

ALFRED P. SLOAN FOUNDATION



A GRANTMAKING HISTORY 1934-2009

75th Anniversary Commemorative Publication

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PRESIDENT'S INTRODUCTION

The Alfred P. Sloan Foundation has a history of marking its 25-year anniversaries. In 1959, as the Foundation was completing its first 25 years under Mr. Sloan's leadership, the founder prepared a memorandum for the Board of Trustees setting out his thoughts about the Foundation and his hopes for its future. In 1984, the Foundation's 50th Anniversary was marked with a special issue of its Annual Report containing an anniversary statement from the Foundation's fourth President, economist Albert Rees. President Rees observed that "[i]t seems appropriate as we embark on the next 50 years to take stock of where we have been, where we are heading, and how we can best continue to carry out the objectives that Mr. Sloan had in mind for the Foundation." Accordingly, President Rees's introduction expanded on the traditional grant reporting presented annually and included a brief history of the Foundation's most important activities during its first 50 years.

President Rees's observation about the importance of taking stock of where we have been and where we are going is as relevant today as it was 25 years ago, perhaps even more so. Private foundations face increasing criticism from a number of interest groups and policymakers regarding their proper role and responsibility, from questions about grantmaking relevance and impact to donor intent. This history of the Foundation's grantmaking activities, which will be posted on our new website to enhance transparency, makes it clear that the Foundation has pursued a focused set of programs of high social value that properly reflect the guidance provided by Mr. Sloan, including adapting to changes in philanthropic opportunities consistent with his express wishes and his original vision.

This is also an opportune time for the Foundation to assess its past and chart its future as part of a process of continuing improvement. My predecessor Ralph Gomory led the Foundation for over 18 years, the longest serving president since Mr. Sloan. President Gomory had a profound impact on the Foundation's programs during a period when the real value of the Foundation's

endowment expanded rapidly and with it the value of the Foundation's grants. He is a tough act to follow. I have been president for less than two years. This initial period has naturally focused on determining our best future course in a changed economic environment. As with other private foundations, the global financial collapse and the deepest recession since the Great Depression led to a reduction in the value of the Foundation's endowment by about 25% during 2008. Our grantmaking activity has already adjusted, and will have to continue to adjust, to the reduced value of our endowment, so it is imperative that we redouble our efforts to spend our scarce resources wisely. Accordingly, this first-ever, detailed documentation of the Foundation's grantmaking history is especially valuable to me and to the Foundation's staff as we make choices about future directions.

Prepared as one component of our program to celebrate the Foundation's 75th anniversary, this booklet provides a thorough history of the Foundation's major grantmaking activity over the last 75 years. It is organized chronologically, starting with Mr. Sloan's years as president (1934-1962). This section is followed by the Case, Wessell, and Rees presidencies (1962-1989) and concludes with a chapter covering (primarily) Ralph Gomory's presidency plus the initial grantmaking activity since I became the Foundation's president in 2008.

As one reviews our three-quarters-of-a-century history, it is striking how consistent the Foundation's grantmaking activity has been over time, both in terms of its goals and in terms of its adherence to the guidance provided by Mr. Sloan in his 1959 memorandum to the Board of Trustees (unsealed after his death in 1966 and provided to all new trustees since then). In 1959, Mr. Sloan wrote:

I would urge the Foundation to employ its resources [in] science and economic research in the various disciplines. I would emphasize the need to support all constructive projects in basic research, upon which all scientific progress and advanced research depends ... I would also like to see the Foundation explore in every possible way the expansion of education, as this is the foundation of all progress...

However, in his 1959 memorandum, Mr. Sloan also recognized that the world would continue to change and along with it the best opportunities for the

Foundation to use its resources. He made it clear that the vision he had for the Foundation at that time was not meant to, and should not, tie its hands in the future:

With such rapidly changing civilization as we are living in it is difficult to sit down and discount the future in terms of definite policies. I do not feel that I am capable of doing so. No one can foresee the future in normal circumstances let alone the unusual circumstances of today.

It is clear from the grantmaking history in this booklet that my predecessors were very effective in furthering Mr. Sloan's vision for the Foundation while adapting to a rapidly changing world and responding to the new opportunities that emerged from these changes. This Foundation has "stuck to its knitting" even as it identified new opportunities. I intend to continue this tradition during my tenure as the Foundation's sixth president. This goal is reflected in the Foundation's new 2008 Mission Statement which states in part:

The Alfred P. Sloan Foundation makes grants primarily to support original research and broad-based education related to science, technology, economic performance and the quality of American life. The Foundation is unique in its focus on science, technology, and economic institutions—and the scholars and practitioners who work in these fields—as chief drivers of the nation's health and prosperity. The Foundation has a deep-rooted belief that carefully reasoned systematic understanding of the forces of nature and society, when applied inventively and wisely, can lead to a better world for all.

There are many grantmaking activities identified in this booklet that earlier presidents can rightfully feel proud of. I can note only a few here: the Foundation's support for the creation of the Memorial Sloan-Kettering Cancer Center and the Sloan School of Management at MIT; its continuing commitment to young scholars through the Sloan Research Fellowship program; its early-stage support for innovative basic research programs in science, technology, economics and business; its foresight in being an early supporter of education in science, engineering and mathematics for underrepresented groups; its efforts to expand access to college education by creatively using new technologies; its

ongoing efforts to advance public understanding of science, technology, economics and business using all available media; and its commitments to enhancing the quality of life for residents of the New York metropolitan area through the Foundation's Civic programs.

While it is natural to focus on the larger grants the Foundation has made and on the programs it has supported over many years, we should also recognize the importance of the many small grants made in furtherance of the Foundation's mission. The Foundation has used its ability to act quickly and to seed innovative activities unrecognized by traditional public and private funding sources to significantly enhance the impact of its grantmaking activities.

In reviewing this grantmaking history, we should never forget that the Foundation can only create opportunities and have an impact by supporting the work carried out by others—namely, by our grantees. As a result, it is our grantees who must be credited with much of the Foundation's success. Let me take this opportunity to thank the thousands of grantees with whom the Foundation has had the privilege to work and who have contributed so much to the Foundation's effectiveness. Over the years, the Foundation has also benefited from advisory committees who have generously provided their expertise and time to the Foundation. Their service is invaluable to the Foundation and greatly appreciated.

As we look forward to the next 25 years, I feel confident that both the Foundation and its grantees will continue to achieve great things as we focus our resources on high-impact opportunities for supporting research and broad-based education in science, technology, economic performance, and enhancing the quality of American life.

Paul L. Joskow

Putting together this grant history publication was not an easy task. The grantmaking covers a long period of time and the Foundation's records for some of this period are incomplete. I want to thank Sam Goldberg for his tremendous effort in compiling a comprehensive working draft of this history from source documents, and to thank Doron Weber, Caroline Young, Nate Williams, Anne McKissick, Gail Pesyna, Everod Nelson and Bill Curtis for working so hard as a team to produce the final product.

ALFRED P. SLOAN JR.

Alfred Pritchard Sloan Jr., born in New Haven, Connecticut on May 23, 1875, was the eldest of five children of Alfred Pritchard Sloan and Katherine Mead Sloan. Although not wealthy, his father was able to maintain the family in comfortable circumstances. In 1886, one year after the family moved to Brooklyn, New York, Alfred enrolled in Brooklyn Polytechnic Institute where he completed the college preparatory course. He was admitted to the Massachusetts Institute of Technology (MIT) in 1892 and earned a degree in electrical engineering in three years, at the age of 20. He devoted himself to his studies with such determination that he later characterized himself as a “grind.”

His first job, at a salary of \$50 a month, was as a draftsman at the Hyatt Roller Bearing Company in Newark, New Jersey, founded by John Wesley Hyatt, the inventor of celluloid and the roller bearing. Disappointed with its inefficient management, he left the company and in 1898 he married Irene Jackson. He subsequently returned to his job at Hyatt (at a salary of \$175 a month) after his father bought an interest in the company to save it from bankruptcy. Alfred Sloan, together with Norwegian-born bookkeeper Peter Steenstrup, worked hard to make Hyatt a successful business and together they soon were operating as its sales manager (Steenstrup) and general manager (Sloan). Within six months of this new leadership, Hyatt’s fortunes turned around and the company earned a small profit.

The new automobile industry was soon identified by Mr. Sloan as a major customer for roller bearings. He proved a quick study when Henry M. Leland, Cadillac’s general manager, pointed out that Hyatt bearings did not meet desired tolerances, telling him, “You must grind your bearings, Mr. Sloan. Even though you manufacture thousands of them, the first and the last must be precisely alike.” After a discussion about interchangeability of parts, Mr. Sloan recalled that “a genuine conception of what mass production should mean really grew in me I was determined to be as fanatical as

he [Leland] in obtaining precision in our work. An entirely different standard had been established for Hyatt Roller Bearings.”

Under Mr. Sloan’s leadership, the company grew rapidly. Fred Diehl, the buyer of car parts for Ford production, complimented Hyatt’s reliability as a supplier, and added that too many suppliers “fail to keep pace, fail to anticipate the inevitable growth that is changing the old way of living. They have not the vision.” Mr. Sloan had the vision. Hyatt’s earnings were plowed back into the business to finance more and better buildings and machinery as substantial orders for roller bearings came in from its two largest customers: Ford and General Motors.

By 1916 Hyatt’s original barnlike structure had expanded into a number of large modern fireproof buildings. Three divisions, each with its own sales and engineering staff, were located in Newark, Chicago, and Detroit. The company could produce as many as 60,000 bearings a day. Mr. Sloan’s net worth and all he had earned were completely tied up in the company’s bricks, machinery, and materials. He worried about the huge risk he faced if either of his major customers decided to start manufacturing bearings themselves or found a competitive supplier.

Fortuitously, William C. Durant, soon to be in control of General Motors (GM), decided to buy up and consolidate into his United Motors Corporation various suppliers of parts for GM cars. Durant was known to make fast decisions once he set his course. It took him only a short time to strike a deal after asking if Hyatt was willing to be acquired. A selling price of \$13.5 million was agreed upon and the Hyatt Roller Bearing Company, together with several other manufacturers of automobile parts and accessories, merged with Mr. Durant’s United Motors Corporation. Mr. Sloan was named President. Two years later, in 1918, that company became part of the General Motors Corporation and Mr. Sloan was named Vice President in Charge of Accessories and a member of GM’s Executive Committee. In addition to this significant promotion in his own business career, Mr. Sloan was gratified that the investment of less than \$10,000 his father had made twenty years earlier

to save the Hyatt Roller Bearing Company had resulted in its sale to GM for millions of dollars and given his father financial security for the remainder of his life.

By 1919, the motor car industry was producing almost two million cars per year. About eight million cars and trucks were moving along streets, highways and byways throughout the country. Mr. Sloan was elected President and Chief Executive Officer of General Motors in 1923, succeeding Pierre S. du Pont, who said of him on that occasion:

The greater part of the successful development of the Corporation's operations and the building of a strong manufacturing and sales organization is due to Mr. Sloan. His election to the presidency is a natural and well-merited recognition of his untiring and able efforts and successful achievement.

Mr. Sloan by then had developed his innovative management system providing decentralized operations with coordinated centralized policy control. Applying it to General Motors, he set the corporation on its course of industrial leadership. The next 23 years produced enormous expansion of the corporation and a steady increase in its share of the growing automobile market as it became the global sales leader. Mr. Sloan served as CEO of General Motors until 1946 and as Chairman of the Board from 1937 to 1956, when he was named Honorary Chairman of the Board.

The final sentences from Mr. Sloan's 1964 book, *My Years With General Motors*, make extraordinarily apt observations for the present time:

Each new generation must meet changes—in the automotive market, in the general administration of the enterprise, and in the involvement of the corporation in a changing world. For the present management, the work is only beginning. Some of their problems are similar to those I met in my time; some are problems I never dreamed of. The work of creating goes on.

For many years Mr. Sloan devoted the largest share of his time and energy to philanthropic activities, both as a private donor to many causes and organi-

zations and through the Alfred P. Sloan Foundation, which he established in 1934. He served as President of the Foundation until mid-1962 and as Chairman of its Board of Trustees until a few months before his death on February 17, 1966, at age 90. Mr. Sloan looked on the Foundation as an extension of his own life and work. In a memorandum to the Board of Trustees of the Foundation dated March 20, 1959, he emphasized the “need to support all constructive projects in basic research, upon which all scientific progress and advanced technology depend.” He added, “I would like to see the Foundation explore in every way possible the expansion of education, as this is the foundation of all progress.”

Although acknowledging that the inevitability of change might dictate a different course, Mr. Sloan expected the Foundation would “continue as an operating facility indefinitely into the future ... to represent my accomplishments in this life.” His accomplishments in his lifetime were of the highest order, and in themselves provide a lasting tribute to his extraordinary talent. Through the Foundation, his accomplishments have been greatly extended and expanded.

Note. All unattributed quotations are from *Adventures of a White-Collar Man* by Alfred P. Sloan Jr., in collaboration with Boyden Sparkes, 1941, or *My Years with General Motors* by Alfred P. Sloan Jr., edited by John McDonald with Catherine Stevens, 1964. The second of these books is still in print and has become required reading for serious students of business administration and industrial management.

THE SLOAN YEARS

In his leadership of the Foundation, Mr. Sloan's approach to philanthropy became apparent. He did not fear making large, multimillion-dollar grants. He dealt in big numbers at General Motors and knew that big money was more likely to have a big impact. To enable the Foundation to make grants sizeable enough to produce truly significant results, he limited the fields in which the Foundation would make major investments. He started by concentrating on economics and industrial management and later included science and technology.

From his General Motors experience, he had brought to the Foundation a preference for practical action based on solid knowledge of the facts. His point of view is clear from the chapter title, "Science, the Handmaiden of Industry," of his 1941 book, *Adventures of a White Collar Man*. There he wrote that modern management "recognizes the necessity of the scientific approach, the elimination of operation by hunches Scientific management means a constant search for the facts Only by increased knowledge can we progress" Economics creates the basic understanding that supports industrial management just as science is at the foundation of technology. Mr. Sloan believed that advances in research and education in the sciences underpin advances in technology. Similarly, effective management depends on advances in research and education in economics. Throughout his leadership of the Foundation, Mr. Sloan supported both research and education in science and technology and also in economics and management.

PUBLIC UNDERSTANDING OF ECONOMICS, BUSINESS, SCIENCE, AND TECHNOLOGY

During the initial years of Mr. Sloan's presidency, the Foundation devoted its resources almost exclusively to supporting various projects concerned with education in economics and business. In the first printed annual report, dated 1938, the Foundation clarified its understanding of "education" by insisting that it "transcends the ideas and interests of any one person or group of

persons” and “its only allegiance is to the truth as proclaimed by sound scholarship.” By improving knowledge and understanding, education serves “to guide social change in the path of orderly evolution towards constantly higher standards of normal living.”

