Enhancing Diversity in Science brought together leaders from professional associations and scientific societies, universities, federal agencies, and private foundations to explore issues related to broadening participation in the science and engineering workforce and to develop a set of actionable recommendations that the organizations could implement individually and in concert.

Speakers were selected to present ideas, catalyze thinking, and set the context for the breakout group discussions. The speakers were asked to describe personal experiences as well as present strategic perspectives for working with government, foundations, and universities. The planning committee encouraged communication and information sharing among participants—through five concurrent breakout sessions in the morning and afternoon—by crafting discussion prompts and assigning informed moderators to focus participation toward clear action steps. (See retreat agenda in Appendix B.)

Summary of Keynote and Panel Discussions

The following section summarizes the topics covered by keynote presentations and panel sessions, which provided a framework for the meeting. These sessions addressed the following questions:

- Why is enhancing diversity in science and engineering important?
- What are the obstacles to enhancing diversity in science?
- What are organizations doing to enhance diversity in science?

Why Is Enhancing Diversity in Science and Engineering Important?

As other countries expand their science and engineering enterprises, scholars and policy makers question whether the United States has the workforce capacity to maintain its competitive edge in these areas. The United States has historically met labor force demands by retraining workers from other fields, relying on immigration, out-sourcing, or off-shoring the work, noted retreat speaker Shirley M. Malcom, head of Education and Human resources at the American Association for the Advancement of Science. Now, as other countries recognize the value of investing in science, technology, and education, they are beginning to adopt the U.S. strategy. As a result, the United States may not be able to continue to rely on immigration to satisfy the increasing demand for scientists and engineers. The good news, according to Malcom, is that “we have no shortage [of scientists and engineers] in the U.S... and according to economists, we probably won’t.” She noted, however, that there is a shortage of minority scientists and engineers. The United States has the talent, panelists agreed, to meet the demands of the 21st century workplace.

NIH Deputy Director Raynard S. Kington reinforced this point when he cited U.S. census data showing that 40 percent of the 18-year-olds counted in the 2000 census were African American, Hispanic, or Asian American. This number is expected to be more than 50 percent by 2050. With a majority of the population expected to come from underrepresented groups, we have a “demographic imperative” to ensure that these individuals are represented in the scientific and engineering workforce. “It’s very important... that we don’t waste any talent we might have,” agreed COSSA’s executive director, Howard J. Silver.

Although the “demographic imperative” is a strong motivator of efforts to broaden participation in science and engineering, Malcom encouraged participants to consider the value of diversity itself, asking: “What do we gain by having diverse teams? What do these diverse perspectives allow us to do and be and to accomplish?”

At the National Science Foundation (NSF), “passion” for enhancing diversity stems from the belief “that the scientific and engineering enterprise is strengthened by the intellectual diversity of thought, as well as the diversity and the composition of the participants, and by
the belief that excellence exists everywhere,” said NSF Deputy Assistant Director for Education and Human Resources, Wanda E. Ward.

Duke University scientist Erich D. Jarvis drew on examples from his own life and the experiences of his students to emphasize that racial, ethnic, and cultural backgrounds influence perspectives on science. “We have to convince people that the reason to have diversity is that it actually breeds success,” said Jarvis.

Demonstrating the value diversity adds to science and education is especially important in the wake of the U.S. Supreme Court’s recent affirmative action decisions. Retreat speaker Arthur L. Coleman, an attorney and former Deputy Assistant Secretary for Civil Rights in the Department of Education, said institutions cannot rely solely on “social justice” arguments or on the perceived need for “compositional diversity” to justify diversity-focused programs and policies. Rather, they must demonstrate that there are “research-based educational benefits associated with diversity in the classroom and in the social setting on a university campus.” The Court’s rulings in the University of Michigan cases “held that, the educational benefits of diversity were compelling,” Coleman noted. This has opened opportunities for broadening participation at colleges and universities. The challenge, Coleman said, is to create an “authentically mission-aligned, integrated, and holistic system of policy development” by which institutions can determine the importance of enhancing educational access and the means to achieve it. Coleman strongly emphasized the need for leadership—and the investment of resources, time, and effort that comes with it—necessary to make diversity a priority.

