



# Advancing STEM Diversity

A History of Inclusion Initiatives at the  
Alfred P. Sloan Foundation



# Mission Statement

The **ALFRED P. SLOAN FOUNDATION** makes grants primarily to support original research and education related to science, technology, engineering, mathematics, and economics. The Foundation believes that these fields—and the scholars and practitioners who work in them—are chief drivers of the nation’s health and prosperity and that a reasoned, systematic understanding of the forces of nature and society, when applied inventively and wisely, can lead to a better world for all.

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Cover (clockwise from upper left)

1. From left, Sloan Scholars Jasmine Dillon, Animal Sciences, Cornell University and Indira Turney, Neurosciences, Cornell University. (Photo courtesy of Cornell University)
2. Edwin J. Barea-Rodriguez, Professor and Associate Dean for Student Success and Instructional Innovation at the University of Texas, San Antonio. Recipient of the 2014 Institute on Teaching and Mentoring's Mentor of the Year Award. (Photo by Denise Ellis)
3. Michele Yatchmeneff, Assistant Professor of Civil Engineering at the University of Alaska, Anchorage and both a graduate of and (now) a faculty member and mentor in the Sloan Indigenous Graduate Partnership. (Photo courtesy of Michele Yatchmeneff)
4. Sloan Scholars supported through University of South Florida's University Center for Exemplary Mentoring. From left, Abdiel Laureano-Rosario, Marine Science; Dinorah Chacin, Marine Science; Ileana Freytes-Ortiz, Marine Science. (Photo courtesy of University of South Florida)
5. Pamela Hallock Muller, Professor of Geological Oceanography at the University of South Florida and recipient of the 2012 Institute on Teaching and Mentoring Mentor of the Year Award. To the right is her former student, Michael Martinez-Colon, then a Sloan Scholar studying marine science who nominated her for the award. (Photo by Denise Ellis)
6. Jermaine Hinds, Sloan Scholar, Entomology, The Pennsylvania State University. (Photo by Denise Ellis)
7. Sloan Scholars at the The Pennsylvania State University. Natasha Batalha, Astronomy and Astrophysics and Jesus Ruiz-Plancarte, Atmospheric Sciences (Photo by Denise Ellis)
8. Grace Bulltail, Sloan Scholar, Biological and Environmental Engineering, Cornell University (Photo courtesy of Cornell University)

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# President's Letter



## Diversity & Inclusion Initiatives at the Alfred P. Sloan Foundation (1950–2016)

**Dr. Paul L. Joskow, President**

### Introduction<sup>1</sup>

The Alfred P. Sloan Foundation is most widely known for its support of basic research in the natural and social sciences; for its sponsorship of several high profile, high quality media programs like *Radiolab*, *NOVA*, and *American Experience* that educate the public about science, technology and economics; and for its role in founding several marquee scientific and educational institutions that bear its name, including the Memorial Sloan Kettering Cancer Center in New York City, the MIT Sloan School of Management, and the Sloan Digital Sky Survey. My previous annual letters have focused on these core activities. Less well known—I think unjustly—is the Foundation's six-decade history of support for increasing educational opportunity, diversity, and inclusion for members of underrepresented minorities and women in a variety of scientific and technical fields. Pursuit of these goals has been every bit as central to the Foundation and its mission over its history as has support for research and public education about science, technology, and economics. Of course the theories of change and the goals that guided the Foundation's initiatives in these areas have evolved over time. This evolution is both interesting and follows closely the historical developments associated with the Civil Rights movement, school integration, and federal support for minorities seeking baccalaureate, professional, and graduate degrees. The history also reflects lessons the Foundation learned from experience; changes in its thinking; and attempts to identify gaps in the design or implementation of educational initiatives launched by colleges and universities, the government, and private philanthropy. I think the evolution of the Foundation's diversity and inclusion programs is a story worth telling.

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<sup>1</sup> I am grateful to Nate Williams, Liz Boylan, and Marta Tienda for their invaluable assistance in preparing this letter.

The Foundation's recent diversity-focused efforts fall into four broad categories:

1. The **Education and Advancement for Underrepresented Groups**<sup>2</sup> program makes grants specifically aimed to increase the diversity of higher education and the scientific and research workforce in STEM fields.
2. Our **Public Understanding of Science, Technology and Economics** program, while not explicitly minority-focused, devotes much of its grantmaking towards supporting projects that highlight the often underappreciated contributions of women and minority scholars and promoting the work of women and minority authors, directors, screenwriters, and playwrights.
3. **All Sloan's grant programs** make grants within their own fields of interest that support the diversity of the scientific and research workforce.
4. **Sloan's grantmaking process** has been enhanced to ensure that grantees, whatever the nature of their particular project, are mindful of diversity and structure their grant-funded work in ways that promote the inclusion of women and underrepresented minorities.