From the beginning, this program was meant “to make authoritative and authentic information and unprejudiced discussion concerning our free economic and political institutions directly available to the great mass of the people.” Grants were made for developing materials to improve teaching of economics in high schools and colleges; for preparation and wide distribution of inexpensive pamphlets on the pressing economic and social issues of the day; for the production of films to present, simply and entertainingly, elementary relationships in American business and economic life; for weekly radio airing of roundtable discussions on current topics in economics and related subjects; and for establishing a Tax Institute at the Wharton School to interpret new taxes and new trends in public finance for the average citizen.

Starting in 1950, the **Institute of Economic Affairs at New York University** received annual grants for:

- The production of a monthly publication, *Popular Economics* (later renamed *Challenge* magazine), with articles intended to appeal to the general reader. Several of these were reprinted in inexpensive booklet form and millions of copies were sold to schools and the public.
- Television programming including more than 20 half-hour educational programs on such economics and business topics as mass production, invention, industrial productivity, inflation, and American investment abroad.
- Radio documentaries exploring how economic development is affected by industrial change and advancing technology.
- Ten cartoon films on themes related to the American economic system.

The Foundation’s support of public understanding, initially of economics and business, was enlarged by projects starting in 1957 to increase public understanding of science and technology. Grants were made to support writers with specialties in science and technology for newspapers, magazines, and radio, and

to improve communication with the public on scientific and technological developments. Funds went to:

- **Columbia University Graduate School of Journalism**
- **Council for the Advancement of Science Writing**
- **Scientists' Institute for Public Information**
- **American Association for the Advancement of Science**
- **National Educational Television**

The theme of public understanding of science, technology, economics, and business, initiated during the Sloan years, became a major interest of the Foundation and remains so to this day.

SLOAN-KETTERING INSTITUTE FOR CANCER RESEARCH

The total contribution to Sloan-Kettering from the Foundation and Mr. Sloan came to 67 million dollars, or factoring in inflation, almost half a billion dollars in 2009.

Starting in 1945, the Foundation made substantial grants to fund a variety of major building projects. The first of these, based on an agreement between the Foundation and New York City's Memorial Hospital for the Treatment of Cancer and Allied Diseases, aimed to create a new division of Memorial, the **Sloan-Kettering Institute for Cancer Research**. Charles F. Kettering, as head of the research division of General Motors, had played a great part in the success of the corporation. Mr. Sloan, a lifelong friend, knew of Kettering's interest in medical research, especially in cancer after his sister succumbed to the disease, and sought both Kettering's advice and name for the new project at Memorial.

The plan was to construct and equip a 14-story building to house research into the causes, prevention, and cure of cancer and allied diseases, hoping that the Institute would become a great research center and a leader in improving scientific methodology in medicine. The Foundation made grants totaling \$2,562,500 for the costs of constructing and equipping the Institute building. A supplementary grant of \$2 million, to be paid in installments of \$200,000 per year for a period of ten years, was made to fund Institute research.

Support for medical research at the Sloan-Kettering Institute continued for some time as an important part of the Foundation's program. Eventually, the annual

\$200,000 operating grant to the Institute was doubled by the Foundation in an attempt to keep pace with rapidly growing research programs and budgets. In response to a need for trained nurses for the Institute's chemotherapy program at Memorial Hospital, a number of grants from 1951 to 1959 financed fellowships for nurses from foreign countries who came to Memorial for study and training. By the end of 1960, Foundation support for research and other activities of the Institute approached \$15 million. In 1962 the Sloan-Kettering Institute became part of a coordinating organization for both the Institute and Memorial Hospital for the Treatment of Cancer and Allied Diseases. The new organization was named the Memorial Sloan-Kettering Cancer Center.

In 1948 the Foundation received an unusual gift from General Motors dealers. They wanted to express their appreciation to Mr. Sloan for his contributions in the reorganization of General Motors Corporation's relationship with its dealer organizations. Knowing of Mr. Sloan's interest in cancer and medical research, the dealers desired to contribute to these endeavors. Mr. Sloan suggested that the gift be made to the Foundation and placed in a separate fund, **The General Motors Dealers' Appreciation Fund for Cancer and Medical Research**. Regular grants continued to be made from the General Motors Dealers' Fund to the Sloan-Kettering Institute until 1980 when the remaining assets of the Fund, then over \$3.5 million, were transferred to the Cancer Center. In his June 19, 1962 letter to the Board, Mr. Sloan, at age 87, wrote that he "treasured the honor the General Motors dealers did me in creating this Fund."

Over the 35-year period from 1945 to 1980, total grants to Sloan-Kettering from the Foundation came to \$34 million. Mr. Sloan contributed personal gifts during his life and at his death of an additional \$33 million. Mr. Sloan's expectation has been realized and the Institute is recognized as one of the most eminent institutions for cancer research in the world.

ALFRED P. SLOAN SCHOOL OF MANAGEMENT

Mr. Sloan felt that a first-rate management school could not be better placed than at a great university emphasizing the sciences and technology as well as economics. In 1950, the Foundation gave a major building grant of \$5,250,000 to create the **Massachusetts Institute of Technology School of Industrial Manage-**

ment. Of the total, \$2,500,000 was used to acquire the land and a six-story building adjacent to the Institute property and to renovate and equip it for purposes of the School. The balance of \$2,750,000 was to be paid in equal installments over a ten-year period to be used at the discretion of the School in support of its program. The School was to provide for undergraduate and graduate instruction and was expected to become a “center of research and education in the field of industrial management, all with the view to educating men broadly for the management and further refinement of the great productive machine in competitive enterprise which is an essential part of our American society.” It was to be established as a fifth separate MIT School, with status equal to that of the existing Schools of Science, Engineering, Architecture, and the just-established School of Humanities and Social Science.

MIT agreed to promote close collaboration with industry to “bring the intangibles of business judgment and experience to bear upon the School’s teaching and research programs” and also to experiment with educational techniques “for bringing students into intimate contact with industrial experience and problems.” The renovated building would also house the growing Department of Economics and Social Science, as well as a faculty club “to integrate the school with the rest of the Institute.” An expansion was completed in 1964 with the Grover M. Hermann Building and a high-rise building for graduate students, for which the Foundation contributed another \$1 million. That year the School of Industrial Management was renamed the **Alfred P. Sloan School of Management** which remains today a preeminent institution for research and education in economics, finance and management. The total gifts to MIT for the Sloan School of Management were equivalent to \$50 million at today’s price levels.

OTHER BUILDING PROJECTS

Other important building projects supported by the Foundation include:

- **Massachusetts Institute of Technology** (\$1,000,000): Support given in 1950 for the building and equipping of the **Sloan Metals Laboratory** for research in metallurgy and the processing of metals.
- **California Institute of Technology** (\$1,165,700): To finance the construction of new quarters for its research and teaching programs in physics and mathe-

matics. The resulting modern five-story facility was named the **Alfred P. Sloan Laboratory of Mathematics and Physics**.

- **Dartmouth College** (\$500,000): To help finance equipment for the classroom building completed in 1961 to house the new **Albert Bradley Mathematics Center**.
- **Columbia-Presbyterian Medical Center** (\$500,000): Support for the expansion of its plant and facilities.
- **Cornell University Graduate School of Business and Public Administration** (\$400,000): Partial support to cover the cost of classrooms, laboratories, and administrative space in a special wing of the new building to be devoted to the **Sloan Institute of Hospital Administration**.
- **New York University** (\$2,750,000): Development and support of the Institute of Applied Mathematics, founded and led by Richard Courant. Two million dollars contributed to the cost of a new 13-story building named Warren Weaver Hall. The Institute, later renamed the **Courant Institute of Mathematical Sciences**, is today one of the world's preeminent centers for education and research in mathematics.
- **Stanford University** (\$1,000,000): To modernize part of the Stanford Quadrangle to accommodate the office and classroom needs of the Department of Mathematics. The new facilities were named the **Alfred P. Sloan Mathematics Center** at the 1964 dedication.
- **Massachusetts Institute of Technology** (\$5,000,000): Support given in 1963, of which \$2.7 million was used to construct a building for the newly organized **Center for Continuing Education in Engineering**, with the remaining funds to support a director, special faculty, course development, and administrative costs, all to keep professional engineers and engineering professors abreast of new developments in science and technology.

Although the Foundation no longer funds building projects, it made important contributions during the Sloan years to educational and research facilities and for the establishment of several renowned institutions that thrive to this day.

MEDICAL RESEARCH AND EDUCATION

Most of Mr. Sloan's interest in supporting medical research was focused on the Sloan-Kettering Institute. However, as recorded below, other institutions also benefited from Foundation grants during this period:

- The **Southern Research Institute** in Birmingham, Alabama (\$700,000): Collaborated with Sloan-Kettering in its cancer chemotherapy research program and received three grants during the period 1953-1962.
- The **Sloan-Kettering Nairobi Chemotherapy Program** in Kenya (\$225,000): Support for investigations in Kenyan hospitals of types of cancers prevalent in Africa.
- The **Menninger Foundation** in Topeka, Kansas (\$600,000): Ten years of support to various educational and research projects at its Menninger School of Psychiatry.
- **Council for Research on Glaucoma and Allied Diseases** (\$1,300,000): From 1953 to 1965 this group of experts received Foundation grants and recommended specific projects worthy of support at ophthalmology research laboratories and hospitals throughout the nation.
- **Deafness Research Foundation** (\$1,000,000): From 1955 to 1966, otological research was mainly supported through the Deafness Research Foundation, a professional organization that distributed funds to physicians and scientists in the country's medical schools for research projects. Mr. Sloan had a particular interest in this research as he experienced significant hearing loss in his later years.

SCIENCE RESEARCH FELLOWSHIPS

Since its modest beginning in 1955, the Science Research Fellowships program has received funds in increasing amounts and expanded to include more fields of science. Mr. Sloan recognized the importance of targeting the nation's most promising young researchers, leading him and Mrs. Sloan to make a special gift of \$5 million to the Foundation for this purpose. This fellowship program, which has distinguished itself for over half a century, is regarded as a signature program of the Alfred P. Sloan Foundation.

As contract and sponsored research in science had grown, so too had concern about restrictions limiting a researcher's freedom to pursue a research topic, modify it, or even to abandon it and move on to another. Many felt that such restrictions resulted from pressure to submit detailed research proposals to funding agencies. The Foundation appointed a special committee of distinguished scientists to study this problem and its advice was clear: support "young scientists of marked promise" in the early stage of their academic careers in chemistry, physics, and mathematics, and in closely related interdisciplinary fields such as geochemistry and astrophysics, and do not encumber fellowship funds in any way that limits the freedom of the selected scientist to apply the stipend to the pursuit of his or her research interests. In short, support people, not projects.

The Foundation invited a group of eminent scientists to review the extensive records of each fellowship nominee and to select award recipients. The submission of a specific research proposal was not required. An individual could not apply for a fellowship, but was nominated by a senior scientist well acquainted with the nominee's research and potential as a creative scientist. The grant, made to the Fellow's university, allowed maximum freedom in its use so long as it related to the Fellow's research. For the initial 1954-55 academic year of the program, 22 Sloan Research Fellows in 16 universities were selected and the Foundation expenditure amounted to about \$200,000. The program was well-received and highly valued. By 1965, there were 155 Sloan Research Fellows from 48 institutions and the Trustees had raised the annual level of expenditures for these fellowships to \$1.4 million.

The Science Research Fellowships program was innovative from its inception and has maintained its unique features even as it has been greatly expanded over the years. This program, initiated under Mr. Sloan's leadership, demonstrates the Foundation's long-standing and continuing commitment in support of the very best young research scientists.

MIT SLOAN FELLOWSHIPS IN EXECUTIVE DEVELOPMENT

The **Executive Development Program** at the Massachusetts Institute of Technology was originally established with the support of Mr. Sloan and five

colleagues from other corporations, each of whom agreed to support a young executive from his company for a year of special course work and related activities at MIT. Mr. Sloan was especially concerned that participants have an opportunity to understand the “broad social and economic aspects of managerial problems faced by industry.” It was expected that this program would broaden the knowledge and management skills of the executives and increase their ability to move up to more responsible managerial positions.

The program was formalized in 1937 with a modest expenditure of \$25,000. Seven executives completed the 12-month program that year. Participants were nominated by the company for which they worked and once selected, the employer paid the salary of the young executive as well as moving and related expenses for the family. The Fellowship Program freed participants from their company responsibilities for a full year of study and business-related contacts and experiences, benefitting both the executives and their companies. The course work included not only various business subjects, but also the humanities and social science. Incorporated were weekly seminars led by economists and business and labor leaders, and visits to industrial plants and business centers. Students who completed a thesis, in addition to their course work, could earn master’s degrees. By 1965, the Foundation payment to MIT for this Executive Development Program had grown to over \$300,000. The program continues in modified form without Foundation support to this day, and versions of this Executive Development Program exist at many other leading university business schools.

RESEARCH IN SCIENCE AND TECHNOLOGY

Although grants to support research in science and technology were made earlier, the Foundation made its two largest gifts for this purpose starting in 1960. That year, MIT received \$5 million to establish a research fund for faculty members. Support was especially intended for researchers in interdisciplinary areas and domains where little support was available from government and other sources. Three years later, Mr. Sloan made a personal gift of \$5 million to augment this fund which was then named the **Alfred P. Sloan Fund for Research in the Physical Sciences**.

In 1964 the Foundation made another grant of \$5 million to MIT to support research there. Together, these three gifts provided about \$100 million at current price levels to support research in the sciences and allied fields of mathematics and engineering to MIT.

In 1965 the **California Institute of Technology** also received a \$5 million grant to create a fund for basic research in the physical sciences, including engineering and mathematics. The fund could also be used where basic research in the physical sciences impacts other disciplines, such as biophysics, bioengineering, and other areas of the life sciences.

A \$1 million grant to **Cornell University** in 1965 recognized not only that the electronic computer had become an essential tool in many fields, but also that a distinct body of knowledge known as computer science had been developed. The grant supported the creation of a new and enlarged Department of Computer Science, with courses for both undergraduate and graduate students in the College of Arts and Sciences and the College of Engineering.

RESEARCH IN ECONOMICS AND BUSINESS

The **Brookings Institution** and the **National Bureau of Economic Research** were the main beneficiaries of Foundation grants for research in economics during the Sloan years. Starting in 1938, Brookings received funding for research on the American capital market, the role of large-scale enterprise in the economy, America's experience with various foreign economic assistance programs, and on industrial concentration in the United States and its effect on competition.

The National Bureau of Economic Research received a number of grants from 1953 to 1964 for studies of wages and productivity in the United States. Research support of the National Bureau continued in 1964 with a \$500,000 grant for a five-year project on Employment and Price Levels. That same year, it received \$180,000 to revive its Research Associate Program for visitors from college and university faculties to come to the National Bureau to participate in research projects.