Institutional commitment to diversity is an essential element of the educational programs that successfully move minority students into scientific careers, agreed Freeman A. Hrabowski, III, President of the University of Maryland, Baltimore County (UMBC). Citing successes such as his university’s Meyerhoff Scholars Program, he described a campus in which diversity efforts are a central concern to leadership and faculty alike. The result has been a thoughtful and rigorous education for all students and striking success in increasing the number of minority students who have gone on to complete doctoral degrees in the sciences.

Andrés E. Jiménez, an administrator in the Division of Academic Affairs at the University of California, echoed Hrabowski’s comments when he said that without senior faculty and administrators representing diversity and bringing equity and inclusion into our institutions, “we cannot achieve the goals that we set forth in this conversation today.”

What Are the Obstacles to Enhancing Diversity in Science?

Careers are often described as following a “pipeline” in which individuals progress linearly from K-12 to professional positions. Several speakers noted, however, that career pathways in the sciences are neither linear nor static. Students may acquire an interest in science at many points in their education, and while some go on to become university and college faculty, others establish careers in industry, clinical practice, and government and policy, among other areas. “These are all successful outcomes,” said Jeremy M. Berg, Director of the National Institute of General Medical Sciences (NIGMS) at NIH.

There is a particular need, however, to ensure that we have a sufficient and adequately diverse pool of academic researchers. Panelists acknowledged that pursuing a career in science requires students to navigate a series of educational and career transitions. “Every time you move from one level to the next... you lose people” stated Malcom. Attrition of minority students may be especially great because these groups “have not had a strong attachment to science and engineering fields.” This point was underscored by Hrabowski, who addressed specific challenges to encouraging minority students to pursue and complete advanced training in
Erich D. Jarvis

Erich Jarvis is associate professor of neurobiology at Duke University Medical Center where he has recently been named a Howard Hughes Medical Institute (HHMI) investigator. He studies the neurobiology of vocal communication in parrots, hummingbirds, songbirds and humans. His overall goal is to see whether similarities in brain structures across these groups reveal “constraints on the evolution of brain structures necessary for vocal learning.”

Jarvis did not immediately set his sights on becoming a scientist. His first love was dance. Raised in New York City, he attended the High School of the Performing Arts to study ballet, and later modern dance. He won scholarships to the Geoffrey Ballet School in New York, as well as the Alvin Ailey Dance School. “There was a lot of psychological support in my family to challenge yourself, do something that has a positive impact on the world, and be ambitious at it if need be.” As he neared high school graduation, he made the decision to transition from a career as a professional dancer to a scientist, believing that he would have a greater impact as a scientist. Jarvis turned down the Alvin Ailey scholarship and attended Hunter College instead where he majored in biology and math.

But dance was never far behind. “I discovered that the discipline I learned as a dancer, the kind of training and the hard work, and the practice and practice until you get it right again — because you can fail a lot of times — was actually very useful, in some ways almost essential for becoming a scientist.”

During his undergraduate years at Hunter, and later at Rockefeller University where he earned in a PhD neurobiology and animal behavior, Jarvis was supported by a Minority Access to Research Careers (MARC) Fellowship from the National Institute of General Medical Sciences. But he struggled with the idea that his ethnicity had become an advantage. Many of his non-white peers looked down on the MARC Fellowship, believing that he was getting a free ride, and Jarvis fought hard not to internalize these negative opinions. Over time, he came to appreciate the value of a MARC Fellowship as well as its necessity.

“We basically have to convince people that the reason to have diversity is that it actually breeds success. Not because you’re trying to be fair, not because you’re forcing somebody to, although those things might work to a certain degree, but because it breeds success. What we need now is more people to lead by example than by being activists; we need the activists, but there is a dearth of people leading by example, and that’s what I decided to try to do.”

