his commitment to diversity and equity in the academic community. Before coming to UCB, he served 4 years as president of the University of Toronto. He previously was dean of the School of Science at MIT, where he spent 25 years on the faculty. He is a foreign associate of the National Academy of Sciences, has received many awards for teaching and research, and is one of the most cited physicists in the world for his work on the fundamental properties of materials. A Toronto native, Dr. Birgeneau received his BSc in mathematics from the University of Toronto in 1963 and his PhD in physics from Yale University in 1966. He served on the Yale faculty for 1 year, spent 1 year at Oxford University, and was a member of the technical staff at Bell Laboratories from 1968 to 1975. He joined the MIT physics faculty in 1975 and was named chair of the Physics Department in 1988 and dean of science in 1991. At UCB, Dr. Birgeneau holds a faculty appointment in the Department of Physics in addition to serving as chancellor.

ANA MARI CAUCE is the executive vice provost and Earl R. Carlson Professor of Psychology at the University of Washington. She graduated from Yale University, earning a PhD in psychology in 1984. She began teaching at the University of Washington in 1986 in the Department of Psychology. She also has a joint appointment in the Department of American Ethnic Studies and an adjunct appointment in women's studies, and served as chair of the Department of Psychology. Since she began her

graduate work, she has been particularly interested in normative and nonnormative development in ethnic-minority youth and in at-risk youth more generally. She has published almost 100 articles and chapters and has been recipient of grants from the W.T. Grant Foundation, the National Institute of Mental Health, the National Institute of Child Health and Human Development, and the National Institute of Alcoholism and Alcohol Abuse. She is the recipient of numerous awards, including recognition by the American Psychological Association for excellence in research on minority issues; Distinguished Contribution Awards from the Society for Community Research and Action; and membership in the American Psychological Association Minority Fellowship program. She has also received the University of Washington's Distinguished Teaching Award. Dr. Cauce is currently president-elect of the Society for Community Research and Action.

CATHERINE D. DEANGELIS is editor-in-chief of the *Journal of the American Medical Association (JAMA)*, editor-in-chief of *Scientific Publications and Multimedia Applications*, and professor of pediatrics at Johns Hopkins University School of Medicine. She received her MD from the University of Pittsburgh's School of Medicine, her MPH from the Harvard Graduate School of Public Health (Health Services Administration), and pediatric specialty training at the Johns Hopkins Hospital. Dr. DeAngelis oversees *JAMA*, nine *Archives* publications, and *JAMA*-related Web-site content. Before her appointment with *JAMA*, she was vice dean for academic affairs and faculty at Johns Hopkins University School of Medicine; from 1994 to 2000, she was editor of *Archives of Pediatrics and Adolescent Medicine*. She has been a member of numerous journal editorial boards. She has written or edited 11 books on pediatrics and medical education and has published more than 200 original articles, chapters, editorials, and abstracts. Most of her recent publications have focused on conflicts of interest in medicine, on women in medicine, and on medical education. Dr. DeAngelis is a member of the Institute of Medicine, a Fellow of the American Association for the Advancement of Science, and she has served as an officer of numerous national academic societies, including being chairman of the American Board of Pediatrics and chair of the Pediatric Accreditation Council for Residency Review Committee of the American Council on Graduate Medical Education.

DENICE DEE DENTON was the chancellor of the University of California, Santa Cruz. She had been dean of and a professor in the University of Washington's College of Engineering. Earlier, she was a faculty member in electrical engineering and chemistry at the University of Wisconsin-Madison. While at the University of Washington, Dr. Denton led the develop-