As Mr. Sloan was Chairman of the Board at General Motors, support of research projects in economics and industrial management was naturally of great interest. **Johns Hopkins University** received \$100,000 for a study in

economic history to trace the evolution of large corporations in the United States. Additionally, a number of Foundation grants to strengthen research programs were made to business schools. The Foundation made a \$1 million grant in 1952 to the **Massachusetts Institute of Technology** for support of research projects in industrial management and related areas.

EDUCATION IN SCIENCE AND TECHNOLOGY

During the Sloan years, the Foundation initiated programs on education in science and technology. In 1961, awards of \$1 million went to each of six institutions to assist them in improving the physical science backgrounds of engineers. The program also aimed to enlarge the pool of talent from which individuals could successfully be recruited into an engineering professorial career. The Foundation sought institutions with strength in engineering and physical sciences and a demonstrated interest in science-oriented engineering programs. Grants went to:

- **Brown University**
- **Dartmouth College**
- **Johns Hopkins University**
- **University of Notre Dame**
- **Princeton University**
- **University of Rochester**

The **MIT Physical Science Study Committee** received a \$250,000 Foundation grant to complete support for a major revision of physics courses in the nation's secondary schools. The **American Chemical Society** was granted \$100,000 to produce two films for college chemistry courses. A 1965 award to **Michigan State University** supported a study of the high attrition rate of beginning students in the sciences and mathematics. This retention problem again attracted interest at the Foundation in later years.

EDUCATION FOR UNDERREPRESENTED GROUPS

In 1963, cognizant of the underrepresentation of both women and African Americans in all aspects of science, technology, and management, the Foundation contributed \$500,000 to the **United Negro College Fund** capital campaign. The Foundation made many additional grants during those early years, aimed at extending educational opportunity to African Americans and other underrepresented groups, including women:

- **Radcliffe College** (\$100,000): To support study by advanced women students with research interests in mathematics, science, or medicine.
- **United Negro College Fund** (\$500,000): Made in 1965 to establish the Sloan Opportunity Awards at ten leading historically Black colleges. Awards were given to promising high school juniors along with the opportunity to qualify for college with financial assistance. Successfully completing two summers of special studies made students eligible for admission to the college and entitled them to scholarships based on need.
- **Cooperative College Development Program**: To help 23 colleges establish or expand their own development offices and to improve their capacity for obtaining financial aid from their alumni, regional organizations, and from government, industry, and foundations to help minority students. The Foundation allocated \$1 million in matching grants as an incentive for these colleges to move rapidly to improve their own fund-raising activities.

In 1954, tuition for the eleven colleges participating in the Alfred P. Sloan National Scholarship Project varied. For example, Oberlin College was \$600 a year.

SCHOLARSHIPS FOR COLLEGE STUDENTS

Early in 1953, the Foundation supported undergraduate scholarships at four engineering colleges through the **Alfred P. Sloan National Scholarship Project**. In 1954 the program added seven liberal arts colleges, and together the eleven colleges provided 64 students with scholarships. With satisfactory records, scholarships were renewable for the entire four-year degree program. The annual stipend ranged from a minimum of \$200 to a maximum of \$2,000, the amount being determined by the college based on need and college costs.

The program was understandably popular and grew steadily over the years. By 1965 it involved over 500 scholarships in 45 colleges, 37 private and eight public. The Foundation's four-year commitment had grown from \$1 million to about \$5.1 million. During the last of the Sloan years, the Board of Trustees initiated a review of the project, especially in light of increasing federal funds available for college students, and in 1969 the Board decided to terminate this scholarship project and divert the funds to other programs in higher education.

LOOKING TO THE FUTURE

Over the years, independent and experienced men with distinguished records in industry, commerce, and the academic world were invited by Mr. Sloan to become Board members. By 1965, the last full year Mr. Sloan served as Chairman of the Board of Trustees, the Board had grown to a membership of 19. Many he approached were friends and colleagues from General Motors including, among other luminaries, Albert Bradley, Director and former Chairman of the Board of General Motors Corporation; General Lucius D. Clay, then Senior Partner of Lehman Brothers; James B. Fisk, President of Bell Telephone Laboratories; James R. Killian, Chairman of the Corporation, Massachusetts Institute of Technology; Laurence S. Rockefeller, President, Rockefeller Brothers Fund and Chairman of the Board of Memorial Sloan-Kettering Cancer Center; and Warren Weaver, Consultant and former Vice President, Alfred P. Sloan Foundation.

Mr. Sloan set Foundation policies, suggested major new initiatives, and was essentially the sole decision maker at the Foundation during his tenure as Chairman of the Foundation's Board of Trustees. Nevertheless, he recognized early on that the Foundation would ultimately have to depend on the leadership of others. The policies he established and the Board he formed allowed him to feel confident that the work of the Foundation would carry on "indefinitely into the future."

THE POST-SLOAN YEARS: CONTINUATIONS AND NEW BEGINNINGS

The Case, Wessell, and Rees Presidencies, 1966 to 1989

Following Mr. Sloan's death in 1966, President Case, the Board of Trustees, and Foundation staff reviewed the significant changes in American industry and society and evaluated the emergence of new funding sources such as the federal government. This led to shifts of emphasis in Foundation programs, with some programs modified or phased out while new programs were developed. Although President Case's tenure was relatively brief, he ably managed this critical transition for the Foundation.

Despite this change, and all the ones to come, the basic themes established during the Sloan years remained intact. Foremost among these was the emphasis on research and education in science, technology, engineering, mathematics, and economics. The Foundation's interest in supporting public understanding in these fields, especially in science and technology, persisted. Programs to assist underrepresented minorities continued to receive attention, as did civic initiatives. While each incoming president brought with him a unique background and perspective, the continuity in the Foundation's mission during these years is noteworthy.

One of the Foundation's eight Particular Programs, the New Liberal Arts Program aimed to expand the traditional liberal arts curriculum by exposing undergraduates to computing and quantitative reasoning and improving their understanding of engineering in the modern world.

PARTICULAR PROGRAMS

Early in President Wessell's presidency the Foundation reorganized its grant-making to include special programs called **Particular Programs**. These efforts fit within the general framework of Foundation interests, but focused on one particular subject. A series of grants over as many as five to ten years, with sizeable commitments of funds, allowed the Foundation to make significant contributions in each of its Particular Programs. During the 20-year period starting in 1969, eight Particular Programs were developed by the Foundation:

- Neuroscience
- Cognitive Science
- Minorities in Management
- Minorities in Medicine
- Minorities in Engineering
- Minorities in Public Management
- Use of Technology in Education
- New Liberal Arts Program

SCIENCE RESEARCH AND EDUCATION

From the late 1960s to 1989, the Foundation made hundreds of major grants and invested millions of dollars in support of science research and education projects. In particular, the early nurturing of programs in Neuroscience and Cognitive Science helped establish these fields as coherent, autonomous disciplines.

Neuroscience

In 1969, after extensive consultation with experts, the Foundation initiated a **Particular Program in Neuroscience**, an emerging research discipline conducted in many different and isolated departments within relatively few institutions. Specialists in neurochemistry, neurophysiology, pharmacology, molecular biology, genetics, biophysics, psychology, and psychiatry were doing research on the biological basis of behavior.

Based on advice from a committee of distinguished scientists, the Foundation began to bring together researchers from these different departments to apply their skills to the new field of neuroscience. Support of basic research was regarded as crucial and a more unified scientific discipline, it was believed, would assist in understanding human behavior at the level of molecular events in the nervous system.

From 1970 to 1976, major grants supported centers of neuroscience research and the training of students and young researchers:

- **Cold Spring Harbor Laboratory** (\$615,000): Support for education of post-doctoral students and established scientists interested in applying their specialized knowledge of chemistry, physics, mathematics and computing to the study of the nervous system; renewal support for research at the Labo-

ratory and for summer training programs which produced many full-time neuroscience researchers.

- **MIT** (\$1,560,000): Grants for its neuroscience research program and to develop and offer students an undergraduate and graduate curriculum in neuroscience, as well as an active postdoctoral program.
- **Salk Institute for Biological Studies** (\$915,000): Funding to expand its research in molecular and cell biology to include study of the nervous system, to make faculty appointments, and to establish new laboratories for research on the function of individual nerve cells of simple organisms.
- **University of California, San Diego** (\$1,660,000): Funding for faculty appointments and expanded training programs for the new Department of Neuroscience and for research and training of young neuroscience investigators.
- **California Institute of Technology** (\$736,000): Grants to support its neuroscience research program.
- **Albert Einstein College of Medicine** (\$1,100,000): Support of research by neurobiologists to grow brain cells in the laboratory in order to study the differentiation of cells for specific functions and various chemical and electrical characteristics of different kinds of brain cells.

In 1972, substantial grants went to **University of North Carolina** and **University of Virginia** to support junior faculty in neuroscience and to strengthen collaborative research efforts by specialists from many different fields. A smaller grant was made to **New York University** to support a research project on learning in large marine snails. Grants were made for research at **Rockefeller University** on the effects of hormones on brain function and behavior in lab rats and at the **University of Minnesota** for studies of changes in brain cells of lab animals following the introduction of viruses. A grant to the **University of Massachusetts** supported the collaboration of scientists active in experimental research and theorists using computer simulation to model the nervous system. Researchers at the **University of Pennsylvania** and **Duke University** received funds to continue joint work and for collaborative neuroscience research projects with colleagues in England, Poland, and Italy.

By the mid-70s, the Foundation's Neuroscience Advisory Committee recommended that the Foundation could now best contribute to the development of neuroscience by supporting young people working with senior researchers from broad areas of neuroscience. In 1974, following this advice, grants totaling over \$1.6 million, mainly for the training of young neuroscientists and post-doctoral fellows, went to:

- Harvard University
- George Washington University
- Columbia University
- Case Western Reserve University
- University of Oregon
- University of North Carolina
- University of California, San Francisco

In total, \$12.2 million was awarded for development of neuroscience research, establishing it as a discipline in its own right that continues to grow. About 1,300 scientists convened in 1971 at the first annual meeting of the Society for Neuroscience; attendance at the 35th annual meeting in 2005 was almost 35,000. The Society currently has almost 39,000 members. Neuroscience is now one of the most active fields of research in science. The education of future neuroscientists is well supported by doctoral programs at the country's strongest research universities and by neuroscience majors or concentrations at leading undergraduate colleges.

Cognitive Science

The **Particular Program in Cognitive Science**, like Neuroscience, was also focused on research in science and was intrinsically multidisciplinary. Researchers from such fields as anthropology, computer science, linguistics, neuroscience, philosophy, and psychology were studying human mental processes like memory, perception, and language, and seeking principles by which mental capacities are organized, developed, and applied by human beings. For the most part, the scientists worked in universities without adequate contact with colleagues from other disciplines and other institutions. In 1977, based on discussions with expert advisors, the Foundation embarked on a multiyear program to support the nascent field of cognitive science.

Initially, emphasis was placed on convening scientists from different disciplines to see where ongoing research stood, where it was headed, and to explore the

possibilities of collaborative research projects. Grants supported a wide variety of workshops, seminars, and conferences, as well as visits by scientists from different disciplines and institutions to contribute ideas and techniques from their various specialties. Grants were made to:

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| ■ University of California,
San Diego | ■ University of California, Irvine |
| ■ University of Texas at Austin | ■ University of Chicago |
| ■ MIT | ■ Cornell University Medical
College |
| ■ Yale University | ■ University of Massachusetts
Amherst |
| ■ Brown University | |
| ■ Stanford University | |

Each of the grantees was actively involved in cognitive science research projects and shared a common objective: to discover the representational and computational capacities of the human mind and how these are related to the brain's structure and function.

By 1979, an increasing number of universities had developed significant research projects and were ready to start advanced training programs for post-doctoral students and younger scientists prepared to master two or more of the disciplines involved in cognitive science. The Foundation began supporting advanced training programs and allowed postdoctoral trainees to develop a working knowledge of concepts and techniques from several different disciplines. Major grants went to:

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| ■ University of California,
San Diego | ■ University of Michigan |
| ■ MIT | ■ Stanford University |
| ■ Carnegie Mellon University | ■ Brown University |
| ■ University of Pennsylvania | ■ University of Massachusetts
Amherst |
| ■ University of Texas at Austin | ■ Cornell University |
| ■ Yale University | ■ University of California, Irvine |
| ■ University of Chicago | |

The final phase of the program concentrated on institutional development. Support was given for the establishment or development of a self-sustaining center, institute, department, or other administrative entity to carry out a con-

tinuing program of research and training in cognitive science. A competition held by the Foundation led to 22 proposals which were carefully reviewed by panels of experts, leading to commitments of significant Foundation support in 1981. **MIT** received \$1.5 million for further development of its Center for Cognitive Science and for research and training focused on language, vision, and conceptual reasoning. Eight institutions received grants of \$500,000 to strengthen, unify, and institutionalize research and training programs in cognitive science:

- **University of California, Berkeley**
- **University of Pennsylvania**
- **University of Rochester**
- **University of Texas at Austin**
- **Carnegie Mellon University**
- **Stanford University**
- **Cognitive Neuroscience Institute**
- **University of California, Irvine**

By 1986, major centers for research in cognitive science at **University of California, Berkeley, University of Pennsylvania, Stanford, MIT, and Carnegie Mellon** had received substantial Foundation support and were engaged in both interdisciplinary collaborative research and graduate and postdoctoral programs to educate and support the next generation of cognitive scientists. The research benefited from rapid advances in computer technology, especially at institutions employing techniques of artificial intelligence, computer simulation, and computer modeling to study complex cognitive functions such as problem solving and decision making.

The Foundation also directly supported cognitive science research. For example, joint work between cognitive psychologists and scientists at the **University of Illinois** studied event-related brain potentials by measurements recorded at the scalp of subjects performing cognitive tasks (e.g., recognizing faces). Also, the **Center for Advanced Study in the Behavioral Sciences** in Stanford, California organized a year-long program to study intelligent behavior in physical and biological systems by leading philosophers and computer scientists working on artificial intelligence. Grants also supported testing models of depth perception at **Johns Hopkins University**, analysis of models of color vision at **Rockefeller University**, research on models of learning at **Stanford University**, and development and testing of computation models of motion perception and control of visual attention at the **University of Alabama at Birmingham**.

Computational Neuroscience: In 1985 a small new program in the field of computational neuroscience, a subdivision of the Cognitive Science Program, allowed researchers to link computer simulation, mathematical modeling, and techniques of artificial intelligence and robotics with experimental work in neuroscience on individual cells, networks of cells, and large neural systems.

Smaller grants to the **Exploratorium** and the **American Psychological Association** funded the development of a new set of interactive exhibits to increase public understanding of cognitive science research. Summer institutes, workshops, research conferences, annual meetings of the Cognitive Science Society, and a summer seminar for teachers of undergraduate cognitive science courses were mainly supported by small grants.