In addition to being named a HHMI Investigator, Jarvis is the recipient of one of the most prized awards given by the National Institutes of Health (NIH Pioneers Award), and one of the highest given by the National Science Foundation (Alan T. Waterman Award).
science, especially at the doctorate level. He has had to think hard about how to get minority students at his own institution to value doctoral education and “to get them excited about becoming PhDs, and in some cases, MD-PhDs.” Recruiting and retaining even those students with a strong interest in science can be difficult. Minority students may be faced with inadequate preparation in foundational math and science courses, financial constraints that compel them to take jobs that detract from their studies, and intended or unintended discrimination. Malcom stated that some people still view underrepresented minorities as the “Achilles heel,” rather than the “ace in the hole” in terms of their potential to contribute to science and engineering.

Troubling disparities between minority scientists and others do not end even when scientists move into the ranks of faculty and independent researchers, Kington noted. African American scientists constituted only 1.3–1.8 percent of principal investigators on investigator-initiated NIH grants between 2000 and 2006. Figures for Hispanics are somewhat better, he stated, but “no strong trends in an upward direction” exist for either group. There are also racial and ethnic differences in success rates for NIH grants, said Kington. The success rate for African American scientists in 2006 was 12.6 percent, whereas their white and Hispanic counterparts received grants at a rate of 21.7 percent and 19.2 percent, respectively. It is not understood, however, what the underlying causes are for those differences. Because today’s scientists have a significant role to play both in training and in serving as role models to students and young professionals, the dearth of minorities in the field may make it difficult to recruit and retain people from underrepresented groups in the future.

**What Are Organizations Doing to Enhance Diversity in Science?**

Broadening participation in science and engineering has long been framed in terms of “trying to fix the students instead of trying to fix the system,” observed Malcom. There is a need, however, for systemic change, and there are myriad opportunities to implement this change. Malcom pointed to the importance of improving the quality of undergraduate coursework and research experiences, providing students with opportunities for mentoring, networking, and leadership training. She also said it is important to develop resources that highlight the variety of career options in the sciences. Professional associations and scientific societies have a role to play in all of these efforts, she said, including “recognizing and celebrating” champions of diversity and “affecting and informing policies” that enable the community to move forward on these issues.

A survey of professional associations and scientific societies conducted by the retreat’s planning committee found that these groups are indeed engaged in efforts to improve diversity in science. Nearly half of the 93 societies responding to the survey reported that they sponsor formal programs dedicated to minority training and career development, reported Mary Ann McCabe, Director of the Office for Policy and Communications at the Society for Research in Child Development. These programs tend to focus on undergraduate and graduate students, but programs also exist for those at the K–12, postdoctoral, and early career stages. (See Appendix E for results of the Enhancing Diversity in Science survey.)

A wide variety of initiatives are underway in academe, as well. “Programs can work,” said Joan Y. Reede of Harvard Medical School, who heads an office involved in more than 20 diversity-related initiatives, ranging from K–12 to faculty development (see sidebar on page 12). In the 18 years that Harvard’s minority faculty program has existed, the number of underrepresented minority faculty members has risen from 185 to 467. Harvard’s biomedical science careers program, a separate nonprofit organization established by Harvard Medical School, the New England Board of Higher Education, and the Massachusetts Medical Society, has served more than 6,000 students and a range of industries and educational institutions. Working together, Reede says, they have “been able to design programs that address students’ awareness of career options, enabling them to understand that there are multiple trajectories in science and multiple ways to enter and exit the system.”

UMBC, has also had tremendous success in advancing minority scientists, noted Hrabowskii. UMBC has been a leader in producing minority bachelor’s degree recipients—particularly African Americans and Hispanics—
who also earned doctoral degrees in science and engineering, a success at least partially attributable to its Meyerhof Scholars Program (see sidebar on page 14). UMBC also holds an NSF ADVANCE grant through which they have been working to increase the representation of women among faculty. These efforts have had an impact: UMBC doubled the number of tenure-track and tenured women in these fields over the course of about seven years.

UMBC’s success is partly the result of its sharp focus on the organizational environment, said Hrabowski. “We work very hard to pinpoint, to highlight and reflect on the strengths of the campus.” This includes assessing the institution’s capabilities, ensuring that strategies are linked to the people responsible for implementing them, synchronizing activities across individuals and disciplines, and linking rewards to outcomes. On the ground level, UMBC makes a strong effort to prepare students for the rigors of scientific training by providing them with a strong foundation in math and science. For

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**Harvard Medical School Minority Faculty Development Program**

In May of 1990, the Harvard Medical School Faculty Council unanimously approved the creation of the Minority Faculty Development Program (MFDP).

