Alfred P. Sloan FOUNDATION

ALFRED P. SLOAN JR., 1875–1966

2016 Annual Report

Contents

Cover: Industrialist and philanthropist Alfred P. Sloan Jr., whose legacy continues to this day in the work of the Foundation that bears his name. 2016 marked the 50th anniversary of Mr. Sloan's death. (PHOTO COURTESY OF GM MEDIA ARCHIVE.)

Preface

The **ALFRED P. SLOAN FOUNDATION** administers a private fund for the benefit of the public. It accordingly recognizes the responsibility of making periodic reports to the public on the management of this fund. The Foundation therefore submits this public report for the year 2016.

Mission Statement

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

2016 Year in Review

DR. PAUL L. JOSKOW

Introduction

The 2016 Annual Report of the Alfred P. Sloan Foundation contains an accounting of the grantmaking activities of the Foundation for the calendar year ended December 31, 2016. The report contains descriptions of our grantmaking programs and a comprehensive account of grants made, to whom we made them, and what each aims to accomplish. The report also contains a financial review, the Foundation's independently audited financial statements, and a list of all Trustees and staff.

In this review, I will summarize the Foundation's grantmaking in 2016 as well as briefly (and incompletely) highlight some of the accomplishments and findings of our grantees.

STEM Research

SLOAN RESEARCH FELLOWSHIPS

The Foundation's commitment to funding basic scientific research dates back to 1955, when Alfred P. Sloan Jr. announced a major foundation initiative to provide research support to the best young scientific minds working in North America. That program, the Sloan Research Fellowships, continues to this day, and remains the Foundation's signature science program. Thousands of young scientists have received Sloan Research Fellowships over the years and the award has become a marker of the winners' unique promise to become leaders in their respective fields. In 2016, as in prior years, the Foundation awarded 126 fellowships to outstanding young researchers in eight fields: chemistry, computer science, computational and evolutionary molecular biology, economics, mathematics, neuroscience, ocean sciences, and physics. Among the 2016 cohort of Sloan Research Fellows includes the co-creator of Hadoop, the data processing system that powers Yahoo, Twitter, and Facebook; an economist who studies what makes rich countries rich and keeps poor countries poor; a molecular biologist who studies how primates are social animals "all the way down" by demonstrating how changes in social status can affect them on a genetic level; and a chemist who is crafting efficient nanoscale batteries.

Sloan Research Fellowships have become increasingly sought after, in part, because Sloan Fellows often go on to have celebrated careers. In 2016, former Sloan Research Fellow F. Duncan Haldane shared the Nobel Prize in Physics for his contributions to topological theory of phase transitions in matter. Dr. Haldane is the 18th former Sloan Fellow to receive the Nobel Prize in Physics and 44th Fellow to receive a Nobel Prize in any field. Also in 2016, the American Economic Association awarded the John Bates Clark Medal, which honors extraordinary achievement by

a U.S. economist under the age of 40, to Princeton's Yuliy Sannikov for his development of new methods to analyze continuous time dynamic games using stochastic calculus methods. Sannikov received a Sloan Research Fellowship in 2010. Sloan Research Fellows are particularly well-represented among John Bates Clark medalists. With only one exception, every Clark medalist since 1997 has been a Sloan Research Fellow.

With his year marking the 50th anniversary of Alfred P. Sloan Jr.'s death, it gives me great pride that a program he started over 60 years ago continues to thrive, and that his vision of support for the best and brightest young researchers continues to animate the Foundation that bears his name.

CHEMISTRY OF INDOOR ENVIRONMENTS

Grantmaking began in earnest in 2016 for the Foundation's newest scientific program. The Chemistry of Indoor Environments program is a ten-year commitment to fund a new field of scientific inquiry, one devoted to understanding the fundamental chemistry of the built spaces in which humans live, work, and play. The Foundation made significant investments in this program in 2016, making major, $750,000 research grants to senior scholars at the University of Colorado, Boulder; the University of Toronto, and the University of California, Berkeley. Grant funds will support a host of research projects that will begin to unravel the mysteries of indoor chemistry: what processes control sources and fates of organic chemicals indoors, what reactions are taking place on indoor surfaces, and how indoor chemistry is shaped by building attributes and the characteristics of occupants.

The beginning of a new field is an exciting time. It is almost impossible to know in advance what we will discover. What is already clear, however, is that some of the most promising science takes place as researchers push into new frontiers, exploring unexplored quarters and asking questions no one has yet thought to ask. Enabling such research is one of the most valuable things a private science funder like the Sloan Foundation can do. I look forward to learning what these pioneers discover as they begin charting uncharted territory.

DEEP CARBON OBSERVATORY

In contrast to the Chemistry of Indoor Environments program, the Foundation's Deep Carbon Observatory (DCO) program is entering its final phase. Launched in 2009, the DCO is a multinational, multidisciplinary collaboration of more than 1,000 scientists across 40 countries that are working together to revolutionize our understanding of the abundance, distribution, movement, and unique properties of Earth's subsurface carbon and the role that carbon plays in the origin and limits of life, the creation of hydrocarbons, and the global carbon cycle. The Foundation plans to end support for the DCO in 2019 and grantmaking in 2016 focused on the essential tasks of beginning efforts to synthesize the tremendous volume of research DCO scholars have generated. A $2 million grant to the Carnegie Institution of Washington provides operational funds for the DCO's Executive Secretariat, which oversees all coordinating and management functions of DCO researchers. A grant to OFM Research funds a project to help integrate two popular scientific models, one which models the behavior of superhot magmas, and the other which models the behavior of deep Earth water and the dissolved carbon it carries. The integration of disparate scholarly insights into a series of interconnected models is one of the most ambitious goals of the DCO. Other major grants provided renewal funding to the DCO data science team at Rensselaer Polytechnic Institute, which provides data management infrastructure and services to the DCO community, and to the DCO's communications and community-building team at the University of Rhode Island, who will have an expanded role to play in facilitating communication during the synthesis-phase of the project and, eventually, in communicating the results of that synthesis to the public.

Findings by Deep Carbon Observatory scientists continued to make their way into major media. In January, PBS's *NOVA* aired "Life's Rocky Start," a documentary narrated by DCO Director Robert Hazen that explores and explains the surprising ways in which Earth's mineral diversity has "co-evolved" with its biological diversity in a millennia-long dance. Also in 2016, the DCO launched its "Carbon Mineral Challenge," a crowdsourced scavenger hunt that enlists the public in the search for minerals not yet discovered but predicted by geological theory. The challenge has so far resulted in the discovery of nine new mineral compounds previously unknown to science. Other research highlights include the discovery of the world's deepest water, located nearly a third of the way to Earth's core; the release of a compelling visual history of terrestrial volcanism; and the discovery of a new genus of bacteria that seems to live only in the fracking wells used to extract oil and gas from shale.