By 1987, a decade after its initial grantmaking in the field, the Foundation had invested a total of almost \$25 million, or almost \$60 million at current price levels, in support of cognitive science and computational neuroscience. Institutions were strengthened and research was active. Ties had been established among the various disciplines involved in the field and study opportunities had increased at leading colleges and universities. The value of the Foundation's early nurturing of the cognitive science discipline is now recognized in all histories of the field.

EDUCATION FOR UNDERREPRESENTED GROUPS

Established in 1965, the Foundation's **College Development Program** led to improved development efforts at its 23 participating historically Black colleges. Over \$9 million of new private funds were generated by the colleges. In 1967, under the leadership of Everett Case, the program expanded to 30 colleges and a second commitment of \$1 million in matching funds. In 1969, the Foundation announced its first Particular Program aimed at improving access of minorities to the professions of management and medicine; subsequent Particular Programs focused on minorities in engineering and in public management.

Minorities in Management

In 1970, the **Council for Opportunity in Graduate Management Education (COGME)** was formed by ten graduate management schools:

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| ■ Carnegie Mellon University | ■ Dartmouth College |
| ■ Columbia University | ■ MIT |
| ■ Cornell University | ■ University of California, Berkeley |
| ■ Harvard University | ■ University of Chicago |
| ■ Stanford University | ■ University of Pennsylvania |

COGME's aim was to increase the numbers of minority students entering graduate management programs by expanding recruiting efforts by the universities and creating fellowships for these students. Minority enrollments in COGME schools increased from 257 in 1969 to 520 in 1974. From 1969 to 1974, five Foundation grants for COGME fellowships totaling \$3,320,000 went to more than 600 students. COGME's efforts produced corporate contributions of \$300,000 in 1973-74, up from \$28,000 two years earlier. In 1974, 173 students, about one-third of all enrolled minority students in these management programs, received COGME support.

The **Consortium for Graduate Study in Management**, which included graduate management schools at the Universities of North Carolina, Rochester, Southern California, Wisconsin, Indiana and Washington, also engaged in active minority recruiting and raised funds for fellowship support. Concentrating on educating minority students for managerial careers in not-for-profit organizations such as schools, hospitals, and government agencies, the Consortium received a \$500,000 Foundation grant in 1971. By 1974, 55 minority students were receiving funds and a renewal grant of \$300,000 was made. The Consortium has since grown to 15 member institutions and has supplied scholarships for over 5,500 students including women, African Americans and other minorities. Its alumni are in managerial positions in companies throughout the country.

From 1965 to 1974, Foundation expenditures in education aimed at improving access of minorities in management totaled almost \$6 million, mostly as part of the Particular Program announced in 1969. **Texas Southern University, Xavier University, and Florida A&M University** received grants in 1973 to improve minority enrollments in their management programs. Other notable grants included:

In 1973, Xavier partnered with Tulane and selected Xavier students for a summer workshop to prepare them for full entry into the Tulane MBA program. The grant to Xavier provided fellowships for 21 students and funding to strengthen the faculty and curriculum.

- **University of New Mexico** (\$365,000): Support of an MBA program for American Indians in its business school, offering financial aid to 15 students for each year of its two-year course.
- **Association for the Integration of Management** (\$193,000): Support to assist development of special services such as conferences, career opportunity workshops, and career preparation for minority management students.

- **Northeastern University** (\$120,000): Support to develop a program for part-time study by older minorities who had graduated from college 10-15 years earlier and were interested in earning MBA degrees to qualify for higher level managerial positions.

The entire nation's graduate schools of management had enrolled only about 55 African Americans in the late 1960s. By the 1973-74 academic year, there were about 640 African American and other minority students in accredited graduate management programs across the country. Business schools had committed to programs to enroll and graduate more minority professionals for management positions. Sources of support for minorities in management had increased significantly with more fellowships available and substantially increased contributions from corporations, foundations, and other private donors.

Minorities in Medicine

Similar efforts were made to improve access of minority students to medical education and to increase the number of minority physicians. **National Medical Fellowships (NMF)**, an organization providing fellowships for minority students in their first two years of medical study, had been receiving Foundation grants since 1959. By 1969, a total of 110 African American students had entered medical schools with scholarships through Foundation support of NMF. In the ensuing years, the Foundation made major grants to NMF totaling \$3.75 million. By 1974, NMF awards had been made to 1,840 minority medical students at 109 medical schools.

Over the next decade, the Foundation made many substantial grants, including:

- **Meharry Medical College** (\$1,000,000): For new science faculty in support of an effort led by President Lloyd C. Elam to improve the college's program and to increase enrollment. By 1970, Meharry College had educated about half of all the nation's African-American physicians.
- **Harvard Medical School** (\$150,000) and **Williams College** (\$140,000): Supported programs over several summers reaching more than 100 minority college students with work in science and mathematics and exposure to medically-related subjects.

- **United Negro College Fund** (\$137,500): Support for four of its member colleges to fund summer preparatory and financial aid programs for prospective minority medical students.
- **Howard University's College of Medicine** (\$800,000): For its Accelerated Medical Education Program in which 20 selected students entered medical studies after their college sophomore year and completed both the bachelor's and the M.D. program in six or seven rather than eight years. By 1974, about forty students each year were being accepted into the accelerated program.
- **University of California, Santa Cruz** (\$76,000): Support for its program of tutoring, financial aid, and summer health-related jobs, all aimed at increasing the numbers of Mexican Americans prepared to enter medical careers.

During the decade from 1964 to 1974, the Foundation invested about \$7.5 million in minority medical education or about \$40 million at current price levels. In 1967, only two percent of medical school enrollment was accounted for by minorities but by 1974, minority students made up ten percent of the incoming freshman medical school class. A significant role was played by the National Medical Fellowships while support from corporations, foundations, other private sources, and schools of medicine increased substantially. As additional funding sources became available, the Foundation chose to end its role in the Particular Program for improving minority access to medical careers.

Minorities in Engineering

In 1973, the Foundation announced a Particular Program to increase the representation of minorities in engineering. Major grants first went to the six predominantly Black engineering schools that together graduated more than half of all Black engineers:

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| ■ North Carolina Agricultural and Technical State University | ■ Howard University |
| ■ Prairie View A&M University | ■ Southern University and A&M College |
| ■ Tuskegee Institute | ■ Tennessee State University |

Plans to increase enrollment included improving the recruiting process, offering special summer programs for high school students, developing ways to reduce attrition among incoming students, and increasing financial aid.

The Foundation-supported **Planning Commission for Expanding Minority Opportunities in Engineering** issued an influential report in 1974 known as “A Blueprint for Action.” The report identified the following conditions as necessary for the success of any program aimed at increasing participation of minorities in engineering: increased financial aid for engineering students; expanded precollege programs to attract students to engineering as a career choice; effective arrangements with feeder colleges supplying aspiring engineering students; and strengthened tutorial and remedial programs at engineering colleges.

The **University of New Mexico**, with close ties to nearby American Indian communities, planned to bring 40 American Indian students a year into a specially designed program involving an orientation period, a preparatory year in a branch of the university, and counseling and tutoring as preparation for enrolling in its College of Engineering. This program received Foundation support in 1974.

In 1975, engineering colleges joined together to form regional consortia focused on increasing the number of minority students in their schools. The colleges worked with secondary schools (primarily in the inner cities) to improve preparation of students in mathematics and science, and to make students and teachers aware of opportunities for careers in engineering. Support was sought from local industries to arrange special summer programs and job opportunities. Foundation grants supported the startup costs and work of many such regional consortia until 1978, including:

- **Committee on Institutional Cooperation (CIC)** (\$2,000,000): A Midwestern consortium of Big Ten and other engineering colleges.
- **Southeast Consortium** (\$1,000,000): Consortium of seven engineering schools.
- **Philadelphia Regional Introduction for Minorities in Engineering (PRIME)** (\$500,000): Consortium of six engineering colleges and universities.

These efforts reached thousands of students throughout the country and were instrumental in producing a significant growth of interest and enrollment in engineering by minorities.

Engineering-oriented educational materials for urban and secondary schools were crucial to the success of early intervention programs. The **National Coordinating Center for Curriculum Development (NCCCD)** was established in 1976 at the **State University of New York, Stony Brook**. Foundation grants totaling more than \$1.5 million supported the Center's work. In workshops, high school teachers and college faculty produced learning modules on science, mathematics, and communication skills for high school courses. The Stony Brook Center worked with consortia of engineering colleges and greatly increased its impact by introducing its curriculum materials into many urban centers with large minority student populations. By the end of 1979, 500,000 copies of some 20 modules had been distributed.

In 1975, with the help of an \$800,000 Foundation grant, the **National Fund for Minority Engineering Students (NFMES)** was created by the National Academy of Engineering to generate student financial aid; it sought the substantial funding needed for the education of minority engineering students from corporations, foundations, and other donors. By 1978, donors had contributed almost \$3.8 million to NFMES, which gave block grants to 70 affiliated colleges of engineering to aid approximately 1,000 needy students. The organization also helped students obtain summer jobs at participating engineering companies. A second Foundation grant of \$850,000 supported the growth of this National Fund.

From 1973 through 1979, Foundation grants totaled over \$13 million to expand minority opportunities in engineering, equivalent to \$50 million at current price levels. During the same period, the number of minority students entering colleges of engineering had more than doubled.

Minorities in Public Management

The Foundation's support of public management included research, education, and a Particular Program to increase the number of minority students entering the field. In 1980, grants totaling \$280,000 were made to **Carnegie**

Mellon University, Universities of Minnesota and Texas at Austin, and State University of New York at Stony Brook to provide summer institutes for minority students who had just finished their junior year. About 25 students at each site took courses in economics, quantitative methods, and communication skills, all designed to encourage them to enter a rigorous course in policy analysis in their senior year and consider applying for admission to a high-quality graduate school of public service.

Throughout its development, the program received assistance in planning and carrying out its activities from the **Association for Public Policy and Management (APPAM)**, an organization of leading institutions and individuals in the field of education for public service. A fellowship program funded by the Foundation provided financial support of minority students for the first year of their graduate work. Thirty-six minority students received fellowships in the fall of 1981 and fellowships continued for minority students until 1989 when the last class entered graduate school. In total, the program awarded fellowships for graduate study to 819 minority students. One indication of the success of the program was the steady increase in the numbers of minority students entering APPAM graduate schools with the help of Foundation fellowships.

The Foundation also supported master's degree programs and career development in public management:

- **Georgetown University** (\$153,000): A 1988 grant for stipends for ten minority graduate students engaged in summer positions with the Department of State, with the aim of interesting them in careers in diplomacy.
- **New York University** (\$225,000): This 1989 grant supported minority students interested in master's degree programs in nonprofit management.
- **New School for Social Research** (\$225,000): A 1989 grant for minority students interested in master's degree programs in nonprofit management.
- **Graduate School of Political Management** (\$207,000): This 1989 grant supported minority students interested in learning about polling, campaign finance, lobbying, and other topics important for a career in managing political campaigns.

In total, about \$22 million was expended on the Particular Program for minorities in public management in support of junior-year and senior-year institutes, graduate fellowships, and special programs.

By focusing extensive resources and attention on individual subjects over time, the Particular Programs had a positive impact on several fields and helped advance the Foundation's mission.

RESEARCH AND EDUCATION IN ECONOMICS

A few major grants in support of economics research were made in the late 1960s and early 1970s. The **National Bureau of Economic Research** received \$1 million in 1968 to expand its research into economic analysis of problems of poverty, urban decay, and economic growth. Major grants from 1970-1973 to the **Brookings Institution** supplied \$800,000 for the *Brookings Papers on Economic Activity* and for research on growing foreign investments by U.S. corporations, the effects of this trend on jobs, wages, and prices, and on the developing countries in which the expansion was taking place.

In 1974 the Foundation initiated a new sustained program in economics. Albert Rees, himself an economist, solidified and expanded this interest when he became President in 1979. Based on the recommendation of an advisory committee chaired by Nobelist Robert Solow—then Professor of Economics at MIT and later a member of the Sloan Board of Trustees—the Foundation began a program of research and education in microeconomics.

Microeconomics is concerned with economic behavior at the level of individuals, households, companies, and industries. In contrast to macroeconomics, it deals with practical problems faced by managers, entrepreneurs, and public servants in specific industrial and market situations. One goal of the Foundation's program was to increase the number of economists possessing the skills required for microeconomics research and to identify the field of microeconomics as a challenging and worthy area of concentration.

The first phase of this program aimed to support research and graduate-level training. Grants of \$210,000 for faculty and graduate student workshops to study topics such as transportation systems and the impact of inflation on

markets, institutions, and taxation went to the following ten departments of economics:

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| ■ University of California, Berkeley | ■ New York University |
| ■ University of Chicago | ■ Princeton University |
| ■ Columbia University | ■ Stanford University |
| ■ Harvard University | ■ University of Wisconsin |
| ■ Yale University | ■ MIT |

These workshops produced new research and publications in important applied microeconomic areas. They provided training and support for many Ph.D. candidates, created a significant impetus to the production of doctoral dissertations on topics in microeconomics, and generally increased interest in the field. Renewal grants of \$140,000 were made to all ten institutions to continue and expand the research and training workshops.

During the second five-year phase of the program, the Foundation solicited proposals from economics departments with strong faculties in applied microeconomics research. A total allocation of \$3,060,000 was equally distributed in 1980 and 1981 to twelve universities:

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| ■ MIT | ■ Carnegie Mellon University |
| ■ University of Minnesota | ■ University of California, Los Angeles |
| ■ Northwestern University | ■ University of Chicago |
| ■ University of Pennsylvania | ■ University of Maryland |
| ■ Princeton University | ■ Yale University |
| ■ Stanford University | |
| ■ University of Washington | |

Research topics included methods of applied welfare economics, social management of private markets, the effects of regulation and taxation on the private economy, and natural resource economics. Final renewal grants of \$170,000 were approved in 1983 and 1984 for all twelve institutions. Some 500 doctoral candidates received stipends in support of their dissertation research on microeconomic topics. By the conclusion of this program the Foundation spent just under \$8.7 million and microeconomics was no longer a neglected area of economics.

The economics program was reviewed in 1984 for the Foundation by Paul Joskow, then Professor of Economics at MIT and now President of the Sloan Foundation. He judged the practice of doctoral candidates working with senior professors a successful workshop model and recommended that it be retained. The following year the workshop model became part of a new macroeconomics program focused on the increased openness of the U.S. economy and the large increases in foreign trade. In the years 1985-1987, grants of \$255,000 went to each of eleven university departments of economics. Four final renewal grants of \$170,000 brought the total expended on this program to just under \$3.5 million.