ment of the Faculty Recruitment Toolkit, a resource for attracting a top-notch and diverse faculty. In a single year (2001), nine faculty members received the prestigious NSF Career Award. In addition, federal research funding more than doubled in 3 years (1998-2001), from \$33.1 million in grants and contract awards to more than \$75 million. She emphasized implementing effective ways to teach a diverse engineering student body using a more project-oriented, experiential approach. Her work was facilitated by the Center for Engineering Learning and Teaching, the first center of its kind when it was established in 1998. Dr. Denton directed the University of Washington's NSF ADVANCE program for advancing women faculty in science and engineering. In 2004, Dr. Denton was honored by the White House with the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, recognizing her role as a national leader in engineering education. Dr. Denton chaired the National Academy of Engineering's Board on Engineering Education from 1996 to 1999. She was a Fellow of the American Association for the Advancement of Science, the Association of Women in Science, and the Institute of Electrical and Electronics Engineers (IEEE). Her awards for research and teaching included the NSF Presidential Young Investigator Award (1987), the Kiekhofers Distinguished Teaching Award (University of Wisconsin, 1990), the American Society of Engineering Education AT&T Foundation Teaching Award (1991), the Eta Kappa Nu C. Holmes MacDonald Distinguished Young Electrical Engineering Teaching Award (1993), the Benjamin Smith Reynolds Teaching Award (University of Wisconsin, 1994), the W.M. Keck Foundation Engineering Teaching Excellence Award (1994), the ASEE George Westinghouse Award (1995), and the IEEE/HP Harriet B. Rigas Award (1995). Dr. Denton earned her BS, MS (1982), and PhD (1987) in electrical engineering at MIT and conducted research on MEMS as an enabling technology particularly in life-sciences applications.

BARBARA J. GROSZ is Higgins Professor of Natural Sciences in the Division of Engineering and Applied Sciences and dean of science of the Radcliffe Institute for Advanced Study at Harvard University. Dr. Grosz is known for her seminal contributions to the fields of natural-language processing and multiagent systems. She developed some of the earliest and most influential computer-dialogue systems and established the research field of computational modeling of discourse. Her work on models of collaboration helped to establish that field of inquiry and provides the framework for several collaborative multiagent systems and human computer interface systems. She has been elected to the American Philosophical Society and the American Academy of Arts and Sciences. She is a fellow of the American Association for Artificial Intelligence, the American Association for the Advancement of Science, and the Association for Computing Machinery; is a

recipient of the UCB Computer Science and Engineering Distinguished Alumna Award, awards for distinguished service from major artificial-intelligence societies, and is widely respected for her contributions to the advancement of women in science. She chaired the Harvard Faculty of Arts and Sciences (FAS) Standing Committee on the Status of Women when it produced the report *Women in Science at Harvard; Part I: Junior Faculty and Graduate Students* in 1991. She was interim associate dean for affirmative action at Harvard in 1993-1994 and served on the FAS Ad Hoc Committee on Faculty Diversity from 1998 to 2001 and the Standing Committee on Women from 1988 to 1995 and again in 1999. Dr. Grosz recently chaired the 2005 Harvard Task Force on Women in Science and Engineering. Before joining the faculty at Harvard, she was director of the natural-language program at SRI International and co-founder of the Center for the Study of Language and Information. She received an AB in mathematics from Cornell University and a PhD in computer science from UCB.

JO HANDELSMAN is a Howard Hughes Medical Institute professor in the Department of Plant Pathology at the University of Wisconsin-Madison (UW-Madison). She received a BS in agronomy from Cornell University and a PhD in molecular biology from UW-Madison. In addition, from 1997 to 1999, she was director of the Institute for Pest and Pathogen Management at UW-Madison. Dr. Handelsman studies the communication networks of microbial communities. She is a coauthor of a book about inquiry-based biology teaching titled *Biology Brought to Life*. In 2002, she was named Clark Lecturer in Soil Biology and received the Chancellor's University Teaching Award at UW-Madison. In addition, she has been active in achieving equity for women and minorities on campus, and her contributions were recognized with the Cabinet 99 Recognition Award. She contributed to the inception of the Women in Science and Engineering residence hall; has chaired the provost's Climate Working Group, an initiative dedicated to improving the campus climate for women and nonwhites; and, through an NSF grant, established, with others, the Women in Science and Engineering Leadership Institute.