MICROBIOLOGY OF THE BUILT ENVIRONMENT

The Foundation's Microbiology of the Built Environment (MoBE) program is also coming to a planned end. Grantmaking in 2016 represented the last major research grants in the program, as grantmaking in 2017 turns to final grants to cement the legacies of the program and ensure the important work being done by MoBE scholars continues after Sloan grantmaking is complete. Major grants in 2016 continued support for the pioneering work of Jillian Banfield at the University of California, Berkeley, who is studying the microbial populations in hospital neonatal care units and is finding that these "sterile" environments are anything but. Other major grants support a study of the microbiome of dormitories at the US Air Force Academy, a study of the microbiome of public transit systems, and a study of microbial populations of "portable" classrooms, nearly 60,000 of which are currently being deployed around the country. Last, the Foundation provided renewal support to researchers at Virginia Tech, whose previous Sloan-funded indoor plumbing microbiome research helped inform the response to the water crisis that gripped the residents of Flint, Michigan. The new study will look at how features like water temperature and recycling affect water-born pathogen blooms.

Public interest in findings by MoBE researchers continued to be high in 2016, with numerous studies covered in both science-focused and mainstream media outlets. News coverage of MoBE discoveries in 2016 include the discovery that holiday houseguests can be an important source of immunity-improving bacteria, that different cities have their own unique microbial signatures, that microbes play a surprisingly crucial role in wineries, and that subways are not nearly so dirty, microbially-speaking, as urban legend would lead one to believe. Also in 2016, the Foundation announced a partnership with NASA to fund several postdoctoral research projects studying microbial isolates taken from the International Space Station. The partnership is not only an important scientific collaboration in itself, but an auspicious sign that government agencies are increasingly open and eager to fund research projects in indoor microbial ecology.

SLOAN DIGITAL SKY SURVEY

While the Foundation made no major grants in the Sloan Digital Sky Survey (SDSS) program in 2016, a small strategic planning grant was provided to evaluate the research program's prospects, operational landscape, and potential options for the future. SDSS reached several milestones during the year and continued its tradition as one of Sloan's most productive and influential scientific research programs. In August, the SDSS issued its 13th data release to the public. The releases, scheduled annually, make SDSS data fully available to the scientific community and the public, allowing both professional and amateur stargazers to use collected data in their research. The regular release of SDSS data has helped make the collaboration one of the most widely cited surveys in telescopic astronomy. Also in 2016, technologists at the University of Virginia built and shipped a state-of-the-art spectrograph, which will be deployed at the DuPont Telescope at Las Campanas Observatory in Chile. Building and equipping the new spectrograph is part of an exciting new phase in SDSS research, allowing the expansion of observations to the southern sky.

Discoveries using SDSS data made major headlines in 2016. Significant stories in the press covered the discovery of a white dwarf star with a unique oxygen-heavy atmosphere, the updated release by SDSS of a map of the cosmos containing 1.2 million galaxies, the discovery of a the largest galactic structure ever found by astronomers: a dense cluster of galaxies forming a wall that measures a billion light years across, and a study that sheds new light on how dark matter affects galaxy formation.

Economics

ECONOMIC INSTITUTIONS, BEHAVIOR, AND PERFORMANCE

The Economic Institutions, Behavior, and Performance (EIBP) program, which funds original high quality, economic research, launched a major new initiative in 2016, one focused on facilitating researcher access to administrative datasets. These data—called "administrative" because they are collected not for scientific research but as byproducts of the administration of a government program or private business and also often provide data on individuals, individual transactions, individual firms, and other individual organizations—are increasingly central to the conduct of high quality research in economics and other social sciences. From individual demographic data collected by the U.S. census to individual retail transactions made available by Amazon, administrative datasets often contain the detailed, granular information researchers need to reach robust conclusions on a host of pressing economic questions. Access to these data, however, is often hampered by legal, regulatory, and other hurdles. In 2016, the EIBP program made

major investments to address these problems, making several high profile grants to create a network of **Administrative Data Research Facilities** (ADRFs). ADRFs are institutions designed to grease the wheels of economic research, serving as middle-men between data owners in the public and private sectors and the academics who want that data for research. In 2016, major grants funded the creation of ADRFs at the University of Chicago, Georgetown, Berkeley, and Stanford University, with subsidiary grants to the University of Michigan and the University of Pennsylvania to provide services to the nascent ADRF community. A major grant to John Haltiwanger at the University of Maryland will fund his efforts to estimate standard government indices, like Gross Domestic Product and the Consumer Price Index, using private administrative data from retailers.

Other major grants in 2016 included the continuation of support for the National Bureau of Economic Research's influential Summer Institute and for the continued operation of J-PAL North America, an economics research network launched by Sloan to field high quality randomized controlled trials in the United States and Canada. Also in 2016, the Foundation renewed its support for the influential Yale Program on Financial Stability, a training program which introduces central bankers and other regulators to the most up-to-date research on issues related to macrofinancial management.

WORKING LONGER

The Foundation's Working Longer program supports scholarly research on the labor market behavior of older Americans and the institutional, social, economic, and regulatory barriers that inhibit working past conventional retirement age for those who want to work longer or need to work longer. In 2016, the Foundation provided major research support for a Brookings Institution study of how employers' benefit costs vary with the age of their workforce, a project to examine retirement decisions by public sector workers in North Carolina, a project by the RAND Corporation to more accurately model and predict workforce participation rates in the older workforce, and a study by Michigan State researchers that will look at a major pension reform in Germany and the workforce management strategies German firms adopted in response. Also in 2016, the Foundation renewed support for the Age Smart Employer Awards, an initiative by Columbia University that recognizes and honors New York City businesses that have adopted innovative and successful strategies for effectively leveraging the talents and expertise of older workers.

As the U.S. workforce ages, issues related to retirement, economic security, and older worker labor markets have increasingly occupied the headlines of major news outlets. Sloan's grantees in the Working Longer program have become a regular part of such stories, with Sloan-funded research often driving important discussions both in scholarly circles and in the public sphere. In 2016, major news outlets covered Sloan-funded research by the Brookings Institution showing vast and growing disparities in life expectancy between the rich and poor, research from NBER on the effect of an aging workforce on economic growth, and results from a study by Boston University economist Larry Kotlikoff and University of California, Berkeley economist Alan Auerbach on how federal regulations, fiscal programs, and tax policy often create significant disincentives that punish older workers who choose to work past traditional retirement age. Other stories reported on the benefits of work for slowing "cognitive aging," and on a Sloan-funded audit study that revealed older workers were called in for interviews at half the rate of their younger peers.