Many other grants were made to support research and education in economics during this period. Some of these included:

- **Brookings Institution** (\$500,000): Support in 1975 for a three-year study of global inflation.
- **American Enterprise Institute for Public Policy Research** (\$500,000): Partial support in 1976 for a comprehensive long-term study of government regulation.
- **University of Michigan** (\$580,000): A 1981 grant for the collection of longitudinal data on a sample of 5,000 American families by the University's Panel Study on Income Dynamics. These valuable data on economic variables had been collected for this same group of families since 1968.

PUBLIC UNDERSTANDING OF SCIENCE, TECHNOLOGY, AND ECONOMICS

Programs for Journalists

In the mid 1970s the Foundation initiated a program to increase the ability of journalists from newspapers, wire services, magazines, radio and television to interpret issues in economics for the general public. **The Woodrow Wilson School of Public and International Affairs** at Princeton University received grants totaling almost \$1.4 million to plan and conduct five year-long graduate-level training programs for about eight working journalists each year. Special courses in economics together with seminars and workshops on current public policy is-

MIT obtained funds to endow the Vannevar Bush fellowships, now known as Knight Science Journalism Fellowships. An expanded program to increase journalists' understanding of science, technology, medicine, and the environment continues to this day at MIT.

sues, often featuring visiting experts from industry and government, were organized. This program continued until 1979.

In 1983, the Foundation contributed to the establishment of the **Vannevar Bush Fellowships in the Public Understanding of Technology and Science at MIT**. Experienced journalists participated in a year-long program to learn about current advances in science and technology and interact with fellow journalists and faculty to improve their newsgathering and reporting. When its final grant was made in 1989, the Foundation had contributed about \$1 million for this program.

Grants from 1987 to 1991 to the **Harvard University School of Public Health** led to the establishment of a year-long fellowship program for mid-career print and broadcast journalists on science, medical developments, and public health.

Science Book Program

The Science Book Program, initiated in 1976, aimed to demystify the world of science, emphasizing for a wide general audience the cultural and humanistic aspects of research in the sciences. With that aim in mind, an editorial advisory committee selected a distinguished group of prospective authors and commissioned books. The first two books, published in 1979, were *Disturbing the Universe* by theoretical physicist Freeman Dyson, and *Advice to a Young Scientist* by Sir Peter Medawar, Nobel Laureate in Medicine. Other Nobel Laureates who authored series books include economist George J. Stigler; biologists Salvador Luria, Francois Jacob, Rita Levi-Montalcini, Eric Kandel, and Francis Crick; psychologist and computer scientist Herbert Simon; and experimental physicist Luis Alvarez. By the end of 1988, fourteen series books had been published by an extraordinary group of scientists.

The Pulitzer Prize-winning book, *The Making of the Atomic Bomb* by journalist and historian Richard Rhodes, is another product of the Foundation's Science Book Program aimed at increasing public understanding of science and technology. This popular book addressed atomic physics, nuclear fission, and the work and thinking of scientists and engineers participating in the Manhattan Project.

Although books were the primary focus, grants in support of public radio and public television shows were also occasionally supported as part of the public understanding of science, technology, and economics program.

FELLOWSHIPS

Sloan Research Fellowships

Initiated by Mr. Sloan in 1955 (see page 15, Science Research Fellowships), this program was regarded by each president as an important part of the Foundation's support of research in science. Fellowships for neuroscientists were added in 1972 and for economists in 1980. By 1989, the program had grown considerably and accounted for an annual expenditure of \$2.3 million. That year, Sloan Research Fellowships were awarded to 91 scholars at 55 institutions in five fields.

Sloan Dissertation Fellowships

Federal support of doctoral fellowships in the physical and social sciences had declined sharply since the 1970s. In 1984 the Foundation established a new program, Sloan Dissertation Fellowships, to help doctoral candidates in two fields: economics and mathematics. These awards were intended to allow each candidate to complete a dissertation without carrying the burden of teaching duties or academic obligations. Leading departments of economics and mathematics were invited to submit nominations, which were reviewed by committees made up of distinguished economists and mathematicians.

By the program's conclusion in 1999, 395 graduate students in economics and an equal number in mathematics had received fellowships. The Foundation's commitment totaled just under \$18 million over the 16-year duration of the program. An overwhelming majority of fellowship awardees, given the freedom to concentrate on completing their doctoral research, received their Ph.D.s at the conclusion of their fellowship year.

Postdoctoral Fellowships in Molecular Studies of Evolution

By the 1980s, powerful techniques in molecular biology made it possible to study the evolutionary history encoded in the genetic complement of living

species. Starting in 1985, the Foundation supported research projects, scientific conferences, and workshops designed to introduce the study of evolution to young molecular biologists. Additionally, a new postdoctoral fellowship program was initiated for young molecular and evolutionary biologists interested in developing the interdisciplinary skills necessary for molecular research on evolution. Sixty-five fellowships were awarded from 1988 to 1993 with a total expenditure of over \$5 million. An expanded program of postdoctoral fellowships in molecular evolution was subsequently funded and operated jointly for another five years by the National Science Foundation and the Alfred P. Sloan Foundation. Molecular evolution is now a well-regarded scientific field, and many of its leaders are among those who received postdoctoral fellowships.

CIVIC INITIATIVES

Civic contributions to the Foundation's home city of New York had been made as early as 1958. This tradition continued in a more substantial form throughout the 1970s and 1980s. Some of the recipients included:

- **Lincoln Center for the Performing Arts:** The initial 1958 grant partially funded construction costs. A second grant in 1976 supported technological improvements needed for the successful "Live From Lincoln Center" broadcasts over a network of public television stations.
- **Channel 13 in New York City** (\$200,000): A 1961 contribution for the acquisition of Channel 13 to convert it to an educational and cultural television station.
- **New York Public Library** (\$325,000): A 1977 grant underwriting the microfilming of its deteriorating main public card catalog, consisting of 11 million entries.
- **New York University** (\$116,500): A 1983 grant to finance a study by its Urban Research Center of recent trends in population and housing in New York City.
- **Fund for the City of New York** (\$150,000): A 1985 grant to finance awards to municipal employees demonstrating extraordinary service over a substantial period of time. The awards, now known as the Sloan Public Serv-

ice Awards, are popular and continue to be made each year through the Fund, which receives support from the Foundation as part of its civic program.

During the Case, Wessell, and Rees years, the Foundation continued the work begun by Mr. Sloan and expanded into new areas. In particular, the Foundation's support of cognitive science, neuroscience, and economics reaffirmed its commitment to funding basic science research, to helping to launch new disciplines, and to supporting innovative developments in existing disciplines of interest to the Foundation. The continuing efforts on behalf of minority programs, civic programs, and programs in public understanding further demonstrate the ongoing commitment to Mr. Sloan's founding vision.

EXPANSION AND TRANSITION

The Gomory and Joskow Presidencies, 1989-2009

In 1989, Ralph E. Gomory, a mathematician and former Senior Vice President for Science and Technology at IBM, was appointed as the Foundation's fifth president. He was the Foundation's longest serving president since Alfred P. Sloan. During his tenure, the assets of the Foundation grew at a steady rate from \$622 million in 1989 to \$1.9 billion at the end of 2007, leading to a corresponding increase in the total of grants authorized each year. From 1989-1992 total grants authorized averaged \$28 million per year. That annual average had grown to \$69.3 million for the four years ending in 2007. Foundation program commitments increased accordingly and grants of more than a million dollars were no longer rare, enabling the Foundation to play a larger role in traditional areas of interest and to create major new programs.

In 2008, Paul L. Joskow, an economist and Professor of Economics and Management at MIT, was appointed as the Foundation's sixth president. Despite a global collapse of financial markets that reduced the value of the Foundation's endowment by about 25 percent during 2008, he has endeavored to fulfill all of the Foundation's existing commitments, to bring a successful conclusion to several programs, to strengthen current programs with external evaluations and advisory panels, and to begin new initiatives in science, digital technology and the dissemination of knowledge, economics, the environment, and aging and work. Looking toward the future during uncertain times, President Joskow also redefined the Foundation's internal operations and undertook a major reorganization, working collaboratively with staff to reformulate the mission statement and making the necessary changes to help the Foundation meet new challenges and embrace new opportunities.

SCIENCE RESEARCH

Sloan Digital Sky Survey (SDSS)

From 1992 to 1994, four grants totaling \$10 million were made to the **Astrophysical Research Consortium**, which together with funds from government

agencies and participating institutions supported the design and construction of a special wide-field telescope at Apache Point Observatory, New Mexico. Additional Foundation grants of \$10 million in 1999 and \$5.4 million in 2004 for an observational program led to the creation of multicolored three-dimensional maps of cosmic structure covering over one-quarter of the sky. Distances to nearly one million galaxies and over 120,000 quasars were measured and the largest known structures in the universe were observed. SDSS advanced our understanding across an extraordinary range of astronomical disciplines. Data and research reports have been made available to the scientific community and the public via the project website www.sdss.org.

An additional Foundation grant of \$7 million was approved by the Board in 2007 to enable SDSS to study the properties of dark matter, the expansion history of the universe, and the structure of the Milky Way. This work, also funded by the United States National Science Foundation and Department of Energy, and participating institutions in the U.S., South America, Europe, and Asia, began in 2008. In recognition of the Foundation's pivotal support in all phases of the project, the 2.5-meter telescope at Apache Point Observatory was formally named The Sloan Foundation Telescope in 2008.

Census of Marine Life

In 1997, the Foundation made exploratory grants to test the feasibility of an international project to assess and explain the diversity, distribution, and abundance of marine life. Positive responses resulted in grants to the **Consortium for Oceanographic Research and Education** to establish an international secretariat for the Census of Marine Life (CoML) that works in close coordination with national and regional committees. The Consortium formed a U.S. national committee whose purpose was to determine U.S. strategy, to establish priorities for the Census, and to secure additional funding. By the end of 2008, over \$6 million in Foundation grants had supported Consortium work of governance and leadership.

Fourteen major international field projects have been mounted, each requiring teams of outstanding researchers, detailed plans, and commitments from sponsors and partners. A grant of \$500,000 went in 2001 to the **Woods Hole Oceanographic Institution** and grants totaling almost \$3.5 million from 2003 to 2008

went to the **University of Southern Maine** in support of the Gulf of Maine field project. This field project produced the first comprehensive census of the region, now exceeding 3,000 species, including surveys of benthos (bottom dwellers), large vertebrates and seabirds, fish and squid, and plankton. It provided the framework for an important new technology, ocean acoustic waveguide remote sensing, which imaged schools of millions of herring over thousands of square kilometers. Another project, at the **University of Hawaii**, received almost \$3 million as part of an international team led by researchers based in Germany and the United States, to study life forms in the abyssal ocean depths. Field projects are described on the Census website, www.coml.org.

The **Ocean Biogeographical Information System (OBIS)** was created to manage and disseminate the huge amount of data produced by CoML field scientists and CoML laboratories around the world. Grants of almost \$7 million to **Rutgers University** and **Duke University** from 2001 to 2008 maintained and extended this computer-based data system of marine animal and plant locations. It now contains over 19 million records of about 105,000 marine species.

From the outset, the program attended to the historical record and established historical marine ecology as an active discipline. Foundation grants totaling over \$2.6 million to the **University of New Hampshire** supported research to develop a global perspective on how the diversity, distribution, and abundance of marine animal populations have altered over the past 2,000 years.

Foundation grants for the entire Census project total over \$70 million. Non-Sloan sources have contributed more than \$500 million. Thousands of scientists from more than 80 nations are participating. Noteworthy for such a multifaceted international project, this program is on schedule to complete the first ever Census of Marine Life in 2010. It will be recognized worldwide as a significant scientific achievement.

Barcode of Life

A 2002 grant to the Cold Spring Harbor Laboratory supported an international conference to explore the feasibility of a DNA-based species identification system. DNA barcoding is a technique that uses a short DNA sequence from a

standardized and agreed-upon position in the genome for species-level identification. The Foundation initiative, the Barcode of Life, aimed to develop a DNA barcode library for reliable identification of animal and plant species. The Consortium for the Barcode of Life, based at the Smithsonian Institution, now includes over 170 member organizations from 50 countries. Barcodes of more than 500,000 specimens from over 50,000 species have been accumulated. A 2008 \$2.25 million grant to the Smithsonian will accelerate the creation of a global barcode library for all animals, plants, and fungi. For the next two years, the Foundation plans to support the Consortium to maintain strong growth of the barcode library. Additional information can be found at www.barcoding.si.edu.

Encyclopedia of Life

The Encyclopedia of Life (EOL) program aims to organize and make available on the Internet a reliable encyclopedia with a website for each of the 1.8 million known species of plants, animals, and fungi. The Foundation contributed \$2.5 million in 2007 to help start this ambitious project, first proposed by the eminent biologist Edward O. Wilson. Content is being generated via the Biodiversity Heritage Library, a consortium of ten major natural history museum libraries, botanical libraries, research institutions, other web-based resources, and by professional and citizen scientists. Employing wiki software, people worldwide are invited to contribute text, video, images and other information about a species and have it incorporated into authenticated pages.

The EOL has grown to almost 200,000 pages since 2008. It has developed web pages for marine species hyperlinked to Census of Marine Life publications and built bridges to DNA barcoding projects. A grant of \$2.5 million went to the **Smithsonian Institution** in 2009 for continued work on this online encyclopedia project (see www.eol.org).

Theoretical Biology

In 1994, interest in bringing theory into areas of biology increased. That year, the Foundation made grants totaling \$7 million to establish five Centers of Theoretical Neurobiology at:

- Brandeis University
- California Institute of Technology
- New York University
- Salk Institute
- University of California, San Francisco

Leading neuroscientists at the Centers trained mathematically and computationally sophisticated young theorists in laboratory techniques of experimental research. Renewal grants totaling over \$5.5 million went to the five centers in 1997. In 2000, the Swartz Foundation joined the Foundation in funding research at the five Centers. The Swartz Foundation has subsequently established an additional five Centers for Theoretical Neurobiology and it is now the main private funder of the original five facilities.

In 1995, as another effort to bring theory to experimental biology, a program of postdoctoral fellowships in computational molecular biology was initiated as a joint venture between the Foundation and the U.S. Department of Energy. Fellowships provided an in-depth experience in a molecular biology laboratory for recent Ph.D.s with theoretical backgrounds in mathematical and computational techniques. The program aimed to increase the number of scientists possessing the cross-disciplinary skills needed to study problems related to data arising from the study of human and other genomes.

Indoor Microbial Environment

The Indoor Microbial Environment initiative started in 2004 with a \$2.5 million grant to the **Center for the Advancement of Genomics, Inc.** (now merged into the J. Craig Venter Institute) to examine the genomics of the microbes in outdoor and indoor air in New York City. In 2007, a \$595,000 grant to **Yale University** supported research combining knowledge and methods from both aerosol science and molecular biology in order to improve understanding of the significance of bioaerosols in the indoor environment. In 2008, almost \$3 million went to the **Marine Biological Laboratory; University of California, Berkeley;** and **University of Colorado.** These grants funded research to build a database of fungal barcodes for species from indoor human dwellings, to study the types of rare organisms found in the microbial population of drinking water, and to establish an inventory of microorganisms encountered by humans in daily life — in homes, public buildings, and hospitals.