MFDP is designed to support the career development of junior faculty and to address crucial pipeline issues. This includes:

- Increasing the pool of minority students interested in careers in science and medicine;
- Promoting medical students, graduate students, and fellows to develop the needed skills for success in the academic arena; and Advancing the career development of junior faculty.

MFDP is a part of the Harvard Medical School Office for Diversity and Community Partnership.

The Office for Diversity and Community Partnership was created to promote increased recruitment, retention and advancement of underrepresented minority faculty at Harvard Medical School and to oversee all diversity activities involving Harvard Medical School faculty, trainees, students and staff.

DCP seeks to preserve the Harvard tradition of excellence in medicine and science by amplifying the search for, and support of, well-trained faculty, while creating a cadré of medical professionals reflecting the larger community that we serve. In addition, the Office coordinates the School’s many and varied interactions with community groups and organizations. The DCP programs and initiatives fall into two broad areas – minority faculty development and community outreach.

The HMS Affiliated Hospitals and Institutions

- Beth Israel Deaconess Medical Center
- The Cambridge Hospital
- Children’s Hospital Boston
- The Forsyth Institute
- Joslin Diabetes Center
- Massachusetts Eye and Ear Infirmary
- Massachusetts Mental Health Center
- Mount Auburn Hospital
- Spaulding Rehabilitation Hospital
- Brigham and Women’s Hospital
- The CBR Institute for Biomedical Research
- The Dana-Farber Cancer Institute
- Harvard Pilgrim HealthCare
- Judge Baker Children’s Center
- Massachusetts General Hospital
- McLean Hospital
- Schepens Eye Research Institute
- VA Boston Healthcare System

Source: [http://www.mfdp.med.harvard.edu/about_mfdp/index.htm](http://www.mfdp.med.harvard.edu/about_mfdp/index.htm)
instance, students who receive mediocre grades in math and science courses are urged to repeat them so that they achieve mastery before advancing. UMBC is committed to evaluating the success of its efforts and applying the lessons learned to improving the education and experience of all its students and faculty.

Initiatives aimed at broadening participation operate at the federal level, as well. According to Ward, NSF’s portfolio includes programs that address individual and institutional-level factors in the successful production of scientists, technologists, engineers, and mathematicians.” Institutional programmatic approaches include NSF’s premier Math and Science Partnership (MSP) program engages higher education faculty in the improvement of K–12 teaching. Their flagship undergraduate program, the Louis Stokes Alliances for Minority Participation (LSAMP), has proven to be quite successful, said Ward. An analysis of the program shows that LSAMP students were more likely to pursue and to complete a graduate degree than majority or minority students who did not participate in the program. At the graduate level, NSF sponsors the Alliances for Graduate Education to the Professoriate (AGEP) program, in which nearly half of the nation’s 1,450 underrepresented minority PhDs have participated.

Ward also described newer approaches at NSF to bring together programs to increase synergy and collaboration across those funded activities and within institutions of higher education. The *Innovation through Institutional Integration* (I-3) activity is one such effort and focuses on broadening participation, critical junctures, integration of research and education, a globally engaged workforce, and research and evaluation. She then described NSF support for various professional associations that are leading broadening participation efforts in STEM education and suggested how such efforts might also operate in a more integrative and collaborative fashion.

Programs at NIH tend to be focused at the undergraduate, graduate, and early career level, said Berg of NIGMS. There is a strong sense at NIH that “by diversifying the university and college faculty, there’s a real potential for having a catalytic effect in terms of making science careers…more attractive to groups that have traditionally been underrepresented,” he said. NIGMS initiatives include: Bridges to the Future, which helps students transition from two-year to four-year colleges and from master’s to doctoral degree programs; undergraduate and graduate student development programs: Research Initiative for Scientific Enhancement (RISE), Initiative for Maximizing Student Diversity (IMSD); Minority Access to Research Careers (MARC), and Undergraduate Student Training in Academic Research (U-STAR); and postdoctoral programs, including the Institutional Research and Academic Career Development Award (IRACDA).