STEM Higher Education

EDUCATION AND ADVANCEMENT FOR UNDERREPRESENTED GROUPS

The Minority Ph.D. (MPHD) program funds the operation of eight University Centers of Exemplary Mentoring (UCEMs). UCEMs are campus-based initiatives that provide fellowship support to underrepresented minority graduate students in STEM fields—called Sloan Scholars—and host an array of activities designed to promote Scholars' success, including faculty and peer mentoring, seminars on effectively managing the challenges of graduate life, and networking and professional development opportunities. The Foundation provided initial funding to its first three UCEMs—at Cornell University, Georgia Institute of Technology, and Pennsylvania State University—in 2013. In 2016, the Foundation's expert advisory committee, in collaboration with program director Elizabeth Boylan, evaluated the performance of each UCEM to see whether they had achieved their performance benchmarks. The committee was pleased to find that they did and on their recommendation the Foundation provided major funding of approximately $1 million to each UCEM to continue its operations for an additional three years.

Also in 2016, the Foundation partnered with the Social Science Research Council (SSRC) to develop

and launch a new mentoring network for graduated Sloan Scholars who are interested in pursuing careers in academia. The new Sloan Scholars Mentoring Network will facilitate connections and a common identity among current and graduated Sloan Scholars, provide mentoring opportunities, and host a variety of leadership development and community-building activities. The launch of the network represents a major expansion of the Sloan Foundation's commitment to Sloan Scholars, demonstrating our abiding interest not merely in helping Scholars successfully navigate the rigors of graduate study, but in helping them thrive throughout their careers.

Two national meetings were particularly noteworthy for Sloan's two graduate scholarship programs in 2016. In October at the Institute for Teaching and Mentoring Conference, 129 Sloan Scholars and 50 program directors in the MPHD program honored Professor Percy Pierre at a special reception for his visionary leadership of the Foundation's "minorities in engineering" effort and his exceptional commitment to national diversity initiatives. In November a record number of Sloan Scholars and program directors of the Sloan Indigenous Graduate Partnership met at the national meeting of AISES (the American Indian Science and Engineering Society). Sloan also sponsored AISES's undergraduate research competition for the first time where approximately 100 Native American students presented their research and were able to explore opportunities for graduate study.

Public Understanding of Science, Technology & Economics

The Foundation's multi-media program aims to educate the public about science, technology, and economics by bridging the gap between the "two cultures" of science and the humanities. In 2016 this program continued to commission, develop, and produce a slate of popular, critically acclaimed works.

Five Sloan-supported books were published in 2016: *Science Blogging: The Essential Guide*, a how-to manual the collects the best practices for web-native writing on scientific topics; *Eyes on the Street: the Life of Jane Jacobs*, about the influential journalist whose observations and critiques helped change the course of modern urban planning; *The Correspondence of Charles Darwin: Volume 24*, the latest in the 30-volume edition of Darwin's letters; *The Pope of Physics: Enrico Fermi and the Birth of the Atomic Age*, a biography of the influential physicist, and *Hidden Figures*, about the unacknowledged contributions made by female, African-American scientists and engineers to the successes of the NASA space program. *Hidden Figures*, by first-time author Margot Lee Shetterly, has been a particularly successful investment by the Sloan Books program. The film adaptation of the book was released in 2016 to rave reviews and high critical acclaim, and the film earned several professional kudos, including a Screen Actors Guild Award for best ensemble performance and an Oscar nomination for Best Picture. The commercial success of the movie has in turn driven book sales, pushing it onto bestseller lists everywhere and has brought widespread social attention to the Foundation's long-term commitment to increasing inclusion of underrepresented minorities in science.

In film, the Sloan-developed film *Operator*, featuring Meg Whitman (*Parenthood*) and Martin Starr (*Silicon Valley*) made its world premiere at the 2016 South by Southwest festival. The film documents the hazards that arise when an anxious computer programmer and his struggling comedian wife try to create the perfect call center program. *Operator* premiered to strong reviews at South by Southwest, was released to general audiences in November and is currently available for streaming on Netflix, Amazon, and iTunes. Directed by Logan Kibens, *Operator* received a Lab Fellowship in 2012 through the Foundation's partnership with the Sundance Film Institute and a Sloan Fast Track Grant from Film Independent in 2014. *Sensitivity Training*, directed by Melissa Finell and starring Jill Alexander (*Mad Men* and *Silicon Valley*), premiered at the Los Angeles Film Festival. The film was originally a short film, supported by a $30,000 Sloan production grant at UCLA in 2014, and brings the total of completed feature films developed by Sloan to 20.

In television, longtime Sloan grantee WGBH aired two science and technology-themed episodes during the 28th season of the acclaimed documentary series *American Experience*. "Space Men" details the forgotten daring of the world's first high-altitude ballooners. "Tesla" tells the tale of the visionary American genius whose achievements rivaled, and arguably surpassed, those of Edison. Also in 2016, the Sloan-supported miniseries, *Mercy Street*, about a fictional field hospital operating during the American Civil War, premiered to strong ratings on PBS. The series was picked up for another season, to air in early 2017.

In radio, the Foundation continued its support for such acclaimed, award-winning shows as *Radiolab, Science*

Friday and *Studio 360*; worked with new shows such as WNYC's *Only Human* and PRX's *Orbital Path*; and saw *Planet Money* win a prestigious 2016 Peabody Award for its coverage of the Wells Fargo scandal.

The Foundation's theater partners staged three mainstage productions in 2016 that highlighted the work of playwrights exploring scientific and technical themes. *Please Continue* by Frank Basloe, premiered in February at the Ensemble Studio Theater (EST) and dramatizes the infamous Milgram experiments, which shocked the nation with their demonstration of ordinary people's willingness to visit inhumane punishments on experimental subjects. In March, EST staged *Boy*, Anna Ziegler's riveting exploration of gender identity through the lens of the true life medical case of a young boy who was raised as a girl in the aftermath of a tragic accident. Finally, in April, the Manhattan Theatre Club staged *Incognito*, Nick Payne's innovative work about memory and identity that weaves together four stories, including the true life tale of the pathologist who stole Einstein's brain. All three shows were well received by critics, with both *Incognito* and *Please Continue* earning much-coveted status as *New York Times'* Critics' Picks.