In what follows, I will begin with a brief discussion of what I mean by the terms "diversity" and "inclusion." I will then discuss the Foundation's rationale for continuing to invest substantial funds to promote diversity and inclusion of underrepresented minorities and women and why our support takes the form that it does. I will then give a brief history of the Foundation's diversity-related grantmaking and then conclude with some reflections on that history.

### What is Diversity and Inclusion?

The U.S. has a very heterogeneous population along racial, gender, ethnic, economic, family origin, and other dimensions, one that has and will continue to become more heterogeneous over time. Efforts to increase "diversity," as I shall use that term, refer to efforts to see that heterogeneity reflected in our society. Diversity is typically measured by count-

2 The Foundation uses "underrepresented groups" to denote four populations historically and currently underrepresented in STEM fields: African Americans/blacks, Hispanics/Latinos, American Indians and Native Alaskans, and women of all ethnicities.

ing, in our case, counting the relative number of women and minorities among the nation's science, engineering, and economics graduate students, faculty, and researchers. But diversity must be more than a numbers counting game. Equally important is ensuring that women and minorities are full participants in the scientific enterprise: in classes, in workshops and conferences, in professional societies, in research teams. This is what I mean by "inclusion." ("Full integration" is perhaps a better phrase.) As Princeton sociologist and demographer Marta Tienda has recently argued (Tienda, 2013), diversity is a necessary but not sufficient condition for inclusion. Inclusion often requires significant additional efforts to promote full integration of scientists from diverse backgrounds into teaching, research, and leadership positions.

### Why Do Diversity and Inclusion Matter?

While there are many worthwhile areas to support increased diversity in our social institutions—education, the workforce, housing, policing—the Foundation's efforts to promote diversity have been tied closely to its broader mission to promote high quality research in science, technology, and economics. We have not tried to address diversity and inclusion issues in all areas but rather to use our resources to move the ball forward in areas related to our mission. The inequalities there are striking. Blacks, Hispanics, Native Americans, and women are underrepresented as scholars, teachers, and practitioners in almost all of the fields where we make grants, both compared to their representation in the total U.S. population and compared to their representation among college and university undergraduates. They are also underrepresented in graduate and undergraduate programs in fields where the completion of an advanced degree is necessary to become college or university faculty and where such a degree is necessary to have a successful research career. Women, for instance, are 50.8 percent of the population and 56.4 percent of all students at 4-year colleges and universities, yet they make up only 30.3 percent of graduate students in the fields Sloan funds.<sup>3,4</sup> Similarly, while Hispanics/

3 See National Science Foundation, National Center for Science and Engineering Statistics. 2015. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015*. Special Report NSF 15-311. Arlington, VA. Available at <http://www.nsf.gov/statistics/wmpd/>.

4 The "fields Sloan funds" includes all science and engineering fields tracked by the National Science Foundation excluding psychology, communications, all social sciences except economics, and all biological sciences except biochemistry and biophysics. Hereafter in this piece, talk of minority repre-

Latinos are 17.4 percent of the general population and 14.8 percent of all undergraduates at 4-year colleges, they make up only 4 percent of graduate students in STEM fields. Blacks do even worse, making up 3 percent of STEM graduate students, even though they are 12.4 percent of the general population and 13 percent of undergraduates.

*Why does it matter? Why support increased diversity and inclusion at all?*<sup>5</sup>

First, diversity and inclusion in all dimensions is an important foundation for a vibrant and stable democracy.<sup>6</sup> Belief that one has a stake in our society, and thus in its continuation, requires belief that the institutions that bestow social status and economic security are equally open to all or, if not, can be made so through participation in the mechanisms of democratic self-governance. Diverse institutions that manifest and demonstrate this openness are thus necessary to the maintenance of the democratic social order. The Foundation's earliest support for expanding higher education of blacks (and, later, Hispanics, Native Americans, and women) reflected the view that a vibrant democracy depended on equal opportunity for all Americans and that equal *educational* opportunity, in particular, was necessary for the creation of a diverse workforce that would have a stake in maintaining our democracy.