In addition, NIH promotes the participation of underrepresented minorities in science through its institutional National Research Service Award (T32) program. Although T32 is not directed specifically toward underrepresented students, it mandates the inclusion of a minority diversity recruitment plan.

Private funders are also engaged in efforts to improve the recruitment and retention of minority scientists. The Alfred P. Sloan Foundation launched an initiative to create centers around the country that bring together large numbers of Native American/American Indian masters and doctoral students. According to program director, Ted Greenwood, the foundation also has the Minority

1 There are other NIH training programs such as those at the National Institute of Mental Health (NIMH). Relative to other NIH institutes, for example, NIMH has historically devoted a larger percentage of its budget to research training and has funded T32 grants through professional associations and scientific societies since 1974.
Retreat Summary (Cont’d)

PhD Program, which aims to “increase by 100 per year the number of minority students earning PhDs in mathematics, natural science, and engineering.” The program currently serves 81 faculty members on 43 campuses and provides faculty members who have a record of successfully recruiting, mentoring, and graduating minority PhD students with the resources to increase the number of minority students. The package includes scholarship money provided directly to those students and a small sum to institutions to aid in recruitment. The Sloan Foundation holds participating faculty accountable for both the number and the success of their students. To remain in the program, they must succeed in both respects, Greenwood explained.

A recurring theme in the discussion of recruitment and retention programs was the lack of reliable, empirical data on program outcomes and on workforce training and development. Participants saw these data as vital for understanding and improving diversity programs and for building a legal basis to show that they are necessary and effective. It is important to have an evidence base to provide clarity “to what programs are supposed to [do] and what they have accomplished and why they’re needed,” said Berg.

In her remarks, Wanda Ward commended the assembled organizations for coming together to “see how to move forward in the production of underrepresented minorities in the STEM fields.” Much more remains to be done, however, and speakers agreed that professional associations and scientific societies can have an impact. “You can reset the value structure. You can help to legitimize things that would otherwise be seen as tangential,” said Malcom. “There is a power to leadership of the professional societies that is absolutely undeniable.”

University of Maryland, Baltimore County
The Meyerhoff Scholarship Program — Succeeding Together

“Most programs directed to minority students look at remediation and deficits only, on getting students to operate at a minimum level of academic achievement,” says UMBC President Freeman Hrabowski. The Meyerhoff Program offers the nation a different emphasis, one that focuses on highly able African-American students who aspire to become leading research scientists and engineers.

That fundamental shift has captured the attention of many seeking new perspectives on advancing achievement. Scores of representatives from federal agencies, campuses and corporations across the country have all asked Hrabowski the question, “What are you putting in the water?” They visit UMBC’s campus to find out for themselves. The College Board’s National Task Force on Minority High Achievement praised the Meyerhoff Program as an example that could provide broader educational lessons. “If we can reach these students, then we can learn something about how to help all minority students,” explains task force director L. Scott Miller.

The Meyerhoff Program’s success is built on the premise that, among like-minded students who work closely together, positive energy is contagious. By assembling such a high concentration of high-achieving minority students in a tightly knit learning community, students continually inspire one another to do more and better.

Ultimately, the program helps all students learn how to work together and benefit from each others’ experiences. Joel Oppenheim, senior associate dean for graduate students at NYU’s School of Medicine, is one of the program’s biggest admirers. “In addition to producing excellent students, the Meyerhoff Program turns out scholars who have a sense of themselves, of social responsibility, and of ethics, and who continually challenge themselves to do more. The program imbues it. I’ve never seen the ability to instill this kind of leadership and determination anywhere else.”