Digital Information Technology

DATA AND COMPUTATIONAL RESEARCH

Grants in our Data & Computational Research program aim to accelerate scientific discovery by helping researchers fully exploit the opportunities created by recent advances in digital information technology. In 2016, the program focused developing and funding an evaluation plan for the Sloan-funded Data Science Environments (DSEs) at the University of California, Berkeley; New York University, and the University of Washington. Created in 2013 as part of a five-year, $37.8 million dollar collaboration with the Gordon and Betty Moore Foundation, Data Science Environments explore new models to re-invent how data science is supported and can advance research within a modern research university. DSE researchers build tools and computational infrastructure for use by scientists, fund data science fellowships, build bridges between the natural and statistical sciences, and explore new models for data science career paths. In 2016, the Foundation approved major $1 million dollar grants to the DSEs to continue their work for another two years. Additional major grants will fund an in-depth independent evaluation process that will document progress and lessons-learned and will help shape decisions on how to spread and share DSE-developed innovations more widely.

Also in 2016, the Foundation provided major grant support to a project by the Mozilla Foundation to launch and extend a training program aimed at helping scientists learn how to manage open source development projects and to the Woodrow Wilson School to lead a grassroots effort to document best practices and standards for the ethical use of citizen scientists in research projects.

SCHOLARLY COMMUNICATION

The Foundation's Scholarly Communication program exploited many exciting grantmaking opportunities in 2016. The program as a whole funds efforts to help scientists better communicate with one another and separate signal from noise when searching for useful scholarly resources.

In 2016, several grants aimed to improve incentives for investment in scientific software, including significant Foundation support for a demonstration project to move the field of astronomy towards better software citation practices, funding for an effort at the University of Texas at Austin to surface implicit but uncited traces of software usage in the scholarly literature, and support for a new start-up effort to reveal the "dependencies" between different software codebases. If successful, these projects would significantly ease the process of ensuring that the developers of useful scientific software receive proper acknowledgement for their role in enabling scientific discovery.

Other grants included a project to plan a complete overhaul of the software underlying the enormously popular arXiv preprint server platform, and for business development capacity that will enable the innovative Hypothes.is online annotation platform to establish "annotation as a service" products for scholarly publishers. Finally, a grant to Phoenix Bioinformatics will support the refinement and expansion of its innovative paywall software for use by scientific data repositories and the implementation of a long-term fiscal sustainability plan.

UNIVERSAL ACCESS TO KNOWLEDGE

Grants in our Universal Access to Knowledge program aim to leverage developments in digital technology to expand access by the public to human knowledge and culture, using improvements in our ability to store, organize, and provide public access to everything from books, to videos, maps, etc. that

have been digitized. In recent years, grantmaking has focused on support for the Digital Public Library of America, the nation's first, fully digital national library. The DPLA continued to grow and thrive in 2016. The Open eBooks Initiative, DPLA's partnership with the White House and book publishers, provided thousands of eBook titles to over one million children from low-income households, enabling them to gain access to a rich library of materials that was previously out of reach. The project is a particularly compelling example of how the Universal Access program is fulfilling its mission to use technology to make the knowledge available to the widest possible audience.

The program made three major grants in 2016, one to fund the launch of a public-facing web magazine by the publishers of the highly regarded Annual Reviews anthology series, one to fund two new initiatives by the Digital Public Library of America to create an expansive new eBook collection and to develop and innovative new marketplace for providing low cost eBooks to consumers, and one to support a major initiative by Wikipedia to make nearly 34 million media files in the Wikimedia Commons more readable and accessible by everyone on the web.

Energy & Environment

The Foundation's Energy & Environment program aims to advance our understanding of the economic, environmental, security, and policy tradeoffs associated with the deployment of low- and no-carbon resources and technologies across the energy system. Major 2016 grants supported a study by MIT that will bring economic and engineering perspectives to bear on the likely future prospects of next generation nuclear technologies, as study to develop a framework to assess and compare subsidies provided for different energy sources, a program at Columbia University to better train journalists to write knowledgeably about energy issues, a research project at Resources for the Future examining consumer demand for new vehicle and alternative fuel technologies, an examination by the Environmental Defense Fund on the environmental impacts of wastewater extraction and disposal at shale oil and gas fields, and a dialogue series by the Aspen Institute on the most up-to-date research on shale oil and gas extraction to culminate the Foundation's major grantmaking on this topic. Other major grants support an innovative randomized controlled trial that will measure whether and how drivers change their behavior in response to real-time information about their driving habits, a project to measure public opinion about the siting of large energy infrastructure projects, and an examination of the distributional impact of several U.S. energy policies. A number of Foundation supported conferences took place in 2016, including a symposium gathering the academic and operational leads of major university energy research initiatives and a workshop to connect economists, engineers, and utilities exploring the changing electricity distribution grid.

One of the primary goals of the Energy & Environment program is to provide methodologically rigorous analysis of energy-related issues that can ideally be used by policymakers to make better decisions about energy policy, environmental policy, infrastructure siting and development, and regulation. There is already some evidence that the program is succeeding in this goal. In 2016, in part due to studies of methane gas emissions in shale oil and gas fields conducted through a Sloan partnership with the Environmental Defense Fund, the Environmental Protection Agency radically revised its estimates of the amount of methane being emitted at U.S. oil and gas extraction sites. The change in EPA estimates led directly to the implementation by the Obama administration of new, more stringent regulations governing the construction of new oil and gas wells. The episode is a demonstration about how high-quality science—objective, impartial, and narrowly targeted—can have a lasting influence on public policy by creating a more informed environment in which political decision-making takes place.

Conclusion

In 2016, the Foundation approved 361 grant totaling more than $73 million in support of research and education in science, technology, engineering, mathematics, and economics. Foundation grantmaking represented both continuing investments in longstanding priorities like the Sloan Research Fellowships and support for increasing diversity and inclusion in STEM fields, as well as exciting forays into new territory like the Chemistry of Indoor Environments program. In this way, our 2016 grants represent the Foundation's mission more broadly: a continuous and unshakeable commitment to the support of basic research combined with the drive to innovate and find new niches and opportunities to add to the body of scientific knowledge. Though Alfred P. Sloan passed fifty years ago, this is still very much his Foundation.

President's Letter

Ten Years at the Alfred P. Sloan Foundation

Reflections on my tenure as President

DR. PAUL L. JOSKOW

Introduction

On December 14, 2016, after a decade of service, I announced my retirement as the Alfred P. Sloan Foundation's sixth President, effective December 31, 2017. I believe ten years is about the optimal time to serve at the Foundation's head: long enough to accomplish something substantial and to provide the stability small organizations need to get things done, but not so long as to deprive the Foundation of regular injections of fresh thinking about both programs and management. Ten years also worked well for me personally, allowing me the opportunity to return to research and teaching at MIT, my home since 1972.