Second, there is growing evidence that more diverse and inclusive classrooms can improve the quality of the educational experience, that diverse and inclusive research teams can lead to more creative and significant research results, and that a more diverse and inclusive workforce can lead to increased productivity. Harvard economists Richard Freeman and Wei Huang, for example, recently analyzed 1.5 million scientific research papers written between 1985 and 2008. Their analysis revealed that paper co-authored by researchers of different ethnicities had higher citation counts and other impact factors than papers authored by teams of a single ethnicity. (Freeman & Huang, 2015). A recent meta-analysis of 23 higher education stud-

ies concluded that college diversity is significantly positively correlated with cognitive development. (Bowman, 2010). A 2015 McKinsey study looking at proprietary data from 366 publicly traded companies found a positive linear relationship between ethnic diversity and firm performance, with a 10 percent increase in diversity associated with a 0.8 percent increase in pre-tax revenue.<sup>7</sup> These results, and others like them, suggest that a more diverse, inclusive STEM education and research workforce will produce better, more innovative science.

Third, the underrepresentation of minorities and women among STEM teachers, scholars, and practitioners itself creates a negative feedback loop that makes it difficult to increase diversity and undermines efforts to ensure that diversity leads to full participation in the classroom and the lab. An overwhelmingly white and male STEM workforce will have very different backgrounds with very different life experiences from a workforce with better representation of woman and minorities. This difference in background and life experience makes it more challenging for the members of the incumbent workforce to serve as models, mentors, and facilitators who can encourage more members of underrepresented groups to take STEM courses, go on to graduate school, or pursue a research or teaching career. Moreover, if women or minority scholars are insufficiently integrated into research teams, meetings, and conferences, this will further discourage diversity. Participation in such activities is crucial to reaping all the benefits of a scientific career and the lack of full inclusion necessarily makes scientific careers less attractive to the excluded. A non-diverse and non-inclusive workforce, in other words, discourages diverse new entrants. This negative feedback loop needs to be broken.

Finally, U.S. demographic trends are making this situation worse, not better. The racial and ethnic composition of the population of the U.S. is changing rapidly, much faster than the racial and ethnic composition of the scientific and educational workforce. In 1970, non-Hispanic whites comprised 83.3 percent of the U.S. population. In 2010, they comprised only 63.7 percent of the population. Over that same time period, Hispanics more than tripled their representation in the U.S. population, moving from 4.6 percent in 1970 to 16.3 percent in 2010.

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sentation in "STEM fields" or "STEM disciplines" should be taken to refer to this subset of science and engineering.

5 What follows is necessarily a brief treatment of the topic. For a much more thorough discussion of the value of diversity, see (Lewis & Cantor, 2016).

6 *Our Compelling Interests*, Earl Lewis and Nancy Cantor's recently published collection of scholarly works on the continuing importance of diversity to a prosperous society, contains several excellent works that speak to this issue.

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7 See "Why Diversity Matters" <http://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters>

Non-Hispanic blacks are also increasing as a share of the U.S. populace, although at a much slower rate, growing from 10.9 percent of all Americans in 1970, to 12.2 percent in 2010.<sup>8</sup> The U.S. Census projects that if these trends continue, non-Hispanic whites will represent only 43.6 percent of the total US population by 2040, while Hispanics will have swelled to 28.6 percent.<sup>9</sup> Yet despite these changes, blacks and Hispanics continue to be underrepresented among the recipients of advanced degrees in STEM fields. Latinos earned just four percent of the PhDs granted in science and engineering fields in the US in 2014. Similarly, blacks represented just 3.5 percent of all science and engineering PhD recipients. Underrepresented minority scholars account for less than five percent of full professors in science and engineering at America's large research universities.<sup>10</sup> This makes it both more important and perhaps more challenging to increase diversity among scholars, teachers, and practitioners in science, technology, and economics. Despite progress in many fields, the research and educational workforce upon which scientific progress depends is looking less and less like the U.S. population.<sup>11</sup>

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## THE SLOAN FOUNDATION'S HISTORY WITH DIVERSITY AND INCLUSION

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### The 1950s and 1960s: Institutions Matter

The Alfred P. Sloan Foundation's first minority-focused grants were made in the 1950s, when issues of educational equity and racial injustice in education were at the forefront of the popular consciousness.<sup>12</sup> Launched when Mr. Sloan was still president of the Foundation<sup>13</sup>, these initial grants

focused on strengthening educational institutions that primarily educated black students. At the time, most blacks who went on to higher education went to a predominantly black college or university. The Foundation's first foray into promoting equality and diversity aimed to strengthen the educational and administrative resources of these institutions.