NANNERL O. KEOHANE is the Laurance S. Rockefeller Distinguished Visiting Professor of Public Affairs at Princeton University. She was the eighth president of Duke University, serving from 1993 to 2004. Dr. Keohane came to Duke from the presidency of Wellesley College. She was the first woman to serve as Duke's president and among the first women to oversee a leading US research university. Under her leadership, Duke launched major programs in fields ranging from genomics to ethics, raised more than \$2 billion through the Campaign for Duke, established the Duke University Health System, and became a much more diverse and interna-

tional institution. Dr. Keohane is a 1961 graduate of Wellesley and earned advanced degrees at Oxford University and Yale University before beginning a career as a professor of political science at Swarthmore College, the University of Pennsylvania, and Stanford University. She returned to Wellesley in 1981 and served as its president for 12 years before moving to Duke.

SHIRLEY MALCOM is head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science and a fellow of the association. The directorate includes programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom serves on several boards—including the Howard Heinz Endowment, the H. John Heinz III Center for Science, Economics and the Environment, and the National Park System Advisory Board—and is an honorary trustee of the American Museum of Natural History. She serves as a regent of Morgan State University and as a trustee of California Institute of Technology. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers, and literacy. Dr. Malcom is a former trustee of the Carnegie Corporation of New York. She is a fellow of the American Academy of Arts and Sciences. She served on the National Science Board, the policy-making body of the NSF, from 1994 to 1998 and on the President's Council of Advisors on Science and Technology from 1994 to 2001. Dr. Malcom received her doctorate in ecology from Pennsylvania State University; her master's degree in zoology from the University of California, Los Angeles; and her bachelor's degree with distinction in zoology from the University of Washington. In addition, she holds 13 honorary degrees. In 2003, Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.

GERALDINE RICHMOND is the Richard M. and Patricia H. Noyes Professor in the Department of Chemistry and Materials Science Institute at the University of Oregon. Dr. Richmond received her bachelor's degree in chemistry from Kansas State University and her PhD in chemical physics at the UCB. For the last 25 years, her research has focused on the development and application of state-of-the-art lasers to study surface chemistry and physics. On a national level, Dr. Richmond has served on many science boards and advisory panels overseeing funding for science, technology, and education. She has been honored with numerous national and regional awards for her research, her teaching, and her efforts in encouraging women of all ages to enter and succeed in science careers. In 2001, she was named Oregon Scientist of the Year by the Oregon Academy of Sci-

ence. Dr. Richmond is a member of the Chemical Sciences Roundtable of the National Academy of Sciences and a governor's appointee to the Oregon State Board of Higher Education for 1999-2006. She is the founder and chair of the Committee on the Advancement of Women Chemists and was the 2005 winner of the American Chemical Society Award for Encouraging Women into Careers in the Chemical Sciences.

ALICE M. RIVLIN is a visiting professor at the Public Policy Institute of Georgetown University and a Senior Fellow in the Economic Studies Program at the Brookings Institution. She is the director of the Greater Washington Research Program at Brookings. Dr. Rivlin served as vice chair of the Federal Reserve Board from 1996 to 1999. She was director of the White House Office of Management and Budget from 1994 to 1996 and deputy director in 1993-1994. She served as chair of the District of Columbia Financial Management Assistance Authority (1998-2001). Dr. Rivlin was the founding director of the Congressional Budget Office (1975-1983). She was director of the Economic Studies Program at Brookings (1983-1987). She also served at the Department of Health, Education, and Welfare as assistant secretary for planning and evaluation (1968-1969). Dr. Rivlin received a MacArthur Foundation Prize Fellowship; taught at Harvard, George Mason, and New School Universities; and has served on the boards of directors of several corporations and as president of the American Economic Association. She is a member of the board of directors of BearingPoint and the Washington Post Company. She is a frequent contributor to newspapers, television, and radio and has written numerous books. Her books include *Systematic Thinking for Social Action* (1971), *Reviving the American Dream* (1992), and *Beyond the Dot.coms* (with Robert Litan, 2001). She is coeditor (with Isabel Sawhill) of *Restoring Fiscal Sanity: How to Balance the Budget* (2004) and (with Litan) of *The Economic Payoff from the Internet Revolution* (2001). Dr. Rivlin received a BA in economics from Bryn Mawr College in 1952 and a PhD in economics from Radcliffe College in 1958.