I would like to use, this, my last President's Letter, to reflect on my tenure as President. Three principles have guided me as President of the Sloan Foundation:

1. **Stick to the Mission.** The Foundation is a mission-driven organization. I have striven to define that mission in light of Alfred P. Sloan Jr.'s intent, to deepen our understanding of the mission through careful attention to the Foundation's history, and to cleave to that mission when developing and implementing grantmaking programs.
2. **Be Careful Stewards.** Stewardship is at the center of the Foundation's mission. Our Founder placed his funds in our trust. It is our responsibility to use those funds wisely. To be careful stewards, we must invest our endowment prudently; we must structure our grantmaking in ways that maximize its likely impact while taking sensible risks;[1] and we must minimize resources devoted to internal management and ensure those resources are efficiently and effectively deployed. To achieve a high return on investment, we must seek opportunities to leverage the Foundation's resources through partnerships with other foundations, government funding organizations, individuals, and the private sector.
3. **Live Our Values.** The Foundation supports the values of the scientific enterprise: objectivity, impartiality, the primacy of observation, the rejection of dogma and partisanship, the evaluation of claims based on hard evidence, the respect for diverse ideas, and the importance of experimentation and risk-taking. These values should be visible, not just in our grantmaking, but in how we operate as an organization, how we treat our grantees, and how we treat each other.

Programmatic Changes

A RETURN TO ECONOMICS

The Alfred P. Sloan Foundation is best known as a supporter of scientific research and education. It is known for its role in the creation of such marquee scientific and educational institutions as Memorial Sloan Kettering Cancer Center, the MIT Sloan School of Management, the Sloan Digital Sky Survey, and the Sloan Research Fellowships. It is known for its promotion of diversity in STEM fields. And it is known for its support of popular science media programs like *Radiolab*, *Science Friday*, *American Experience*, and *NOVA*.

1 For more about how the Foundation structures its grantmaking in light of our limited resources, see Annual Report of the Alfred P. Sloan Foundation (2011) pp. 9–12.

The Foundation is also an important and influential funder of economics research and public education about the economy. Indeed, when Alfred P. Sloan Jr. founded this institution, he dedicated it solely to economics education and research.[2] The 1940 Annual Report states this succinctly: "By decree…the Foundation has, since January 1, 1938, devoted its resources exclusively to the field of American economic education and research."[3]

Over the eight decades since its inception, the Foundation has played an important role in the development of economics as a field. Since the 1930s, Sloan has provided key support for two of the most important economic research institutions in the country: the National Bureau of Economic Research and The Brookings Institution. In the 1980s, the Foundation made major million-dollar investments in the then-struggling field of microeconomics and helped reinvigorate the microeconomics programs at the University of California, Berkeley; the University of Chicago; Harvard; MIT; Princeton; Stanford; and Yale.[4] A Sloan grant of half-a-million dollars in 1981 saved the influential Panel Study of Income Dynamics from devastating federal budget cuts. And in the mid-1980s, the Foundation was an influential early supporter of the nascent field of behavioral economics and supported many social scientists who would go on to become major figures in the field, including George Akerlof, Kenneth Arrow, Daniel Kahneman, Richard Thaler, and Amos Tversky.

Despite the historic centrality of economics to both its mission and history, the Foundation's commitment to economics faded in the 1990s and 2000s. When I joined the Foundation in 2008, no formal economics program existed, aside from a small subprogram on the economics of the scientific workforce.[5]

Support for economic research is not only in keeping with Sloan's history and our founder's intent, it is also an important and worthwhile pursuit in itself. As Alfred P. Sloan saw firsthand during the development of the American automobile industry, advances in science, engineering, mathematics, and management can have tremendous positive impacts on productivity, economic growth, and the general welfare of a

2 Foundation support for scientific research did not begin in earnest until after World War II.
3 Alfred P. Sloan Foundation Annual Report (1940) p. 39.
4 I happened to be the external reviewer of this program at its midway point in 1985.
5 The Foundation did have grantmaking programs in Industry Studies and on Working Families that involved economics, but these programs were multidisciplinary in focus. Neither supported economics as such.

nation. Conversely, robust economic growth can lead to increases in the rate of scientific and technological progress. Wealthier nations have more resources to devote to the support of research and innovation, which quickens the pace of technological advance, which leads to even larger gains in productivity and growth. The performance of the economy, the rate of scientific advance, and the ways that scientific knowledge are deployed all connect in a complicated but mutually reinforcing loop. It thus makes sense that an organization like the Sloan Foundation, whose interest in science is in its capacity to raise living standards, would be equally interested in understanding these connections. Indeed, much of the work supported through the Foundation's Economic Institutions, Behavior, and Performance program aims at issues such as the economics of science and digitization, the effects of patent and copyright laws, financial markets and their regulation, the factors driving productivity growth, the development of a strong scientific labor force, the effective use of administrative data in research and policy, and ways to integrate scientific and economic knowledge more effectively in policymaking.

Science and economics have much to learn from one another. Economic research is more advanced than many scientific fields in causal modeling, causal inference, and the application of statistical methods to estimate the size and significance of causal relationships, especially in nonexperimental settings. Several fields of science are more advanced than economics in experimental methods; the creation, manipulation, and visualization of huge datasets; and algorithms that make use of these datasets to identify important statistical relationships and make predictions. Important cultural differences also exist between economics and some science and engineering fields in how research is disseminated; in norms for access to publications, data, and computer code; and in the way research gets done. An institution like Sloan with interests in and connections to both science and economics is uniquely positioned to broker a dialogue between these disciplines, allowing the best of economics to inform scientific practice and vice versa.

Last, Sloan support for economics is driven by the very same considerations that drive Sloan investment in other areas: the promise of meaningful advances in our knowledge. The rise of the internet and the digital revolution have opened opportunities to study economic behavior in unprecedented detail and at unheard-of scale. At such a time, opportunities abound to support innovative, path-breaking research.

For all these reasons, one of my primary goals as President has been to make economics once again a central area of Foundation grantmaking.

One of the first major grants during my presidency supported MIT economist Amy Finkelstein in what is now regarded as a seminal study of the 2008 Oregon Medicaid expansion. This research relied on a "natural experiment" and made use of an extensive dataset on individuals in the Medicaid program and those who did and did not win Oregon's Medicaid entry lottery. The research combined an important health care policy challenge, analyses of individual behavior, experimentation, big data, state-of-the-art statistical methods, and a public/private partnership.