Source: UMBC (www.umbc.edu/meyerhoff/index.html)
Breakout Sessions Summary

While the panel and keynote presentations provided the overall framework for the meeting, breakout sessions examined issues in detail. In these sessions, participants considered challenges in the context of the policy and funding landscapes, as well opportunities for collaboration among professional associations, funding agencies, and scientific training, and research institutions. In addition, each of the breakout groups developed recommendations to address the challenges identified in the respective discussions. Subjects covered in the breakout sessions include:

- Recruiting and retaining underrepresented minorities
- Mentoring underrepresented minorities
- Evaluating diversity programs
- Building public support for a diverse scientific workforce

Recruiting and Retaining Underrepresented Minorities

Recognizing that scientists face distinct challenges at different phases of their careers, the Enhancing Diversity in Science planning committee established two breakout groups to address the retention of underrepresented minorities in science. The first focused on retention of students, postdoctoral scholars, and early career scientists; the second addressed retention of scientists in early-to-late career phases. Both groups examined the factors that contribute to the attrition of minority scientists, as well as the challenges and constraints that associations face in developing and then sustaining career support and transition programs for these groups. The points listed below reflect the combined comments of both groups:

- Career progression involves a series of transition and decision points as scientists move through educational stages, institutions, and career roles. There is a lack of data on the factors that influence the recruitment into and retention through each of these transition and decision points. Likewise, we know little about the effectiveness of programs aimed at supporting the education and career development of underrepresented scholars and scientists.

- A shortage of peers, mentors, role models, and academic and social support to aid educational and career transitions may contribute to the attrition of minorities from science.

- The academic preparation that minority students receive, particularly at the early stages of their education, may not match or support their aspirations for a research career.

“We start by finding faculty with a record of success with underrepresented minority students or faculty in whom, for other reasons, we come to have confidence that they can successfully recruit, mentor, and graduate minority students with PhDs. That is, we look for champions, faculty champions, of minority students. That’s the word I use: faculty champions.”

—Retreat Speaker
Ted Greenwood

- Students and faculty tend to be poorly informed about the full array of career options available to one with scientific training. As a result, many may leave science because they have lost interest in pursuing a traditional academic research career.

- Minority faculty members are often asked to take on more service activities (e.g., committee service, mentoring) than other faculty members. These activities increase their total workload and may diminish their research productivity. As a result, minority faculty may be both overburdened and penalized in tenure and promotion decisions.

- Financial considerations, including loan debt, often constrain the educational and career choices that aspiring scientists make. These pressures are often more severe for individuals with modest financial resources, including many students from underrepresented groups. As a result, these individuals may choose not to pursue careers in science, opting for more lucrative career paths instead.

- Professional association and scientific society staff
have only limited contact with individual students and scientists, making it a challenge to provide nuanced and sustained support to their members.

- Competing priorities for financial resources and staff time prevent some associations from fully meeting the educational, career, and professional development needs of their members.

**Recommendations**

Professional associations and scientific societies should make recruitment and retention of underrepresented minority scientists a goal of their organizations. These organizations should work with their membership, academic institutions, and funding agencies to monitor impact of programs aimed at broadening participation in science and to develop and sustain effective, new initiatives. Specifically, professional associations and scientific societies should:

- Incorporate diversity goals into their strategic plans. Organizations should espouse inclusion principles in their policies, strategies, program designs, and leadership.
- Work to improve the collection and evaluation of empirical data on underrepresented minorities, as well as research on program outcomes. Likewise, they should work with their members to emphasize the importance of good data collection and evaluation at their home institutions.
- Identify, highlight, and reward model programs and best practices for enhancing diversity.
- Communicate with universities about the status of underrepresented minorities in science to raise awareness and demonstrate commitment and leadership in setting expectations and norms for behavior.
- Provide tools, resources, and incentives to improve member mentoring and provide support to underrepresented minorities during transition periods when there may be gaps in mentoring.
- Provide or identify financial support for professional development workshops.
- Advocate for policies and funding to support diversity initiatives.