In 1953, the Foundation committed \$1 million (2016\$) to the Tuskegee Institute to help it build and equip its engineering school, expanding the educational offerings available to students. In 1959, the Foundation began making regular contributions to the annual fundraising drive of the United Negro College Fund, including a \$4 million (2016\$) donation in 1963. In an effort to help historically black colleges and universities (HBCUs) build their endowments and fundraising infrastructure, the Foundation launched an innovative matching gift program in 1965. The program created a \$7.5 million (2016\$) matching gift fund that provided a one-to-one match for every dollar raised by select HBCU's. Participating institutions, 23 in all, included Atlanta University, Spelman College, Langston University in Oklahoma, Southern University in Baton Rouge, and Alabama's Tuskegee Institute. The program was so successful—participating institutions raising some \$67 million in response to the matching gift program—the Foundation re-authorized the program for another \$7.5 million in 1967.

By the mid-1960s, support for these and other initiatives aimed at increasing educational opportunity for blacks had become a major part of the Foundation's grantmaking, generally. Indeed, in 1965, grants focusing on increasing educational opportunity comprised nearly 14.5 percent of all Foundation outlays.

The strategy underlying the Foundation's early minority-focused grantmaking might be called *institutions matter*. In an era when higher education was highly segregated, blacks, Hispanics, and other minorities underrepresented in STEM fields could only receive educational opportunities as good as the institutions that were open to them. Better educational opportunities and better educational outcomes would result from building strong institutions committed to successfully educating minority students.

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from its founding in 1934 until 1962, when his chosen successor, Everett Case, took over as president. Sloan remained Chairman of the Board until his death in 1966.

8 Statistics taken from Tienda (2013).

9 See <https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf>

10 See (National Center for Science and Engineering Statistics, 2015).

11 This difficulty is compounded by evidence that the U.S. as a whole may be less committed to promoting diversity and inclusion than it has been in the recent past. See (Tienda, 2016) and (Tienda, 1999)

12 *Brown v. Board of Education of Topeka*, the landmark U.S. legal case that ruled public school segregation unconstitutional and resulted in court-ordered desegregation and busing regimes throughout much of the American south, was filed in 1951, argued before the Supreme Court in 1952 and 53, and decided in 1954.

13 Alfred P. Sloan Jr. served as president of the Sloan Foundation

Though it correctly identified and sought to address the pressing need to expand the educational opportunities available to African Americans, the *institutions matter* strategy, suffered from several weaknesses. First, strengthening predominantly *black* colleges left untouched the educational inequities suffered by women, Hispanics, and Native Americans. Second, while a focus on strengthening these colleges did extend educational opportunity, it failed to acknowledge the important benefits to be reaped by diversity and inclusion across all higher education institutions. Third, the Foundation assumed that the majority of blacks would continue to receive higher education at a predominantly black college or university. This was insufficiently optimistic. The rapid desegregation of educational institutions and the increased subsidization of higher education by federal and state government quickly expanded the educational opportunities open to African Americans. It was soon apparent that most African Americans would receive higher education outside the relatively small circle of historically black colleges and universities. To have a meaningful impact, a new strategy was needed.

### The 1970s and 1980s: Money Matters

Even as the Foundation aimed to strengthen black-focused educational institutions in the 1960s, it was experimenting with a different model for expanding minority education and advancing diversity: direct support of minority students themselves. We might call this new model the *money matters* strategy. This strategy de-emphasizes the importance of building strong educational institutions (or better, that building strong educational institutions is properly the work of some other entity) and instead focuses on empowering minority students to take advantage of educational opportunities that were, in principle, increasingly open to them. What inhibits minority students from taking advantage of these opportunities, the theory goes, is the lack of available resources to do so. If you give minorities the resources to take advantage of these opportunities, they will.

Grants made under the *money matters* strategy largely took the form of fellowship programs that provided stipends to minority students. The Foundation's first fellowship program, launched in 1960, provided fellowships for black students entering medical school, an area that, at the time, showed very little representation of blacks. Initially supporting 10 students, the Foundation quadrupled the size of the program in 1965 and then expanded

it again in 1969 when new Foundation president Nils Wessell announced that the Foundation would commit between \$60 and \$85 million (2016\$) over five years to expand underrepresented minority enrollment in medical schools. Also in 1969, the Foundation launched a second major fellowship program, this one focused on expanding minority enrollment in graduate programs in business management. In 1974, the Foundation launched a third five-year program aimed at expanding minority enrollment in undergraduate engineering schools, and in 1980 it announced a fourth fellowship initiative, one focused on increasing minority enrollment in graduate public management and administration programs.