Deep Carbon Observatory

Launched in 2008 under Paul Joskow, this program aims to advance understanding of Earth's deep carbon, including its connections to the origins, distribution, and abundance of fossil fuels and to the origins of life. A 2007 exploratory grant of \$398,000 to the **Carnegie Institution of Washington** supported work on the carbon associated with life deep in the Earth and on the implications that a deep origin of life might have for our understanding of geological processes and resources. An international conference of 115 expert geologists, biologists, engineers, and economists concluded that ignorance of deep carbon is largely the result of severe technical challenges associated with probing high-pressure and high-temperature processes in Earth's deep interior. In 2009, a grant of \$4 million went to the Carnegie Institution of Washington to launch a decade-long effort to understand Earth's deep carbon cycle through an international Deep Carbon Observatory. Envisioned as a distributed facility, the Deep Carbon Observatory will combine existing research capabilities with new high-pressure/high-temperature environmental chambers, micro- and nano-scale analytical apparatus for light element and isotope analysis, and computer hardware and software for theoretical modeling of deep-Earth processes.

Forest Measurement and Monitoring

This new Foundation program, created in 2008, seeks to improve measurement and monitoring of world forests in order to meet emerging information demands, including those for carbon markets. Because forests remove carbon dioxide from the atmosphere and store the carbon in biomass, concerns about climate change have increased attention to the value of carbon sequestered in trees. Environmental policies that involve monetizing carbon held in forests have pointed to the unreliability of forest inventory estimates. Large differences that exist among surveys of forests translate into large dollar values when converted into millions of carbon credits. Measurement of forest carbon can affect carbon dioxide mitigation targets, allocation of targets among countries, use of sequestration to meet targets, and accuracy of carbon trading systems,

helping to create a more efficient and effective system for meeting energy needs while protecting the environment.

In December 2008, **Resources for the Future** received \$330,000 to support the creation of an integrated and transparent picture of current forest information and the preparation of technical designs for more accurate systems of forest measurement and monitoring. Further grants to develop this program are planned.

Sloan Research Fellowships

Since its beginnings in the mid-50s, the Sloan Research Fellowships have remained a fundamental component of the Foundation's support of research in science. Over the years, this longest standing program at the Foundation has benefited from advisory committees of senior scientists and these experts ensure that the fellowships are awarded each year to the very best early-career scientists of outstanding promise. The program has continued to grow over the years with awards in computer science added in 1993, and computational and evolutionary molecular biology in 2002. Although the two-year grants are relatively modest (\$50,000 in 2009), former Fellows have attested to the value of having maximum freedom in the use of research funds early in one's career.

An annual expenditure of \$6.1 million currently supports 118 fellowships distributed as follows: chemistry (23), computer science (16), economics (8), mathematics (20), molecular biology (12), neuroscience (16), and physics (23). Through 2009, expenditures totaling about \$130 million have been made to over 4,500 Sloan Research Fellows.

Thirty-eight Sloan Research Fellows have won Nobel Prizes (17 in physics, 15 in chemistry, 3 in economics, and 3 in medicine or physiology), fifty-six have won the U.S. National Medal of Science, sixteen have been Fields Medalists in mathematics, and nine have been awarded John Bates Clark Medals in economics. Many hundreds have received other distinguished honors and awards. The Foundation website contains detailed information about the program, including a list of all Sloan Research Fellows.

Since the mid-1950s, thirty-eight Sloan Research Fellows have received Nobel Prizes.

EDUCATION AND CAREERS IN SCIENCE AND TECHNOLOGY

Anytime, Anyplace Learning

In the early 1990s, anticipating the possible importance of online learning, the Foundation began work in this area before the arrival of the commercial Internet. When the Internet boom arrived, the Foundation then made grants to build both the scale and quality of online learning as it spread from a few pioneers to become a significant mode of education. The Asynchronous Learning Networks (ALNs) program allowed a remote learner to access instructors, classmates, course assignments, and other educational resources over the Internet. Several important grants were initiated during this time:

- **Drexel University** (\$2,050,000): A 1993 grant created six software design courses that allowed off-campus students to enroll in courses along with resident students. In 1995 Drexel received a renewal grant to expand ALN course development.
- **University of Illinois** (\$2,000,000): To establish a Center for Asynchronous Learning Environments and create a broad range of ALN courses and degree programs.
- **Pennsylvania State University** (\$1,300,000): To launch “World Campus,” designed to reach off-campus learners with about 300 online courses for 30 different academic programs.
- **State University of New York** (\$1,300,000): To expand ALN course offerings at more than nine system colleges and regional community colleges by adding over 200 online courses. This expansion represented the start of a New York State “virtual university” in which online degrees were made available for students throughout the state system.
- **Council for Adult and Experiential Learning** (\$2,000,000): A 1998 grant to establish programs for telecommunication and electrical workers. Pace University delivered online degree programs to telecommunication workers across the country. Bismarck State College in North Dakota provided an Associate of Applied Science in Electric Power Technology for electrical industry technicians.

Over \$5 million has supported the growth and development of the Sloan Consortium (Sloan-C), a group of Sloan grantee and other institutions committed to promoting quality online education. Sloan-C leadership maintains a website (www.sloan-c.org), publishes the online *Journal of Asynchronous Learning Networks*, organizes workshops, and maintains the web-based Sloan-C degree catalog. In 2002, the membership of Sloan-C was less than 100; by 2008 this Consortium had over 1,500 members.

In August of 2005, following Hurricane Katrina, devastating damage closed many area colleges, disrupting the education of thousands of students. A \$1 million grant to **Olin College of Engineering** allowed Sloan-C member institutions to offer ALN college courses free of charge to all affected students during an eight-week “Sloan Semester.” Over 1,300 courses were made available online by 160 colleges and universities from 38 states.

The ALN program, active for 15 years and with a total expenditure of approximately \$75 million, made important contributions to online learning. A survey conducted in 2008 showed that over 3.9 million students, more than twenty percent of all U.S. higher education students, had taken at least one online course during the fall term, an increase of 12 percent over the number reported the previous year. In 2008, as a major step in concluding the ALN program, the Foundation made a \$4 million grant to Sloan-C, now a 501(c)(3) organization, to institutionalize the major features of the program. A website devoted to ALN activities (www.aln.org) was created in 1996. The original goal, formulated by Ralph Gomory, was to make high-quality learning, education, and training available anytime and anywhere for those motivated to seek it. This Foundation program has helped move the country closer to achieving that goal.

...the Professional Science Master's (PSM) initiative seeded by the Alfred P. Sloan Foundation—has shown that graduate education in these fields can prepare students for advanced science-based work in a way that is highly desired by employers.

—National Research Council's Committee on Enhancing the Master's Degree in the Natural Sciences, 2008

Professional Science Master's Degree

In 1997, the Foundation initiated a program to institutionalize a high-quality two-year professional science master's degree (PSM) that would equip graduates for work outside academia. Since then, grants totaling \$20 million have supported the creation of 146 professional science master's degree programs at 78 universities. Some of these degree programs combine advanced work in a scientific field together with courses in allied fields such as bioinformatics,

computer science, and environmental science. Other programs integrate study in natural science or mathematics with coursework in professional areas like management or law. Many graduates have successfully found employment in industrial laboratories and government agencies.

As the program approaches its planned conclusion in 2010, grants are being made to broaden national support for the professional science master's degree, to support system-wide state projects to initiate PSM degree programs, and to fund activities designed to make the PSM degree a normal, recognized, and widely accepted feature of American graduate schools. For more information, visit www.sciencemasters.com.

Education for Underrepresented Groups

In the 1990s, underrepresented groups in education continued to attract Foundation support and grants were made to improve recruitment and retention of women students in mathematics, science, and engineering to:

- Dartmouth College
- University of California, Davis
- University of Maryland
- University of Michigan
- University of Washington
- Carnegie Mellon University
- Cornell University
- Purdue University
- Rutgers University

Projects included mentoring, special orientation seminars, research internships, connecting successful science and engineering alumnae with current students, industrial site visits, and organizing Women in Science and Engineering Programs to create a more hospitable climate to attract and retain women in engineering schools and science programs.

Similar programs were supported for minority students:

- **University of Illinois** (\$600,000): A 1992 grant organized a consortium of 14 Midwestern universities and 6 historically Black colleges to increase minority students completing bachelor's degrees and pursuing graduate work in mathematics, science, and engineering.
- **University of Maryland, Baltimore County** (\$203,412): A 1993 grant assisted the administration of the Meyerhoff Scholarship Program by sup-

plying funds to facilitate research internships for over 100 African-American students and placing almost 40 such students in graduate schools each year.

- **MIT (\$375,000):** A 1994 grant supported a program which recruited highly qualified undergraduate African-American and Hispanic students, brought them to Cambridge for an intensive ten-week program of classes, mentoring, and research experiences and encouraged them to pursue doctoral study in science or engineering.

The Foundation's grantmaking also aimed to increase the number of minority Ph.D.s in mathematics, science, and engineering, thereby increasing the number of potential new minority faculty members. The Foundation sought out universities, departments, and faculty with records of successful minority recruiting and guiding completion of doctoral degrees. Starting in 1994, the Foundation made grants ranging from \$60,000 to \$1.1 million to many universities, the amounts depending on the projected increase in enrollment of minority Ph.D. students. In 1995-96, the Foundation started providing scholarship support directly to minority doctoral students called Sloan Scholars, who entered Ph.D. programs to work with participating faculty. Today Sloan Scholars are located at 39 campuses across the country.

The **Sloan Indigenous Graduate Partnership**, started in 2003, aims to increase the number of American Indian, Native Alaskan, and Native Hawaiian students earning master's and Ph.D. degrees in mathematics, science, and engineering. This program now operates at:

- **University of Alaska Anchorage** ■ **University of Montana, Missoula**
- **University of Alaska Fairbanks** ■ **Montana Tech**
- **University of Arizona** ■ **Purdue University**

The Foundation is helping these institutions establish themselves as regional centers, each with a critical mass of indigenous students successfully working toward advanced degrees.

A small component of aid is given to feeder college departments to improve their already strong records of sending minority graduates on to doctoral programs. The feeder college programs have supplied approximately 450 minority doctoral students and have received funds of about \$6 million.

The **National Action Council for Minorities in Engineering (NACME)** has served as the Foundation's agent in administering these programs since 2001. NACME receives applications, selects students for Foundation scholarships, administers awards, and supports recruiting. As of academic year 2008-09, over 1,100 Ph.D. students have received Foundation scholarships totaling almost \$20 million. Since 2000, total Foundation expenditures for the minority Ph.D. programs are over \$36 million. For more information see www.nacme.org/sloan.

Information about Careers in Science and Engineering

During 1995 and 1996, grants totaling about \$3.4 million were made to nine leading professional societies for the preparation of CD-ROMs, videotapes, and brochures designed to give students realistic information about professional careers in over a dozen different fields of science and engineering. In 2003, these materials were made freely available on the Web through the Sloan Career Cornerstone Series. The website, www.careercornerstone.org, now features career information for about 170 degree fields. A series of career podcasts, each covering a different career path and answering questions from listeners, is now part of Cornerstone. This Foundation program has produced an up-to-date, reliable, and widely used information site on science-based careers for guidance counselors as well as students.

Manufacturing in Schools of Management

From 1990 to 1995, a series of grants supported the joining of management and engineering schools to refocus management training on manufacturing. This was intended as a corrective to the emphasis placed on finance and marketing in many MBA and other graduate programs. Grants went to:

- **MIT** (\$400,000): Supported the development of courses combining technological and managerial aspects of manufacturing.
- **Northwestern University** (\$332,000): Developed a Master's Program in Manufacturing.

- **Cornell University** (\$558,900): Added manufacturing courses to engineering, industrial and labor relations, and business administration programs, and developed a new master's degree in Mechanical Engineering with the Manufacturing Option.
- **Stanford University** (\$3,000,000): Organized a new Ph.D. program in the Graduate School of Business and the School of Engineering for those with industrial experience in order to produce professors to teach manufacturing. A \$2 million renewal grant supplied funding for five classes aimed at producing 25 new Ph.D.s with experience and expertise in manufacturing.

STANDARD OF LIVING AND ECONOMIC PERFORMANCE

The goal of these programs was to increase understanding of the basic forces affecting American economic progress and standards of living in an increasingly competitive world economy.

Industry Studies and Centers

The Industry Studies program, launched in 1990, supported research on American industry. Initial grantmaking focused on creating research centers of multidisciplinary groups of faculty and graduate students whose research was grounded in direct observation of a single industry. During the next fifteen years, Foundation grants supported the formation and work of 26 Sloan Industry Centers. From 1990-1993, grants totaling over \$18 million went to the following universities for study of specific industries:

- **MIT** (motor vehicles and pharmaceuticals)
- **Harvard University** (textile and apparel)
- **Carnegie Mellon University** (steel)
- **University of Pittsburgh** (steel)
- **Stanford University** (computers)
- **University of California, Berkeley** (semiconductors)
- **Wharton School of the University of Pennsylvania** (financial services)

In subsequent years, Centers were established to study the airline, aluminum, biotechnology, construction, electric power, information storage, internet retailing, legal and professional services, managed healthcare, paper and forest products, powder metallurgy, personal computers, printing, retail food, software, telecommunications, travel and tourism, and trucking industries. By the end of 2007, 1,000 faculty and 1,300 graduate students had participated in Sloan Industry Center research projects and approximately 460 Ph.D. degrees were awarded based on research conducted at Centers. Centers were asked by government departments to produce state-of-the-industry reports and projections while the Sloan Industry Centers were receiving increasing support from government, private foundations, and companies in their industries.

Over the years, the field expanded beyond the Centers to include many faculty and postdoctoral researchers identified as Sloan Industry Studies Affiliates. The Foundation funded annual conferences, fellowships, and other activities to support this larger community. The Industry Studies Association, developed with Foundation assistance beginning in 2004, became an independent 501(c)(3) organization in 2008. The practice of visiting company sites, interacting directly with industry practitioners, observing company practices in manufacturing, marketing, and other divisions, and learning firsthand about the markets, firms, and institutions all established a new research model for young doctoral students, many of whom are now faculty members doing industry studies at universities around the country (see www.industrystudies.org).

Foundation support for this program is scheduled to come to an end in 2010. By then, two decades of Foundation support totaling over \$110 million will have been committed to the Industry Centers and Industry Studies programs, including the following related research projects in Globalization, Competitiveness, and Economics Research.