**Mentoring Underrepresented Minorities**

Scientific and professional associations, public and private funding organizations, and universities have developed a variety of programs and resources to provide minority students and faculty with access to effective mentoring. Participants in the breakout group addressing this subject identified the types of mentoring programs offered by associations and considered whether “best practices” have emerged from these programs. They were also asked to discuss challenges to improving mentoring and to consider the obstacles to developing effective mentoring programs at the association level. The discussion yielded the following observations:

- Many faculty do not know how to provide, and students do not know how to seek, effective mentoring. Often, both parties lack information about the goals and process of a mentoring relationship and the responsibilities mentors and mentees have to each other.
- Minority students may be less inclined to seek out mentoring compared to other students, because seeking mentoring may suggest that they are less prepared for a science career than students who do not seek mentoring.
- Minority students may desire mentors of their own background, but qualified minority mentors are limited. Those individuals who are available often become overloaded with demands to mentor, to serve on campus and national committees, and on professional and scientific boards.
- Faculty perceive that their colleagues and institutions do not support effective mentoring by recognizing the time and resources required or by offering incentives and rewards for effective mentoring. At many institutions, mentoring does not contribute to faculty career advancement since tenure, promotion, and funding all generally depend on research, publication, and grant success and not on mentoring.
- Competing funding priorities make it difficult for professional and scientific associations to develop and sustain mentoring programs.
**Recommendations**

Mentoring underrepresented minorities should be integral to any initiative or program designed to enhance diversity in the sciences. Organizations should emphasize the importance of mentoring and promote and facilitate mentoring of students and junior scientists by their senior colleagues. Special mentoring efforts should be made for minority scholars. Specifically, professional associations and scientific societies should:

- Collaborate to emphasize the importance of mentoring throughout its member programs and services, and demonstrate the importance of mentoring to their field and their science. This could lead to new models for other institutions.
- Reward faculty for time spent on mentoring and encourage the provision of grants that offer protected time for mentoring activities.
- Demonstrate the importance of mentoring by showing the successes of mentored minority scientists and identify a pool of mentors and mentees who can promote the value of mentoring.
- Build an infrastructure to support long-term mentoring relationships and develop a mechanism to evaluate the sustainability of these relationships.
- Collaborate to develop resources and programs to help mentors and mentees understand goals and expectations. Use professional newsletters to promote these resources.
- Invite students to annual meetings for scientific and nonscientific programming and networking opportunities.
- Collaborate to develop definitions of program success and program evaluation metrics and to collect empirical data on program outcomes.

**Evaluating Diversity Programs**

Efforts to assess the effectiveness of programs that strive to improve the participation of underrepresented minorities in science are often hampered by a lack of agreement on what the goal of diversity programs should be and a lack of data on program outcomes. To address these issues, breakout session participants were asked to identify distinct and shared goals among association diversity programs, consider the outcomes that need to be measured to assess progress toward these goals, and discuss how associations are measuring these outcomes. Participants were also asked to identify challenges to collecting and using outcomes data. The following themes emerged:

- Reliable data on minority individuals, at various career stages, can be difficult to obtain, difficult to share, and inconsistently recorded and stored.
- It is difficult to assess the efficacy of programs aimed at enhancing minority participation in science when monitoring and evaluation are under-valued, under funded, and under reported.
- The goals and intended outcomes of diversity programs, and their funding sources, are not always clearly articulated and change over time. This makes it difficult to evaluate the success of these programs as the “yardstick” can be constantly shifting.
- Methods for evaluating the success of diversity programs are frequently inadequate, as evaluation criteria are often imprecise, difficult to measure, or altogether lacking.
- Comparing program outcomes across organizations is complicated, even when programs share common goals. Organizations may use different units of measurement and employ different data collection strategies based on their interests and capabilities.
- The collection of data on minority populations is becoming increasingly difficult as race and ethnicity categories change and increasing numbers of people choose not to provide race and ethnicity information. In addition, there are concerns about confidentiality and privacy disclosure such that some organizations may not be able to collect or share their data.
- Success in science has typically been defined by an individual’s ability to obtain an academic research position and federal research grants. There can be, however, a wider range of successful outcomes. In evaluating the success of diversity efforts, it is vital to broaden the range of what are considered to be successful and desirable outcomes.
Design of and funding for program assessment and evaluation has, for too long, been an afterthought. Maintaining contact with program participants, especially over longer time periods, is not always feasible.