In 2009, under the direction of Program Director Daniel L. Goroff, the Foundation launched its Economic Institutions, Behavior, and Performance program, devoted exclusively to funding high-quality research in economics. The program initially focused on questions raised by the financial crisis and the associated Great Recession of 2008–2010. It has since moved on to support applications of behavioral economics to a variety of issues (including financial decision-making by individuals and households, information framing, nudges, payday loans, applications of behavioral economics to improve government performance, and other topics), the study of the factors affecting the productivity and output of scientific researchers, and the development of more effective models of the macroeconomy (especially the development of linkages between macroeconomic models and models of financial markets and institutions). More recently, the economics program has made several grants to facilitate researcher access to private and governmental administrative data. The availability of administrative data on individuals and individual business and nonprofit organizations, both from government and private sources, has dramatically changed and strengthened research in economics and associated policy applications. The program has also supported the use of randomized controlled trials (RCTs) in economics, which are changing the breadth of economics research and its value in policymaking. Together, the uses of administrative data and RCTs are expanding the frontier of economic research and fact-based policy using the results of economic research. Finally, we have made significant efforts to improve both access to and the quality of economic research, methodology, and data.

The Foundation's Working Longer program, led by Program Director Kathleen E. Christensen, is a complementary program that focuses on a specific but

very important set of attributes of the U.S. economy as well as the economies of most other developed countries. The population is aging, people are living longer, and a growing number of workers need or desire to work past traditional retirement age. This program focuses on understanding the opportunities and barriers that workers face when trying to realize these preferences. While not strictly an economics program, the Working Longer program has made many grants to leading economic thinkers, including David Neumark, Nicole Maestas, John Shoven, David Card, Claudia Goldin, and David Wise.

We believe that the Foundation is now the largest private funder of basic economics research in the United States, not far behind the National Science Foundation. And unlike many science and engineering fields where there are many billions of dollars of government research funding available, government funding for social science research is modest and under constant political attack (without good reason). As a result, the Foundation's financial commitments loom large in economics and are having significant impacts on what research gets done; how it gets done; and how it is made accessible to scholars, policymakers, and the public.

I have also worked with program directors of the Foundation's other grantmaking programs to include, where appropriate, economic analysis in their purview. The Energy and Environment program, which I launched in 2015, pursues economic analysis of issues related to the energy system. Major grants studying shale gas, transportation, and solar and nuclear power technologies have focused not merely on their technical promise from an engineering perspective, but on their economic costs and competitiveness relative to alternative technologies. A Sloan-funded study of shale gas reserves in Texas's Barnett Shale paired state-of-the-art geology with a series of economic models to predict both how much gas was waiting to be extracted from the shale, and how much could be extracted profitably under different assumptions about energy prices. Similarly, I worked with Vice President and Program Director Doron Weber to expand the Foundation's longstanding program in the Public Understanding of Science and Technology to include economics. Since 2008, this program has supported several economic-themed projects, including Paul Solman's economics reporting on the *PBS Newshour,* the popular *Planet Money* podcast, a *Frontline* program on the Fukushima nuclear accident, and research for a forthcoming book on generic drug manufacturing in the pharmaceutical industry.

Refocusing the Foundation on its historical charge to further the advance and dissemination of economic knowledge is one of my proudest achievements as President of the Alfred P. Sloan Foundation. There is important work to be done in economic research, its application to public policy, and to the public understanding of the economy.

DIGITAL INFORMATION TECHNOLOGY

Historically, the advent of new technologies has inspired much of the Foundation's grantmaking. In the 1940s, medical innovation drove the Foundation's decision to fund the creation of the Sloan Kettering Cancer Research Institute (now part of Memorial Sloan Kettering Cancer Center). In the 1970s and 1980s, technological advancements led the Foundation to become one of the first funders of neuroscience. New developments in optical and infrared telescopy and advances in digital data acquisition, management, analysis, and dissemination led to what would eventually become the Sloan Digital Sky Survey.

In keeping with this Foundation tradition, I hired Program Director Joshua M. Greenberg in 2010 and tasked him with creating a new program focused on emerging technologies. The Digital Information Technology program's purview lies in the tremendous challenges and opportunities occasioned by the explosive rise in our ability to collect, store, move, and analyze the large datasets that are being used in research fields. The Big Data Revolution has touched every corner of scientific practice. The outputs of modern scholarship are increasingly not merely papers published in peer-reviewed journals, but access to supporting datasets, software packages, and computer code. The skills and analytical sophistication needed to accomplish good science in the twenty-first century will be significantly different from those that dominated the twentieth. The Digital Information Technology program is devoted to helping the scientific community manage this enormous change by developing tools, practices, and institutions that empower data-driven research and maximize both the efficiency and trustedness of academic scholarship. The challenges scientists face in the data revolution are daunting, and I am pleased that the Foundation has found a niche that both addresses a major issue facing scientific research today and does justice to Alfred P. Sloan's wish that his Foundation be involved in promoting the development, adoption, and effective use of new technologies.[6]

6 For more on the challenges facing science in the age of big data, see my letter to the 2014 Sloan Foundation Annual Report. https://sloan.org/storage/app/media/files/annual_reports/2014-Annual-Report.pdf

Advances of digital information technology have given rise to radical new possibilities for the conduct of scholarly research. Perhaps even more important are the ways in which these advances have changed the way nonscientists access knowledge. The Foundation's Universal Access to Knowledge program, launched in 2005 under the direction of Vice President Doron Weber, develops tools, technologies, and institutions that use digital technology to broaden the public's access to knowledge. In 2008, the Foundation became the first major foundation sponsor of Wikipedia, providing a significant injection of funds that would ensure the continued growth and improvement of the world's largest, most dynamic, and—importantly—most accessible encyclopedia in the world. Total Foundation support to Wikipedia over the past 10 years totals some $12 million (nominal US$) in support of numerous projects, including efforts to improve the accuracy of Wikipedia articles, efforts to diversify the ranks of Wikipedia editors, and, most recently, a project to expand the accessibility of the millions of photos and other files in the Wikimedia Commons. The Universal Access program also successfully shepherded the development and launch of the Digital Public Library of America, a consortium of more than 2,000 libraries, museums, and archives that are collaborating to make some 15 million digitized items more readily available to the public.

ENERGY AND ENVIRONMENT

The origin of the Foundation's Energy and Environment program is different from the other new programs begun during my tenure. When I became Sloan Foundation President in 2008, I intended to create a grantmaking program to support research on low- and no-carbon energy supply and consumption technologies. I knew this was an important area where high-quality nonpartisan research could help reduce the greenhouse gas emissions that contribute to climate change. It is also an area where research on science, technology, and economics could naturally converge. To conserve resources during the financial crisis, we decided that a few program directors would share responsibility among themselves for pilot grantmaking. I was also involved directly in the selection of grants, as energy economics is one area I focused on as an academic.