The Foundation's effort to boost minority enrollment in engineering programs deserves particular mention.<sup>14</sup> Led by Dr. Percy A. Pierre, then a Sloan program director and the Dean of the College of Engineering, Architecture, and Computer Sciences at Howard University, the Minorities in Engineering program resulted in several durable institutions that continue to advance minority inclusion in engineering today.<sup>15</sup> As a dean at a historically black university, Pierre saw that "too few African Americans were graduating from high school with knowledge of and an interest in engineering" (Pierre, 2015) This supply constraint redounded through the academic pipeline. Fewer qualified minority students led to fewer applications to undergraduate engineering schools, which in turn led to fewer baccalaureate degrees granted to minorities, fewer minority enrollments in graduate programs, fewer masters and doctoral degrees granted, and fewer minority engineers in industry, research, and the academy. Fixing K-12 math and engineering education, however, was too large a problem for the Sloan Foundation, with its limited resources, to address on its own. Meaningful change would require leveraging the influence of stakeholders in the private sector, education, philanthropy, and government. So under Pierre's direction, the Foundation set itself two goals. First, it would seek to convene a consortium of universities and other institutions devoted to increasing minority representation in engineering and in minority mathematics training

14 For an excellent and detailed history of the Foundation's minorities in engineering program and related efforts, see (Pierre, 2015)

15 The Foundation is grateful to Dr. Pierre who has had a continuing relationship with Sloan from the early 1970's to today. Pierre currently serves on the Advisory Committee to Sloan's Minority Ph.D. Program.

at the precollege level. Second, it would establish a national scholarship fund for undergraduate minority engineering students. Foundation grants in the former category helped create the National Action Council for Minorities in Engineering (NACME)<sup>16</sup> and MESA, the national engineering preparatory program.<sup>17</sup> Grants in the latter category were instrumental in the creation of the National Scholarship Fund for Minorities in Engineering and in the creation of the GEM consortium, a national network of corporations, government labs, and universities that provide graduate fellowships to minority engineering students.<sup>18</sup> The Minorities in Engineering program was notable not only for its influence, but also because its dual focus on building institutions (*institutions matter*) and providing direct fellowship support to students (*money matters*) represents the Foundation's shifting ideas about how to best advance the cause of diversity and inclusion.

The change in strategy from building institutions to empowering individuals was not the only change in the Foundation's minority-focused granting in the 70s and 80s. Whereas grantmaking in the 50s and 60s focused on increasing general educational attainment among minorities, these new efforts were narrowly tailored to specific academic fields historically related to the Foundation's wider mission. This narrowing of focus was a response to several factors, including rapidly increasing tuition costs and increased government support of minority undergraduate education. It was also during this new era that the Foundation expanded its vision beyond blacks to include other underrepresented minorities. In 1972 the Foundation made its first grant specifically targeting Hispanics, funding a program at the University of California Santa Cruz that prepared talented undergraduate students of Hispanic background for medical school. Also in 1972 the Foundation made its first grant aimed at Native Americans. The program, housed at the University of New Mexico School of Business, provided fellowships for indigenous students who wish to attend the graduate school in management.

The Foundation's fellowship programs in the 1970s and 1980s, however, raised a pressing issue. The Foundation did not have the resources to support a

fellowship program at every college and university in the country. Its limited resources meant it would have to focus on some schools and programs and not others. The *money matters* strategy, taken by itself, provided no guidance on which schools to partner with.

### 1990s and 2000s: Mentors Matter

That guidance would come in the 1990s, when the Foundation drastically altered its minority-focused grantmaking. Spearheaded by new Foundation president Ralph E. Gomory, the new strategic focus began with the observation that some graduate departments were better than others at moving minority graduate students through the academic pipeline from enrollment to graduation. In such departments, it was observed, a passionate faculty mentor had taken a special interest in mentoring minority graduate students. If these mentoring "champions" could be identified, the Foundation reasoned, it could use its funds to enable them to take on more students. Identifying just such mentoring champions became the focus of the Foundation's new Minority Ph.D. program (MPHD). Launched in 1995 and led by new program director Ted Greenwood, the MPHD program's explicit focus was to increase the number of degrees granted in STEM fields to students of color through incentivizing students to join Ph.D. programs that were more successful than average in graduating minority Ph.Ds. The MPHD program augmented and extended the *money matters* strategy. It continued the Foundation's tradition of directly providing fellowships to students, but restricted support to students in STEM graduate programs where a dedicated faculty champion (or better, a group of champions) had demonstrated an effective ability to graduate minority doctoral students. Over the next fifteen years, the Foundation supported, at one time or another, some 145 individual STEM departments in the natural sciences, mathematics, and engineering.<sup>19</sup> Between 1996 and 2011, more than 1700 minority Ph.D. students received support from this program and nearly 1,000 completed their Ph.D. Total outlays for minority grantmaking over the time approached \$70 million (2015 US\$)

Though the Minority PhD program was designed to support blacks, Hispanics, and American Indi-

<sup>16</sup> The Foundation continues to work with NACME to this day. The organization serves as the primary administrative agent in the Foundation's Minority Ph.D. program and the Sloan Indigenous Graduate Partnership.