RUTH SIMMONS became president of Brown University in 2000. She has spent her career advocating for a leadership role for higher education in the arena of national and global affairs. Dr. Simmons has created a set of initiatives designed to expand the faculty; increase financial support and resources for undergraduate, graduate, and medical students; improve facilities; renew a broad commitment to shared governance; and ensure that diversity informs every dimension of the university. Those initiatives have led to a major investment of new resources in Brown's educational mission. A French professor before entering university administration, Dr. Simmons also holds an appointment as a professor of comparative literature and of

African studies at Brown. She graduated from Dillard University in New Orleans before completing her PhD in Romance languages and literatures at Harvard. She served in various administrative roles in the University of Southern California, Princeton University, and Spelman College before becoming president of Smith College, the largest women's college in the United States. At Smith, she launched a number of initiatives, including an engineering program, the first at an American women's college. Dr. Simmons is the recipient of many honors, including a Fulbright Fellowship, the 2001 President's Award from the United Negro College Fund, the 2002 Fulbright Lifetime Achievement Medal, and the 2004 Eleanor Roosevelt Val-Kill Medal. She has been a featured speaker in many public venues, including the White House, the World Economic Forum, the National Press Club, the American Council on Education, and the Phi Beta Kappa Lecture at Harvard University. She has been awarded numerous honorary degrees.

ELIZABETH SPELKE is Berkman Professor of Psychology and co-director of the Mind, Brain, and Behavior Initiative at Harvard University. She studies the origins and nature of knowledge of objects, persons, space, and number by assessing behavior and brain function in human infants, children, and adults, and nonhuman animals. A member of the National Academy of Sciences and the American Academy of Arts and Sciences and cited by *Time* magazine as one of America's Best in Science and Medicine, she has received such honors as the Distinguished Scientific Contribution Award of the American Psychological Association and the William James Award of the American Psychological Society.

JOAN STEITZ is Sterling Professor of Molecular Biophysics and Biochemistry at Yale University School of Medicine and an investigator at the Howard Hughes Medical Institute. She earned her BS in chemistry from Antioch College in 1963 and her PhD in biochemistry and molecular biology from Harvard University in 1967. She spent the next 3 years in postdoctoral studies at the MRC Laboratory of Molecular Biology in Cambridge and joined the Yale faculty in 1970, where her teaching focuses on undergraduates. Dr. Steitz is best known for discovering and defining the function of small nuclear ribonucleoproteins, which occur only in higher cells and organisms. These cellular complexes play a key role in the splicing of premessenger RNA, the earliest product of DNA transcription. Dr. Steitz is a member of the National Academy of Sciences, the American Association of Arts and Sciences, the American Philosophical Society, and the Institute of Medicine. She is a recipient of the National Medal of Science, 11 honorary degrees, and a Gairdner Foundation International Award. She serves on numerous review and editorial boards.