We initially pursued opportunities in three areas. Vice President Danny Goroff launched a series of projects examining the "energy efficiency paradox"—the observed reluctance by consumers to adopt purportedly cost-saving energy efficiency technologies and behaviors. This fit nicely into the Foundation's new behavioral economics subprogram due to various information, finance, regulatory, and behavioral anomalies that contribute to the paradox. Danny and I were particularly interested in supporting randomized controlled trials in this area and creating a network of researchers to work together and share their results. The result was the founding of the E2e research network headquartered at the Haas School of Business at University of California, Berkeley and involving Berkeley, MIT, and the University of Chicago.[7]

The second area where we began to support energy research was on the resource potential, extraction cost, and environmental and local community impacts of shale gas development. My own research suggested that shale gas would become a major new supply source that would transform the North American natural gas market and that the magnitude of its impacts, both positive and negative, was yet to be fully appreciated. Because natural gas used to generate electricity produces about half of the CO2 of an equivalent coal plant and has the potential to become cheaper than coal, it could help get the U.S. on a path of declining carbon intensity and lead the U.S. to become a natural gas exporter rather than a natural gas importer. However, the method for extracting oil and gas from shale plays—hydraulic fracturing—can have negative environmental effects on water supplies and land use. Additionally, methane (the primary component of natural gas) is a potent greenhouse gas in itself, so evaluating its potential requires understanding the amount of fugitive methane that leaks into the atmosphere during extraction, transit, and use. The rapid growth of shale gas (and shale oil) production can also have both positive and negative effects on local communities.

In cooperation with then Program Directors Ted Greenwood and Jesse Ausubel, the Foundation created a portfolio of grants that examined the resource potential for shale gas; the production costs of shale gas; the environmental impacts of shale gas, including methane leaks; and the local impacts and political acceptability of shale gas development. Grants were made to the University of Texas, Austin; Resources for the Future; the Environmental Defense Fund; Rice University; the University of Colorado, Denver; and Duke University to work on these issues. I believe the Foundation's grants advanced knowledge about shale gas development at a time when its importance was not yet widely appreciated and when support from the government and other foundations was limited.

7 http://e2e.haas.berkeley.edu/

The third area in which we developed a few grants was nuclear proliferation and safety. In 2008, there was a lot of talk about a resurgence of nuclear power in China and other developing countries, but also in the United States where many applications to license new plants were being filed with the Nuclear Regulatory Commission. Dramatic growth in nuclear power, especially in countries without a safety and anti-proliferation infrastructure, was disturbing. Working with other foundations, Program Director Ted Greenwood made grants to support research and education on these issues.

Finally, in conjunction with our New York City Initiatives program, we began to support the nascent Center for Global Energy Policy at Columbia University to help to fill a vacuum in serious research on energy markets and energy policy at universities in New York City. This Center is now thriving and has received grants to expand its activities to engage more women and to educate journalists in energy research and policy.

By 2014 this portfolio of grants required the dedicated attention of a Program Director, as Ted Greenwood had retired, and Jesse Ausubel had transitioned back to his work at Rockefeller University. Accordingly, I hired Evan Michelson to expand and reshape our energy-related grantmaking. After going through the white paper process (see below), we formally launched the Energy and Environment program in 2015. Evan has wrapped up our shale gas research portfolio and our nuclear proliferation and safety grants, has continued Sloan's grantmaking in energy efficiency, and has begun funding research on distributed energy resources, local distribution grids, transportation, and energy data acquisition and archiving.

DEEP CARBON OBSERVATORY

In contrast to the Foundation's Energy and Environment program, which started small and slowly expanded, the Deep Carbon Observatory (DCO) was ambitious and expansive from its very beginnings. Conceived and managed by then–Program Director Jesse Ausubel,[8] the DCO is a 10-year project with a compelling vision: to unite geoscientists around the world in a shared quest to revolutionize our understanding of Earth's subsurface carbon. Headquartered at the Carnegie Institution for Science and led by geologist Robert Hazen, the Deep Carbon Observatory is divided into four research communities, each focused on a different area of deep carbon research: the **Extreme Physics and Chemistry Community** explores how the high temperatures and pressures deep in Earth alter the physical and chemical properties of carbon; the **Reservoirs and Fluxes Community** explores where deep carbon is, how much there is of it, and how it moves both within the mantle and between the mantle, crust, and surface; the **Deep Energy Community** examines the abundance, distribution, and origins of abiotic hydrocarbons and those deep earth reactions that produce energy; and the **Deep Life Community** seeks to characterize the deep biosphere and its relation to surface life. Additional teams provide data services and communications support to these four research communities.

The prospects for discovery are exciting. Understanding carbon and the role it plays in the global ecosystem bears on some of the most important questions facing the world today, including the role volcanoes and other carbon seeps play in climate change, the role of subsurface carbon in the creation of fossil fuels, and the origins of life. As conceived, Sloan provided funding for the infrastructure to create and manage the DCO—intellectual leadership, data services, internal and external communications, initial instrument development, seed research, and synthesis. DCO leadership, in turn, leveraged these resources to obtain hundreds of millions of dollars in additional research funding from government agencies, private funders, and other sources. Our DCO grantmaking illustrates another theme of my presidency: the effort to leverage Sloan funds to their greatest effect. Since Sloan's annual expenditures are tiny compared to annual global expenditures on scientific research, having a meaningful impact will often require partnering with other funders, and I have encouraged program directors to seek out such opportunities when they align with the Foundation's mission.[9]

Since its 2009 launch, the DCO has successfully grown into a major scientific collaboration involving hundreds of scientists from dozens of countries who are producing first-rate research on the deep Earth that is regularly featured in highly regarded journals like *Science* and *Nature*. As the effort marches toward its planned conclusion in 2019, efforts have now turned to the intellectual synthesis of what DCO researchers have learned, incorporation of new insights

8 Jesse Ausubel has since moved full time to Rockefeller University, but continues to ably manage Sloan's investment in the DCO as a grantee, under the direction of Program Director Paula Olsiewski.

9 Other examples during my presidency include a collaboration with the Russell Sage Foundation to fund research in behavioral economics and a partnership with the Moore Foundation to fund experimental "data science environments" at three U.S. universities.

into a series of interlinked models, and securing the legacies of the Foundation's grantmaking in this area.

THE INDOOR AND BUILT ENVIRONMENT

The Sloan Foundation has a long tradition of support for nascent scientific fields: those areas of inquiry where opportunities for discovery abound, but that are too new and untried to attract funding from risk averse funders in the public and private sector. During my presidency, the Foundation has continued its historical focus on the development of new fields, specifically the study of indoor and other built environments. Though we spend about 90 percent of our time indoors, there has been limited research focused on understanding the attributes of the indoor microbial environment or the most important chemical reactions that take place indoors. In 2004, the Foundation began modest grantmaking in what would become the Microbiology of the Built Environment (MoBE) program, a sustained effort to foster the development of indoor microbial ecology as a field. This initiative was expanded significantly in 2009 and became a formal program with the MoBE title. Under the leadership of Program Director Paula J. Olsiewski, the program has been extremely successful as an incubator of new research. After 13 years of grantmaking, MoBE researchers are regularly included in disciplinary meetings and conferences, are routinely published in important journals, and are increasingly successful in attracting funding from federal agencies and other foundations for their work. Major grantmaking is scheduled to conclude this year.