<sup>17</sup> See [mesausa.org](http://mesausa.org)

<sup>18</sup> [www.gemfellowship.org](http://www.gemfellowship.org)

<sup>19</sup> As time passed, the MPHD program began to increasingly focus on support for graduate degree programs in engineering, where minority representation lagged badly behind some other STEM disciplines. By 2010, more than 40 percent of MPHD scholars were in engineering programs.

ans/Alaska Natives, this last group proved hard to reach. Despite our best efforts, few Native Americans were taking part in the program. So in 2003, the Foundation launched a second major minority-focused initiative, the Sloan Indigenous Graduate Partnership (SIGP), which took aim at the unique challenges and barriers that graduate school poses for indigenous students. Studies show that feelings of isolation are a common barrier to completion of graduate programs, both inside and outside the sciences. This is a particularly vexing problem for Native American graduate students. Since only 1.7 percent of the population is Native American and since most Native Americans (like most ethnic groups generally) will not go on to graduate study, it is nearly impossible for a graduate department or school to develop the sort of “critical mass” that is required to stave off feelings of isolation. Those institutions that had succeeded in attracting indigenous students in abundance—the various Tribal Colleges for example—often had weak or no graduate STEM departments. What was needed was a set of institutions that specialized in graduate STEM education for Native American students, institutions that were attractive enough to enroll a critical mass of Native American graduate scholars and yet rigorous enough to have high quality faculty capable of providing first class scientific education and training. The Sloan Indigenous Graduate Partnership aimed to support just such institutions. Strategy in hand, Greenwood explored which institutions had been successful in moving Native American students through M.S. and Ph.D. degree programs in STEM fields. That led him to Maria Teresa Velez, Associate Dean of the Graduate College at the University of Arizona and a passionate advocate and devoted mentor of Native students. Together, Greenwood and Velez developed plans to help the University of Arizona become a national leader in the education of indigenous students<sup>20</sup>, and the institution became the first SIGP grantee in 2003. Since then, the SIGP has expanded and now partners with four institutions—the University of Alaska (Anchorage and Fairbanks campuses), the University of Arizona, the Montana University System (Montana State University, University of Montana, and Montana Tech) and Purdue University—to support four regional centers devoted to creating educational environments designed to encourage the successful education of Native

American graduate students in STEM fields. The program is notable for its unique (at the time) focus on creating a supportive inclusive community in which student learning could be embedded and where students of Native American heritage could learn together, share and compare ideas, address common problems, and help one another rise to the challenges of graduate study.

Also during this era, the Foundation launched a program in the Public Understanding of Science & Technology. Started in 1996, the program’s overall aim is to increase the public’s understanding of the increasingly important role played in modern life by science and technology through creating engaging, high-quality books, films, plays, and radio and television programs.<sup>21</sup> Under the able leadership of Vice President and Program Director Doron Weber, the program has taken a particular interest in shining a spotlight on the often underappreciated accomplishments of women and scholars of color. While all the works supported by the Foundation over the past twenty years are too numerous to mention here,<sup>22</sup> a partial list is appropriate. Supported books include *Hedy’s Folly*, about the life of famous actress and inventor Hedy Lamarr; and *Hidden Figures*, about the black female mathematicians and engineers who were instrumental in NASA’s space program in the 1960s. In Film, the Foundation has supported *The Man Who Knew Infinity*, about Indian mathematician Srinivasa Ramanujan; *Path to Nuclear Fission*, about physicist Lise Meitner’s work unlocking the secrets of nuclear fission; *Afronauts*, about Zambia’s space program; and *Decoding Annie Parker*, about Dr. Mary Claire-King’s groundbreaking discovery of how mutations in a particular gene dramatically increase the risk of breast cancer. In television, the Foundation has supported such projects as *Africa: The Great Civilizations*, a six-part documentary set to air in 2017 about the scientific, technical, and cultural achievements of Africa’s great civilizations; and NOVA’s *Forgotten Genius*, about the life and work of the pioneering black chemist Percy Julian. In theater, the Foundation has commissioned and supported the production of *Photograph 51*, about Rosalind Franklin’s unappreciated contributions to the discovery of the structure of DNA; and *The Explorers Club*, about a turn-of-the-century

20 It worked. Today, more Native Americans get their doctorates from the University of Arizona than from any other institution in the country.