ELAINE WEYUKER is a principal technical staff member at AT&T Labs in Florham Park, New Jersey. Dr. Weyuker received a PhD in computer science from Rutgers University and an MSE from the Moore School of Electrical Engineering, University of Pennsylvania. Before moving to AT&T Labs in 1993, she was a professor of computer science at the Courant Institute of Mathematical Sciences of New York University, where she had been on the faculty since 1977. Her research interests are in software engineering, particularly software testing and reliability, and software metrics, and she has published many papers in those fields. She has been elected to the National Academy of Engineering, is a Fellow of the Institute of Electrical and Electronics Engineers, and is a Fellow of the Association of Computing Machinery (ACM). Dr. Weyuker is one of only two female AT&T Fellows. In each of the past 6 years, the *Journal of Systems and Software* has rated her as one of the top five software engineering researchers in the world. In November 2001, the New York City YWCA honored Dr. Weyuker as a Woman Achiever for both her career achievements and her community service. She has made major contributions to the formal foundations of testing and to establishing testing as an empirical discipline and has been a prime mover in making testing a recognized professional specialty. She has been a lecturer, teacher, and mentor; and she has been actively involved in professional activities. She was a founding member of the ACM Committee on the Status of Women and Minorities, which was established to improve the status of underrepresented groups by developing programs to target girls and young minority-group members. During her tenure, the committee established a successful distributed-mentoring program.

MARIA T. ZUBER is the E.A. Griswold Professor of Geophysics at MIT, where she also leads the Department of Earth, Atmospheric, and Planetary Sciences. Dr. Zuber has been involved in more than a half dozen National Aeronautics and Space Administration (NASA) planetary missions aimed at mapping the Moon, Mars, and several asteroids. She received her BA from the University of Pennsylvania and ScM and PhD from Brown University. She was on the faculty at Johns Hopkins University and served as a research scientist at Goddard Space Flight Center in Maryland. She is a member of the National Academy of Sciences and the American Philosophical Society and is a fellow of the American Academy of Arts and Sciences and of the American Geophysical Union, where she served as president of the Planetary Sciences Section. Among her awards are the NASA Distinguished Public Service Medal, the NASA Scientific Achievement Medal, the Brown University Horace Mann Medal, and a Scientific Achievement Award from the American Institute of Aeronautics and Astronautics. Dr. Zuber served on the Mars Program Independent Assessment Team that investigated the

Mars mission losses in 1999 and more recently on the Presidential Commission on the Implementation of the United Space Exploration Policy tasked with conceiving a plan to implement President Bush's Vision for Space Exploration. In 2002, *Discover* magazine named her one of the 50 most important women in science.

Appendix B

Statement of Task

Research in science and engineering has been and remains central to the US role in the world, the culture of the nation, its continuing economic development, and its security. It is imperative that the nation access its entire talent pool. However, it is clear from several recent studies that while women are an increasing proportion of those earning undergraduate and graduate degrees in science and engineering fields, they have not been hired into academic positions commensurate with this increasing representation. Ultimately, this means that the academic research enterprise is missing out on talent, and will underperform relative to its potential.

The study committee will integrate the wealth of data available on gender issues across all fields of science and engineering. The committee will focus on academe, but will examine other research sectors to determine if there are effective practices in place relevant to recruiting, hiring, promotion, and retention of women science and engineering researchers. Throughout the report, profiles of effective practices, scenarios, and summary boxes will be used to reinforce the key concepts.

The committee is charged to:

1. Review and assess the research on gender issues in science and engineering, including innate differences in cognition, implicit bias, and faculty diversity.
2. Examine the institutional culture and practices in academic institutions that contribute to and discourage talented individuals from realizing their full potential as scientists and engineers.

3. Determine effective practices to ensure women doctorates have access to a wide range of career opportunities, in academe and in other research settings.

4. Determine effective practices on recruiting and retention of women scientists and engineers in faculty positions.

5. Develop findings and provide recommendations based on these data and other information the committee gathers to guide the following groups on how to maximize the potential of women science and engineering researchers:

(a) Faculty: roles in hiring, promotion, retention, and mentoring.

(b) Deans and Department Chairs: roles in hiring and promotion and equitable provision of resources.

(c) Academic Leadership: roles in hiring, promotion, resource allocation, tracking, and setting the tone for institutional culture.

(d) Funding Organizations: roles in education and training, compensation levels, review, and tracking of grant applicant and recipient data.

(e) Government: roles in enhancing and diversifying access to education, training, and research funding, and in ensuring that data about program users are collected and available for assessment purposes.