Globalization, Competitiveness, and Economics Research

From 1990 to 2006, grants were made to support research projects in Globalization, Competitiveness, and Economics Research. Grants supporting this research include:

- **University of California, Berkeley** (\$1,062,400): Support for research on competitiveness, especially in biotechnology and the pharmaceutical industry, by the Berkeley Roundtable on the International Economy.
- **Columbia University** (\$1,500,000): Support for case studies and econometric analyses to study the mechanisms of productivity in service businesses in finance, telecommunications, insurance, retail food, and banking.
- **National Bureau of Economic Research** (\$2,424,000): Support for research on productivity changes in manufacturing industries and links between new science and commercialization.
- **University of Wisconsin** (\$491,765): Support for the study of the uneven recovery of manufacturing industries among Midwestern states from the “rusting” evident in the 1980s.
- **University of California, San Diego** (\$1,150,510): For study of globalization of the computer data storage products industry.
- **University of California, Davis** (\$191,000): Support for research on the U.S. outsourcing of business operations and the relocation of U.S. firms to India (offshoring) for services that can be delivered with no production of physical goods.
- **Levy Economic Institute of Bard College** (\$293,030): Support for continued research on a new measure of “economic well-being” for U.S. households.

Workplace, Work Force and Working Families

The Foundation started the Workplace, Work Force and Working Families program in 1994 in response to a fundamental social and economic change taking place in America: the rise of middle class, dual-earner households. The program established three main goals: to create a new interdisciplinary field focused on issues faced by working families; to educate the public about these issues; and to increase workplace flexibility, a high priority for both working parents and older workers, by encouraging voluntary employer efforts and changes in federal policy and regulations.

From 1996 to 2001, grants totaling more than \$16 million supported the creation of six Sloan Centers on Working Families:

- **Cornell University**
- **University of California, Berkeley**
- **University of Chicago**
- **University of Michigan**
- **University of California, Los Angeles**
- **Emory University**

Research at these Centers created a deeper understanding of working families and how work conditions affect them. Center researchers have produced books and journal articles, have graduated a significant number of Ph.D.s, and have created the next generation of work-family scholars. A 1997 grant to **Boston College** established the Sloan Work and Family Research Network to provide information to scholars, human resources practitioners, and state legislators. This Foundation program has helped advance recognition of work-family as an interdisciplinary area of academic research.

Foundation-supported demonstration projects have shown that workplace flexibility can reduce paid time off and absenteeism, and increase productivity. In 2003, the **Families and Work Institute**, in partnership with local chambers of commerce, received almost \$1.4 million to launch the Sloan Awards for Business Excellence in Workplace Flexibility to recognize firms for their flexibility best practices. Also in 2003, grants to the **American Council on Education** created the Sloan Awards for Faculty Career Flexibility which recognize institutions with exemplary flexible work practices for their faculties. Eleven universities have received these awards. Also supported were projects that provided case studies of flexibility used as a strategic tool to achieve business results in specific workplaces. Georgetown University's Foundation-supported "Workplace Flexibility 2010" project works to create the support necessary to develop national flexibility policies.

In 2005, a Foundation grant of just under \$3 million supported the establishment of a Center on Aging and Work at **Boston College**. The Center is focused on aging and work in the 21st century and encouraging business communities to adopt and utilize flexible work options for older workers. The Center is a prime source of quality information about flexible work options for older workers.

In 2008, final grants were made to:

- **Families and Work Institute** (\$2,838,785): To continue its competitive business awards program and to promote workplace flexibility as a strategic means of achieving business goals.
- **Georgetown University** (\$2,589,612) and **New America Foundation** (\$250,000): For the University's Workplace Flexibility 2010 project, in cooperation with New America Foundation, to advance policy ideas for federal legislation and agency regulations regarding workplace flexibility.

Since the program's launch, grants totaling \$118 million have been made. Workplace flexibility is increasingly recognized as important in improving lives and supporting business objectives. This program will reach its planned conclusion in 2010. Further details are available on the Foundation website, <http://www.sloan.org/program/32>.

Making Municipal Governments More Responsive to Their Citizens

This program, launched in 1994, aimed to promote widespread acceptance of citizen-based and citizen-informed measurement and public reporting of municipal government performance. In 1995, a \$1.5 million grant went to the **Urban Institute** to help the International City/County Managers Association establish a comparative performance measurement program that continues today. A \$2 million grant went to the **Fund for the City of New York** to develop, test, and implement performance measures to assess the performance of New York City agencies. From this emerged the technique of citizens using handheld computers and digital cameras to report on observable conditions in neighborhoods and parks. This is now widely used in New York, San Francisco and elsewhere. In subsequent years, grants were made across the country to enable non-government organizations to perform performance measurement from outside their local governments. Most of this work continues.

Between 1997 and 2004, three grants, totaling nearly \$1.5 million, went to the **Financial Accounting Foundation** to support research of the **Governmental Accounting Standards Board**. This led to the Suggested Guidelines for Voluntary Reporting of Service Efforts and Accomplishments Performance. **Rut-**

gers University-Newark received grants in 2001 and 2004, totaling about \$974,000, to teach citizen-based performance assessment in schools of public administration and elsewhere. The resultant curriculum materials and online modules are now widely used at Rutgers and across the country.

From 2003 through 2008, almost \$7 million supported the **National Center for Civic Innovation's** work with governments to advance performance measurement. From 2006 through 2009 over \$1.1 million was granted to National Center for Public Productivity at **Rutgers University-Newark** to launch and expand the online Public Performance Measurement and Reporting Network. The Foundation also promoted the spread of telephone and online systems, enabling citizens to make direct service requests and to check the status of those requests.

This program is scheduled to end by 2010, by which time grants totaling over \$42 million will have been made.

Economic Institutions, Behavior and Performance

In 2008, this program was initiated to support research in economics, management, regulation, law, and political economy related to the structure, behavior, and performance of the U.S. economy and its place in the global economy. It aims to develop research-based insights to inform critical policy decisions and spur advances in finance, economics, law, and organizational behavior.

Grants in this area include:

- **Brookings Institution** (\$406,495): To hold six conferences in three years presenting research on financial markets and institutions, with conference proceedings to be published in the *Brookings Papers on Economic Activity*.
- **National Bureau of Economic Research** (\$588,800): For three research groups to study issues of financial security design, linkages between financial market participants and the internal organization of financial institutions and how it affects the degree of risk-bearing, risk management protocols, and the reporting of changing financial circumstances within these institutions.

- **University of Pennsylvania** (\$733,318): For research by the Wharton School on regulation of today's financial markets and institutions, with workshops and conferences to bring together investigators and experts in the field.
- **Office for Oregon Health Policy Research** (\$1,000,000): For research by health economists from Harvard and MIT, in collaboration with representatives from Oregon's health policy research office, to study health insurance and its effect on healthcare utilization and healthcare outcomes.
- **University of Maryland** (\$323,115): A 2009 grant supported the launching of an international Financial Crisis Database that provides open access data on financial crises, covering many variables in many countries and going back several centuries.

PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY

Since its earliest years, the Foundation has been concerned with public understanding, first of economics, and then of science and technology. During the Gomory-Joskow years, the program expanded to include theater, film, commercial television, and other art forms and new media, and integrated these efforts with enhanced support of books, public radio and public television to create a comprehensive media program. The goal is to bridge the gap between the "two cultures" of science and the humanities by providing the public with a better understanding of the scientific and technological environment in which we live and by portraying the lives of the men and women engaged in scientific and technological pursuits.

Books

The Foundation's sponsorship of the *Science Book Series* (see page 38) in the 1980s was followed in 1991 by the *Sloan Technology Book Series* on the development and impact of 20th-century technologies. More recently, the Foundation has partnered with Doubleday on a new biography series, *The Innovators*, focusing on the lives of great inventors and entrepreneurs.

Over the past twelve years, the Foundation has also made an average of ten author grants a year to support popular books on science and technology topics, and it has become the best known supporter of science writers and science writing in the country. *Inventing America: A History of the United States*, *Infrastructure: A Field Guide to the Industrial Landscape* and *They Made America: Two Centuries of Innovation* have joined bestsellers like *Galileo's Daughter* by Dava Sobel and *Collapse* by Jared Diamond and Pulitzer Prize winning books like *American Prometheus* by Kai Bird and Martin Sherwin. Since 1996, the Foundation has committed about \$9 million to books as a means of helping the public better understand both the issues involving science and technology and the lives of scientists, engineers and mathematicians. For more information see <http://www.sloan.org/program/17>.

Radio

The Foundation has long supported radio as an effective medium through which to increase public understanding of science and technology. From 1992 to 2008, major grantees included:

- **National Public Radio** (\$3,400,000): Grants for a Science Desk, a full-time science reporter, and the addition of technology reporters, have significantly expanded the science and technology presence on the nation's leading public radio network.
- **Public Radio International** (\$1,800,000): From 1998-2007, PRI received support for technology coverage on *The World*, its news and information program, until it institutionalized a Technology Desk with a full-time technology reporter.
- **WNYC Radio** (\$1,900,000): Grants for integrating science and technology programming into the popular arts show *Studio 360*; and start-up and continuing support for *Radiolab*, an innovative show focused on a single scientific theme, now heard around the country.
- **American Communications Foundation** (\$1,600,000): For science and technology stories on CBS Radio's *The Osgood File* by Charles Osgood, reaching over 12 million weekly listeners; the Foundation's first foray into commercial radio.

- **SoundVision Productions** (\$1,200,000): To produce radio documentaries on genetics for *The DNA Files*, hosted by John Hockenberry. *The DNA Files* won the Peabody and other prestigious awards.
- **L.A. Theatre Works** (\$570,000): Recording of science-themed plays for broadcast on public radio, ensuring expanded audiences and a permanent afterlife for limited run theatrical productions.

Television

From 1990 to 2008, the Foundation committed about \$66 million to support the production of documentaries, mainly for public television, on topics in science, technology, and the U.S. economy. About half of this total went to **WGBH Educational Foundation** for such programs as *The American Experience* and *NOVA*. *The American Experience* aired many science and technology programs, including documentaries on the laying of the transatlantic cable; the building of the Alaskan pipeline; the development of the Pill, which won an Emmy award; and the 2009 Emmy nominated *The Trials of J. Robert Oppenheimer*. More recently, funding has gone to WGBH for scientist profiles on *NOVA scienceNOW*, hosted by astrophysicist Neil deGrasse Tyson.

Other programming included a six-part series on women in science, three shows on technology and war, a three-part *NOVA* series on string theory hosted by physicist Brian Greene and based on his book *The Elegant Universe*, which won both the Peabody Award and the Emmy; and *Forgotten Genius*, on the life and work of Percy Julian, the first African American elected to the National Academy of Sciences. Many programs, on such topics as the building of Grand Central Station, the making of the hydrogen bomb, and the search for an AIDS vaccine, were based on Foundation-supported books.

Other television grants include:

- **Civil Rights Project, Inc.** (\$3,800,000): A 1993 grant to support PBS programs on minorities in science and engineering to encourage young people to consider education and careers in these fields.
- **Film/Video Arts, Inc.** (\$2,000,000): A 2001 grant for the Emmy Award-winning series, *DNA*, commissioned by the Foundation in honor of the 50th anniversary of the discovery of the double helical structure of DNA.

- **Living Archives, Inc.** (\$975,000): A 2006 grant for three PBS documentaries on women scientists: Ada Byron Lovelace, a pioneer of mathematical computing; Irène Joliot-Curie, the co-discoverer of artificial radioactivity; and Frances Kelsey, the pharmacologist who exposed the dangers of thalidomide. Another \$350,000 grant went to produce *The Path to Nuclear Fission: The Story of Lise Meitner and Otto Hahn* which won the Aurora Gold Award for best historical documentary.
- **National Geographic Society** (\$1,500,000): A 2008 grant for the production of *Darwin's Darkest Hours*, a drama about Charles Darwin, to be aired by NOVA on the 200th anniversary of Darwin's birth and the 150th anniversary of the publication of *On The Origin of Species*.
- **Greater Washington Educational Telecommunications Association** (\$987,000): A 2008 grant to educate the American public about business, economics and finance went to *The NewsHour with Jim Lehrer*.

The Foundation is now widely recognized as a leading sponsor of television programming aimed at improving public understanding of science, technology, and the elements of economics and finance.

Film

In 1996, the Foundation launched a new effort to encourage filmmakers to create more realistic and accurate stories about science and technology and to challenge existing stereotypes about scientists, engineers, and mathematicians through the visual media. The program is focused on film schools, film festivals, and film development and production.

Initial grants in 1996 and 1997, totaling about \$1 million, went to six leading film schools:

- | | |
|---|--|
| ■ American Film Institute | ■ NYU Tisch School of the Arts |
| ■ Carnegie Mellon University School of Drama | ■ USC School of Cinematic Arts |
| ■ Columbia University Film Department | ■ UCLA School of Theater, Film and Television |

The schools give annual prizes in screenwriting and film production, organize annual science seminars, engage scientists as script advisors, and assemble every three years in a film summit attended by film executives that showcases prize-winning student films and scripts. NYU and Columbia make annual awards to graduates for production of their first feature films. USC awards an annual prize for an animation film. Subsequent film school grants have amounted to over \$4.5 million as writing and producing science films have become part of the regular curricula.

The film festival program presents science and technology film awards and supports panels, seminars, and readings to encourage and reward new work. Since 2001 the Foundation has invested almost \$9 million to establish partnerships with three major film festivals: **Hamptons International Film Festival**, **Tribeca Film Festival**, of which it was a founding sponsor, and **Sundance Film Festival**. Sloan Feature Film Prizes in Science and Technology have gone to some of the nation's leading filmmakers while helping to launch the careers of promising newcomers. Foundation events have introduced the film community to leading Nobelists and science luminaries.

The screenplay development program, largely run through workshops and labs at the three film festivals, has supported science and technology scripts, linked them with leading screenwriters and scientific mentors, and pushed them closer to production by attaching talent. In 2007, a two-year grant of \$124,000 went to **Film Independent**, sponsor of the Los Angeles Film Festival, for development of one film each year in its Producers Lab.

To date, one feature film, *Not by Chance*, has been produced by the Foundation's four partners, a score have attracted financing, and several have attached leading Hollywood directors and producers. In 2004, *Face Value*, a script about screen siren Hedy Lamarr and her invention of frequency hopping, won the Tribeca Sloan Screenplay Prize; and in 2008, the Foundation approved a Program Related Investment of \$2.5 million to help turn this script into a feature film and television broadcast.

The **Museum of the Moving Image** received grants of about \$700,000 to establish a website for the Sloan film program that includes a directory of over 250 Foundation-supported science-themed films, streaming video of award-

winning short films from the six film schools, and videos of discussions with filmmakers and scientists (visit www.scienceandfilm.org).