21 In 2008, the program was expanded to include the Foundation’s historic interest in economics.

22 Visit the Foundation’s website at [www.sloan.org](http://www.sloan.org) for a comprehensive list of the works supported through the Public Understanding of Science, Technology & Economics program.

science society thrown into crisis over whether to admit a woman scientist to its ranks. These are only a few of the many films, television broadcasts, books, and plays about the extraordinary scientific and technical contributions made by women and scholars of color.

The Foundation's Public Understanding program not only supports artistic works *about* women and minority scholars, it also support work *by* women and minority artists, promoting gender and racial diversity from the Hollywood studio to the Broadway theater house. More than fifty women playwrights have received commissions through the Foundation's theater program over the past twenty years and more than a hundred female screenwriters, directors, and producers have received support through the Foundation's film program. The Foundation is also currently supporting a series of television and radio programs hosted by women scientists or scholars of color. These include PBS's *Science goes to the Movies*, hosted by Faith Salie and Heather Berlin; and PRX's *Transistor* podcast, hosted by astrophysicist Michelle Thaller, neuroscientist Wendy Suzuki, and biologist Christina Agapakis. From its inception in 1996 to today, few initiatives have done more to raise the profile of women and minority scientists in the public eye than the Foundation's public understanding grantmaking.

### The Modern Era: Synthesis and Inclusion

In 2010, two years after I became President of the Alfred P. Sloan Foundation, I initiated an extensive review of the Foundation's Minority Ph.D. program.<sup>23</sup> The review was led by program director Elizabeth S. Boylan, an accomplished developmental biologist and faculty administrator who had spent twenty years successfully promoting diversity and institutional change, first at Queens College and then at Barnard. Boylan met with and solicited assessments from a host of stakeholders in the program, including Foundation staff, Trustees, supported students, and directors at the various departments supported by Sloan grants.

Taken together, the assessments counseled that the Minority PhD program should be reorganized around a new strategy, one supported by four insights gleaned from the Foundation's sixty-year history of promoting diversity and inclusion in STEM higher education.

**Institutions matter:** (1950s-60s) Minority students are more likely to succeed when embedded in institutions with a strong commitment to minority education.

**Money matters:** (1970s-80s) Minority students are more likely to succeed when they have access to resources that allow them to take advantage of educational opportunities available to them and when they may direct those resources to their most effective purpose.

**Mentors matter:** (1990s-2000s) Minority students are more likely to succeed when a committed mentor takes both responsibility for and pride in a student's educational achievements and excellence.

**Community matters:** (Sloan Indigenous Graduate Partnership, 2003-present) Minority students are more likely to succeed when they are members of a robust, thriving community of mutual support.

Put another way, the various strategies pursued by the Foundation over the years represented complementary—not competing—visions, visions that would be most effective when brought into synthesis with one another. The most effective grantmaking in support of increasing diversity in education is one that provides students with significant resources to deploy as they see fit, recognizes that minority students need the support of mentoring and other robust and vibrant institutional structures designed to help them succeed, and integrates them into their professional communities.

In pursuit of this new strategy, a revamped Minority PhD program now concentrates its efforts in a new direction, creating and supporting **University Centers of Exemplary Mentoring (UCEMs)**. These new centers, based at eight university campuses across the country, combine all the best elements of the Foundation's minority grantmaking over the years. As the name suggests, these new centers continue the Minority Ph.D. program's insistence that effective, engaged mentoring is a crucial component to success. And like the fellowship programs supported by the Foundation in the 70s and 80s, the lion's share of Foundation support goes directly to students in the form of fellowships and stipend support. In order to qualify for a UCEM grant, however, an institution must demonstrate

23 The Sloan Indigenous Graduate Partnership will be reviewed in 2017.

an institutional commitment to minority graduate education, including a commitment of significant university matching funds, demonstrated buy-in from STEM department chairs and faculty mentors, and support from high-level university administrators. What's more, UCEMs must develop a slate of minority recruitment and retention initiatives and create a host of professional development and educational support structures designed to foster a vibrant community integrated with their student and research colleagues of all ethnicities and genders to facilitate success. In addition to the above, UCEMs are also expected to track student progress during and after they complete their degrees, solicit student feedback, and use the collected data to evaluate and improve their efforts.

My own view of the efforts of some universities to promote diversity in graduate education can be summed up by the phrase “talk is cheap.” I wanted the universities that we support to show their institutional commitment by committing their own resources (human and financial) to our efforts. In addition, I wanted to go well beyond “the numbers” to create a comprehensive program at each participating school that included student support, mentoring, career development, network development, the full participation of the students who we support in all of the educational, research, and social activities of their departments. That is, *diversity + inclusion*.