**Recommendations**

Professional associations and scientific societies should work together to develop a comprehensive data collection and evaluation system to monitor the success of diversity programs. This information should be collected and shared across organizations and with the public to identify trends, best practices, and areas that need improvement to enhance diversity. Specifically, professional associations and scientific societies should:

- Work together to collect and critically review research and best practices on diversity programs that can be evaluated and generalized across disciplines. These data could be used to generate a typology of programs according to goals and career stage. This information should be continually updated and made publicly available by various means (e.g., Internet, journal articles, critical reviews.)
- Show members the value of providing demographic data about themselves so as to increase the provision of this information.
- Work with federal agencies to better inform data-collection strategies and to integrate datasets, when possible.
- Advocate for enhancing federal longitudinal data collection strategies for underrepresented minority issues, as well as for including financial support for program evaluation.
- Collaborate with funding agencies and university departments to collect data on minority scientists and diversity programs. Ideally, organizations will work with different departments at the same institution to achieve critical mass across disciplines and to increase awareness of what is being done on the issue and what has proven successful.

**Building Public Support for a Diverse Scientific Workforce**

Programs aimed at increasing the participation of minorities in higher education have come under increasing public, legislative, and legal scrutiny in the wake of the U.S. Supreme Court’s rulings on the University of Michigan’s diversity practices. In view of these decisions, this breakout group was asked to discuss challenges related to increasing support for minority programs among the public, policy makers, and funding agencies. The following themes emerged from this discussion:

- Professional associations, scientific societies, universities, and many other organizations have been unsuccessful in demonstrating the importance of diversity in educational and scientific settings. Enhancing diversity has been promoted as a way to correct racial imbalances (i.e., affirmative action) rather than as an educational, societal, and economic benefit. The complexity and unfamiliarity of these arguments is a major obstacle to building public support for diversity programs.
- Four decades of investment in diversity programs have led some to believe that a great deal of progress has been made and that special efforts to enhance diversity are no longer necessary. This perception erodes support for diversity programs, both in the present and for the future.
- A national consensus on the importance of educational diversity and the merits of a diverse scientific enterprise does not exist—this is reflected in our professional associations and scientific societies. Recognizing the lack of an internal consensus on the nature and importance of diversity, many leaders are hesitant to make broadening participation an organizational priority.
- A lack of diversity within association and society leadership, staff, and membership often limits their ability to promote diversity more broadly.

**Recommendations**

Professional associations and scientific societies should work together to communicate the importance of broadening participation in science to their members, the public, and policy makers. Specifically, professional associations and scientific societies should:

- Develop a joint public statement that simply and coherently articulates common goals with regard
to diversity and encourages policy development to affirm those goals.

- Gather data to inform policy decisions and work together to identify best practices and common challenges to enhancing diversity in science. This may involve examining the social science research on the benefits of diversity, translating research findings into action steps, and recognizing and supporting good institutional practices.
- Promote the value of enhancing diversity to their members and provide them with the impetus, foundation, and tools to take action on this issue.
- Develop an informal network of individuals that can communicate about diversity in science to the leadership and membership of other organizations.

Conclusions

The consensus that emerged from the retreat is that enhancing the diversity of the scientific workforce is a shared aspiration. This cannot be accomplished, however, through a single or simple step divorced from institutions’ and organizations’ overall work and missions. There will be success when the commitment is infused in all aspects of an organization and at all levels of leadership. Most importantly, diversity must be understood as involving not merely a certain number of students, faculty members or workers, but as an essential element of science and of growing a field or discipline. This commitment must be demonstrated by specific actions by organizations, working both individually and in concert. Using their influence, resources, and expertise, America’s professional associations and scientific societies can move the issue forward on many fronts.

Next Steps

The planning group recognizes that a collective leadership around enhancing diversity in the sciences is urgently needed. The retreat planning group therefore formed the Collaborative for Enhancing Diversity in the Sciences (CEDS) group to address some of the recommendations that resulted from this retreat.

One challenge that emerged early on is the need to develop a common public statement that articulates common goals with regard to diversity and encourages policy development to affirm those goals. As Arthur Coleman noted during the retreat, we must continue to communicate simple and coherent messages to the scientific community and the public. With this goal in mind, CEDS will continue its efforts to establish and promote a clearinghouse of information about what associations and societies are already doing to enhance diversity in the sciences. It will continually reach out to these organizations to discuss further collaborations.
Recommended Reading