In 2005 and 2008, Galatée Films received grants totaling \$4.7 million to support the production of *Oceans*, a documentary film with dramatic elements by internationally acclaimed nature documentarian Jacques Perrin. *Oceans* will be accompanied by a major DVD release, TV broadcasts, books, and extensive Web outreach. It was shot with the active participation of scientists from the Foundation's Census of Marine Life project.

Theater

In 1997, the Foundation launched a new program to encourage playwrights and theater companies to write and produce new plays about scientists, engineers, and mathematicians. Starting in 1998, major grants to commission, develop, produce, and stage new science and technology plays were made to two main theater partners: **Ensemble Studio Theatre (EST)** and **Manhattan Theatre Club (MTC)**.

Ensemble Studio Theatre has received \$4.6 million over the past decade and commissioned over a hundred writers, composers, choreographers, and theater companies resulting in new work engaging over 1000 theater artists across the country. The program includes a national competition for new science and technology-themed dramatic works, as well as an annual EST/Sloan First Light Festival, a month-long series of staged readings, workshops, and a mainstage production of a science and technology play. EST has partnered with over 20 regional theaters to produce and stage Foundation-commissioned work. Some of the EST/Sloan plays that have been successfully produced and published include *Moving Bodies* by Arthur Giron, *Louis Slotin Sonata* by Paul Mullin, *The Secret Order* by Bob Clyman, and *End Days* by Deborah Laufer. In 2000, the EST/Sloan program also organized a day-long event around Michael Frayn's play *Copenhagen* that helped introduce this London-based work to American audiences and begin a successful two-year run on Broadway that led to a Tony Award for Best Drama.

Foundation grants to the Manhattan Theatre Club totaling \$1.2 million have supported annual commissions for writers and production grants to develop

and stage science and technology plays. The Foundation was an early supporter in 2000 of David Auburn's Tony Award and Pulitzer Prize-winning drama *Proof*, which opened at the Manhattan Theatre Club before moving to Broadway. In 2003, the Foundation supported the MTC production of Charlotte Jones' *Humble Boy*. MTC/Sloan commissions include well-known playwrights and several MTC/Sloan plays are being produced in major theaters around the country including *Fake* by Eric Simonson at the Steppenwolf Theater in Chicago; *Intelligence Slave* by Kenneth Lin at the Alley Theater in Houston; and Kenneth Lonergan's *The Starry Messenger* at New Group in New York.

In subsequent years, program grants also went to **The Magic Theatre** in San Francisco and to **Playwrights Horizons** in New York, while individual grants were made for select new plays like *QED* with Alan Alda at the Mark Taper Forum in Los Angeles and *The Notebooks of Leonardo Da Vinci* by Mary Zimmerman at Second Stage in New York. In addition, the Foundation partnered with the Mathematical Sciences Research Institute in several events including a discussion with playwright Tom Stoppard about *Arcadia* and with playwright and actor Steve Martin about the role of science and mathematics in his works, *Picasso at the Lapin Agile* and *Funny Numbers*.

The Foundation's investment of about \$7 million in this theater program has played a leading role in introducing to the public a new wave of science and technology theater.

Other Public Understanding Grants

The Foundation also supports select grants that fall outside of books, radio, theater, film, and television, but that advance public understanding of science and technology. Some of these grants include:

- **Arizona State University** (\$500,000): Support for a comprehensive and accessible website to promote greater understanding of human evolution. See www.becominghuman.org.
- **Project Rebirth** (\$519,435): Two grants to record the multi-year rebuilding of Ground Zero in lower Manhattan on seven time-lapse cameras and to put it on the Web.

- **Brooklyn Academy of Music:** Support for the U.S. premiere of *Violent Fire*, a multimedia opera about inventor and electrical engineer Nicola Tesla, and *Kepler*, a new opera about astronomer Johannes Kepler by Philip Glass.
- **Science Festival Foundation** (\$1,300,000): Inaugural support for the World Science Festival in New York City. The Festival holds a series of events to inform the public of the value and wonder of science. The first year success led to a second grant in 2008.

The entire public understanding program continues to receive strong support with a total Foundation commitment of about \$16 million in 2008 for support of projects involving books, radio, television, theater, film, new media, and special events.

SELECTED NATIONAL ISSUES

This program area contributes to special issues in a way appropriate to the Foundation's expertise and size. A few of these grants made prior to 2001 include:

- **RAND Corporation** (\$1,000,000): Support for a systematic analysis of issues surrounding the debate on drug legalization and decriminalization.
- **Carnegie Mellon University and Harvard University** (\$1,400,000): Support for studies on illegal gun markets and their role in the upsurge of youth violence.
- **International AIDS Vaccine Initiative** (\$5,000,000): Support to help launch and then further support a project to accelerate the development of an effective AIDS vaccine.

Bioterrorism

In 2000, the threat of bioterrorism was identified as an important national issue. Since then, the Foundation has made almost 150 grants and committed about \$42.5 million to this program. Some of the most noteworthy projects supported over the years include:

- **Johns Hopkins University** (\$3,500,000): A 2000 grant supported the Center for Civilian Biodefense Studies. The Center, one of the first working to improve bioterrorism preparedness, became the international leader in civilian biodefense. In 2003, the Center moved to the Medical Center at the **University of Pittsburgh** and became the Center for Biosecurity. A \$2 million grant supported the Center which played an important role in passing the Pandemic and All Hazards Preparedness Act, legislation essential to vaccine development. The Center also led policy discussions on business continuity, corporate security, emergency preparedness and response, and risk management as part of its Pandemic Flu Initiative. A \$3 million grant in 2006 renewed support for Center work.
- **The Advertising Council, Inc.** (\$3,800,000): For the development, in collaboration with the U.S. Department of Homeland Security, of a public education media campaign named READY, aimed at empowering citizens to prepare for and respond to potential terrorist attacks. See www.ready.gov.
- **INTERPOL** (\$4,500,000): Three major grants to train regional leaders throughout the world. INTERPOL training materials have been distributed to law enforcement agencies worldwide to expand global bioterrorism preparedness programs.
- **The Center for Strategic and International Studies** (\$618,550): Support for development of a national bioterrorism strategy to improve federal government performance and prepare citizens. Led by Richard Danzig, former Secretary of the Navy, two influential reports have attracted government attention.
- **University of North Carolina** (\$1,000,000): Support for the Institute of Public Health to study “Good Samaritan” liability protection to help businesses and nonprofits that participate in emergency response. Foundation grants led to templates for specific legislation to address these concerns. In 2007, Iowa became the first state to adopt such legislation.

In 2008, this program was restructured under the heading of **Biosecurity**, with a focus on synthetic biology. Synthetic biologists seek to build new systems to serve specified purposes. Although these synthetically created systems hold

promise for societal benefits, it is possible they have properties not found in natural systems and may introduce new risks to society and the environment. The Foundation's goal is to identify and address the risks associated with synthetic biology research and to educate scientists, policy makers, the media, and the public on the ethical, social, and policy issues arising from this research.

2008 grants include:

- **Hastings Center** (\$512,365): To investigate the societal and ethical issues raised by applications of synthetic biology.
- **J. Craig Venter Institute** (\$595,749): For an examination of societal concerns in synthetic genomics, a field in which novel organisms are produced from DNA sequence information.
- **Woodrow Wilson International Center for Scholars** (\$525,000): To identify and address risks associated with synthetic biology with the goal of ensuring that policy makers are informed, public concerns are understood, and regulatory weaknesses are addressed.

Energy

A 2008 grant of \$400,000 to **Massachusetts Institute of Technology** supplied partial funding for a comprehensive study of the future of solar power. The new study will examine direct solar technologies and the energy storage necessary to make intermittent solar resources economically useful. Previous grants to MIT supported studies that resulted in influential reports on nuclear power and coal: *The Future of Nuclear Power* (2003) and *The Future of Coal* (2007). These reports had an impact on U.S. energy legislation, the Department of Energy's R&D program, and the ongoing global debate about nuclear power and coal-based electricity generation.

Universal Access to Recorded Knowledge

Universal Access to Recorded Knowledge began in 2004 as an effort to increase access to recorded knowledge by encouraging digitization of material in the public domain, assuring public archiving of knowledge on the Internet, and fostering availability of books on demand.

Early support went to the **Internet Archive** for archiving Web content at the rate of two million Web pages per month. By 2005, after the Archive had become a resource for libraries around the world, the Foundation became a leading supporter of a universal library that would also provide access to digitized books, film and video, still images, audio, and software. A Foundation grant of \$2 million in 2005 enabled the Internet Archive to begin building a universal digital library, starting with an archive of 50,000 books.

In 2005, spurred by Google's efforts to commercially digitize books, the Internet Archive, together with dozens of libraries, universities, archives, museums, and companies like Microsoft and Yahoo, formed **The Open Content Alliance (OCA)**, a coordinating group for the creation of an open access digital library. The goal was to make knowledge, to the extent allowed by law, freely viewable, downloadable, shareable, and printable. Two grants totaling \$1.5 million went to the Internet Archive in 2006. The first was to establish OCA scanning centers in four cities and scan about 10,000 books per month. The second grant funded digitization of book collections and research materials from several world-class institutions. Over one million books have now been digitized and are available on the Internet Archive.

Other grants in the Universal Access to Recorded Knowledge program include:

- **Library of Congress** (\$2,000,000): To digitize over 100,000 public domain books and to support developments in digitization capabilities. This grant, at the world's largest library, was a pilot effort to create significant digital content and to provide leadership, including best practices, to the library community. The Library of Congress eventually became the regional scanning center for the Smithsonian and all other federal libraries and research organizations.
- **PALINET** (\$1,000,000): To establish a collaborative digitization service for open access to the materials of over 600 member institutions. In 2009, PALINET merged with SOLINET, doubling the number of member institutions.
- **On Demand Books, LLC** (\$766,000): To develop and build the first-ever print-on-demand book capability — the Espresso Book Machine (EBM) — that manufactures quality paperbacks from a digital file. The EBM has since

been licensed to Ingram, the nation's largest book distributor, while several countries have also bought the EBM.

- **New Orleans Public Library Foundation** (\$353,000): For an Espresso Book Machine to help rebuild New Orleans libraries' book collections, as two-thirds of their collections were destroyed in Hurricane Katrina. The new machine also supplied classrooms with books.

The Universal Access to Knowledge program was restructured and expanded in 2008 and is now called the **Digital Information Technology and the Dissemination of Knowledge** program. Its additional goals include seeking to create interactive communities of people who can share knowledge centered around social and natural science to generate deeper interactions and new discoveries as well as supporting research to improve understanding of the economics of markets for information goods.

Grants in this program include:

- **Wikimedia Foundation** (\$3,000,000): To improve the accuracy and organizational capacity of Wikipedia, the largest encyclopedia in history, the fourth largest website in the world, and a model of collaborative open source knowledge on the Web.
- **Open Knowledge Commons (OKC)** (\$400,000): A previous grant to the Internet Archive was transferred to OKC to create more community-building efforts and more collaborative projects in the library and archival worlds.
- **Public Library of Science** (\$125,000): To launch online article collections for the Census of Marine Life and to pilot online hubs as a new way to organize information for targeted knowledge communities.

Federal Statistics

The goal of the Federal Statistics program is to improve the underpinnings of federal statistics. Some grants include:

- **Brookings Institution** (\$546,833): A 1997 grant supported a series of workshops to improve conceptualizations of productivity in the service sector. A renewal grant in 2001 supported additional workshops focused on meas-

ures of productivity in non-bank finance, business services, telecommunications, and computers.

- **Urban Institute** (\$1,400,000): A 2002 grant supported a collaborative research project of the Urban Institute, five Sloan Industry Centers, the Census Bureau, and seven State employment data agencies using the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) database, which links data of millions of U.S. workers to data on their employers. A report of this research can be found in *Economic Turbulence: The Impact on Workers and Businesses*.
- **W. E. Upjohn Institute for Employment Research** (\$208,000): To study the effects on economic statistics of globalization and the resulting surge of imports from low-wage countries such as China. For information on 2009 conference papers and presentations, visit <http://www.upjohninst.org/globalization.html>.
- **University of Michigan** (\$128,694): Partial support in 2009 for a free, user-friendly website designed to make the voluminous data produced by the American Community Survey available to non-expert users and to educate them regarding its complexities.

CIVIC PROGRAM

Grants continued to be made for projects aimed at enhancing the economy of New York City and the quality of life of its citizens. Some of these grants include:

- **Polytechnic University** (\$1,500,000): A 1994 grant funded a new Center for Technology and Financial Services to provide technically trained professionals for the finance industry.
- **New York City Technical College** (\$780,000): A small 1998 grant helped outfit a computer and animation sound laboratory for upper division courses in the Stage Technology Program, preparing students for careers in technical aspects of the entertainment business. A more substantial grant in 1999 helped make the Stage Technology Program the best in the country.

- **City University of New York** (\$400,000): A 2001 grant to create a series of programs to assist the launching of new businesses in the City.

After the attack in New York City on September 11, 2001, the Board of Trustees approved special funds for projects helping people and businesses affected by the attack. Grants included:

- **Acción New York** (\$357,000): For extra staffing costs to enlarge their micro-lending programs for the many needy small business owners affected by the attack.
- **New York Community Trust** (\$1,000,000): A contribution to its September 11 Fund for use of families of victims.
- **Pace University** (\$500,000): To place fifty undergraduate and graduate courses online for their students to continue their education after the downtown campus was seriously damaged. An additional \$350,000 grant funded scholarships for 70 student interns who helped businesses in downtown Manhattan recover.
- **City University of New York and George Mason University** (\$700,000): To support teams of historians using electronic media to collect, preserve, and present the history of the September 11 terrorist attacks and public responses.
- **World Trade Center Memorial Foundation** (\$1,000,000): Partial support for the Memorial and Museum being built at the World Trade Center site.

Periodic grants to the **Fund for the City of New York**, including \$450,000 made in 2008, renewed support of the annual Sloan Public Service Awards recognizing outstanding performance by civil servants. Also administered by the Fund for the City of New York, the **Sloan Awards for Excellence in Teaching Science and Mathematics** recognize New York City public high school teachers in science and mathematics who achieve exemplary results and inspire students to pursue careers in scientific and mathematical fields. In 2008, \$1,360,750 was approved to support five years of this new program. The first awards are to be made in the fall of 2009. Details for both programs and information about award winners can be found at www.fcny.org.

BEYOND 2009

For its first 75 years, the Foundation established by Alfred P. Sloan in 1934 has remained faithful to its founder's vision while adapting to a changing world. Mr. Sloan's wish to improve the lives of his fellow citizens by harnessing the power of knowledge through research and education has guided the Foundation's grantmaking. An impressive range of programs has focused on science, technology, engineering, mathematics, and economics as keys to progress and a better standard of living for all members of society. As the Foundation looks to the next 75 years, it can feel proud of its contributions while acknowledging that much work remains to be done so that constant improvement in knowledge and understanding may lead to a more prosperous and rewarding future.

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