Using a competitive solicitation process, the Foundation reviewed and assessed dozens of UCEM proposals, selecting eight universities whose plans demonstrated a truly remarkable commitment to advancing minority diversity and inclusion in STEM graduate education. The selected universities were Cornell University, the University of California at San Diego, Georgia Institute of Technology, the University of Illinois at Urbana-Champaign, the University of Iowa, MIT, Pennsylvania State University, and the University of South Florida.

The Foundation assumes it will support these UCEMs for at least nine years, assuming they meet certain performance benchmarks, at which point it will re-evaluate the program. In addition to the UCEM grants, the Foundation has made several subsidiary grants to support the overall effort, including grants to facilitate collaboration between the UCEMs and a grant to create a mentoring network for minority scholars after they have completed their degrees and entered the workforce.

Though it is too early in the lifetime of the program to expect good data on outcomes, I am cautiously optimistic about the program's prospects. The new, revamped Minority Ph.D. program represents a synthesis of all the Foundation has learned in sixty years of grantmaking in this area. In my opinion, it is better positioned to succeed than any other Foundation minority initiative to date.

### **Diversity Unsiloed**

While I am proud of the Foundation's commitment to diversity over the last six decades and especially proud of the changes made to the MPhD program to increase its effectiveness, I came to believe that we were missing a big opportunity by putting diversity in a separate program “silo” and not making it a goal of *all* of our research and education programs. I have implemented several changes to the Foundation's grantmaking policies and procedures that aim to ensure that the Foundation's commitment to diversity is expressed more broadly than just in the Foundation's grants to support graduate education for underrepresented groups.

Diversity goals should be pursued in all of our programs in all of their dimensions. All of Sloan's grantmaking programs are now required to take both racial and gender diversity into account, working with grantees to ensure that minorities and women are fully represented on research teams, in postdoc and fellowship awards, and at meetings and conferences. The Foundation's grant proposal submission guidelines now require all grant proposal to include an “Attention to Diversity” statement describing the efforts that a prospective grantee plans to take to ensure their proposed work is adequately inclusive. Many grant proposals have been turned back due an inadequate actions to structure a project to ensure inclusion of women and underrepresented minorities.

I also encourage all Sloan's grant programs, be they in science, technology, economics, energy, or public understanding, to make specific grants to promote racial and gender diversity in their respective fields. Recent grants support a minority fellowship program in the Sloan Digital Sky Survey, a diversity fellowship initiative for young researchers in the Deep Carbon Observatory, several major grants to Wikipedia to aid its efforts to increase the representation of women and minorities among its editors, and a grant to Harvard for an innovative program to prepare recent bachelor's degree recipients from minority groups for graduate study in economics. In our New

York City Initiatives program, the Foundation has made several major grants supporting educational efforts aimed at minority populations and women. These include the support for Cold Spring Harbor Laboratory's DNA Learning Centers<sup>24</sup>, Cell Motion Laboratory's BioBus and BioBase STEM education programs in Harlem<sup>25</sup>, a CUNY initiative to support summer laboratory experiences for undergraduates and to provide research support to early career faculty from underrepresented groups, and grants to the Center for Mathematical Talent at NYU to motivate and nurture mathematical talent among underrepresented groups in New York City high schools.

Lastly, while it had always been implicit in our programs, I have expanded our understanding of diversity and inclusion to explicitly include women and have opened our diversity efforts, long focused on science, technology, and engineering, to include economics, one of the Foundation's oldest interests.<sup>26</sup>

## Conclusion

Looking over even this brief history—and there is much more to tell—I am struck by how the Foundation's minority-focused grantmaking represents, in microcosm, so many of the virtues the Foundation pursues in its grantmaking writ large. While we have kept true to the overall goal of promoting increased diversity and inclusion in science, engineering and economics education and research, particular initiatives were temporary and limited, allowing the Foundation to learn from its efforts. We changed strategies in response to changing circumstances and narrowed our focus over time in order to maximize the probability of meaningful impact. Self-evaluation and re-evaluation has been a constant part of our efforts, and the program has steadily improved through the frank and honest appraisal of our successes and failures. Lastly, the values underlying our minority initiatives have come to be reflected not just in one grant program but in every single grant we make. The story of the Alfred P. Sloan Foundation's minority-focused grantmaking is the story of a Foundation attempting to learn and do better; one flexible in its tactics, open to new ideas, but unwavering in its underlying commitment to a scientific enterprise whose benefits and challenges are open and welcoming to all.

– October, 2016

<sup>24</sup> [www.dnalc.org](http://www.dnalc.org)

<sup>25</sup> [www.biobus.org](http://www.biobus.org)

<sup>26</sup> As a field, economics suffers from a significant diversity problem. See, for example, (Bayer & Rouse, Forthcoming)

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