One of the most exciting things about research is that it often sheds light on the extent of the unknown. MoBE research taught us much about the microbial populations that thrive in our homes and offices. It also revealed how little we understand the most basic physical and chemical attributes of indoor spaces. So as grantmaking in the MoBE program was coming to a planned end, in 2016 the Foundation launched the new Chemistry of Indoor Environments program and has begun to investigate the fundamental chemistry of indoor spaces.

SDSS EXPANDS TO CHILE

The Foundation's involvement in the Sloan Digital Sky Survey long predates my presidency, with the first Foundation grants made in the 1990s. The effort has become one of the Foundation's signature scientific programs, not only because the survey and the telescope it uses carry the Sloan name, but because data produced by SDSS have led to over 7,500 published papers and hundreds of thousands of citations. The survey was also a pioneering project in citizen science, and SDSS has become an influential model of openness and scientific collaboration. SDSS entered an exciting new phase during my presidency. Sloan funding is allowing SDSS to partner with researchers at Las Campanas Observatory in Chile to operate a sister spectrograph in the southern hemisphere, allowing SDSS researchers to literally double the scope of the survey and explore new scientific questions. The new partnership is not only scientifically exciting, but is a model of international scientific collaboration. SDSS is committed to fully engaging with the Chilean astronomical community, partnering with local astronomers to help with observations, instrument calibration, and data analysis.

THE NEW YORK CITY INITIATIVES PROGRAM

The Foundation has always had a small program devoted explicitly to making grants in and around New York City. (Real spending averaged between half-a-million and two million dollars annually in the 20 years from 1989 to 2008.) As President, I have deliberately expanded grantmaking in the program, increasing average real expenditures to more than $5 million per year.

The health of the City and the opportunities it offers directly affects many of our staff members who live in or near New York and whose children attend NYC schools. Moreover, the Foundation is exempt from New York State and New York City income taxes. I believe, therefore, that the Foundation has some obligation to demonstrate its gratitude to New York through targeted grantmaking aimed at benefiting New York City and its residents. Not only have I increased the resources available to support New York City–based projects, but I have also restructured the New York City Initiatives program so that our grants are aligned with our broader mission to promote research and education in science, technology, and economics.

Major grantmaking in the New York City Initiatives program during my presidency has focused on helping bolster the city's scientific institutions and expanding educational opportunities, especially for members of underrepresented groups. Large Foundation grants helped create the New York Genome Center, a state-of-the-art gene sequencing and analysis facility that provides services to more than a dozen New York scientific and medical institutions. The Foundation was also a significant contributor to CUNY's Decade of Science, a drive to help CUNY bolster its scientific offerings. Sloan funding created a fellowship pro-

gram to attract outstanding junior scholars to CUNY, and Sloan has funded a summer program that offers research opportunities to talented students.

As a product of the New York City public school system, I am keenly aware of the importance of public schools and the role they play in starting and keeping young men and women on a productive and successful educational trajectory. The Foundation has made several investments in the New York City education system, including founding support for InsideSchools, a website the provides independent information on all 1,700 schools in the NYC public school system; the BioBus, an innovative educational organization that has retrofitted two city buses into mobile labs and brings fun, engaging science education to schoolchildren all over the city; and Cold Spring Harbor Laboratory's initiative to open a new New York City location for its pioneering DNA Learning Center. The Foundation has also spearheaded two initiatives that recognize and honor exceptional teaching in science, mathematics, and economics in New York City schools: the Sloan Awards for Excellence in Teaching Science and Mathematics, which honor excellent public high school science and math teachers, and an awards program administered by the Council on Economic Education that recognizes extraordinary high school economics teachers.

Other high-profile efforts the Foundation supports through this program include the World Science Festival, a city-wide celebration of all that is fun and fascinating about science, which has quickly become one of the most influential and well-attended science festivals in the world; and the Tribeca Film Institute, which hosts an annual screening of an important science-themed film and serves as a highly visible platform for supporting filmmakers who are exploring scientific or technological themes in their work.

These and other grants in the New York City Initiatives program demonstrate the Foundation's abiding gratitude toward New York City and our ongoing commitment to be good citizens of the city we call home.

THE MINORITY PH.D. PROGRAM

An important area in which I have made major programmatic changes during my tenure as President has been that of diversity. I covered the history of the Sloan Foundation's diversity-based grantmaking in depth in my letter in the Foundation's 2015 Annual Report, so I will treat this issue only briefly here.[10]

10 For more, see https://sloan.org/storage/app/media/files/annual_reports/2015_annual_report.pdf

For some six decades, the Foundation has been committed to ensuring the challenges and rewards of the scientific enterprise are open and accessible to all, regardless of race, gender, or ethnicity. While the Foundation is unwavering in its commitment to that overall goal, it has pursued differing strategies over the years to achieve it. In 2010 the Foundation conducted a review of our Minority Ph.D. program, led by new Program Director Elizabeth S. Boylan. Based on feedback and suggestions from experts, program participants, and Ph.D. students who were supported by the program, we concluded that the most effective way to promote diversity and inclusion in the scientific workforce would be to support the creation of major university-based centers devoted to fostering the sorts of environments that scholarly research shows are most conducive to minority student success. These new **University Centers of Exemplary Mentoring** (UCEM) combine fellowships, mentoring, and professional development support to underrepresented minority graduate students in the sciences and engineering. UCEMs are conceived as true partnerships and Foundation funds are matched by significant financial, mentoring, and community support from UCEM host universities. This gives each university "skin in the game" and demonstrates institutional commitment to each UCEM's success. Eight centers have been launched since the restructuring of the program in 2013. The Foundation has also created an alumni network for program graduates, which will serve as a professional development and mentoring network for supported scholars to help them throughout their careers.

PUBLIC UNDERSTANDING OF SCIENCE, TECHNOLOGY, AND ECONOMICS

The Public Understanding of Science and Technology program, led by Vice President and Program Director Doron Weber, has long played an important cross-cutting role in the Foundation's menu of programs. Most of our grant money goes to support scholarly research. We expect the results of this research to be published in high-quality scholarly journals, books, and conference proceedings. While some of this research does get attention from the general media and policymakers, that attention is not our primary goal. Our research programs are concerned, in the first instance, with the community of scientific practitioners and on helping scholars speak to each other. On the other hand, the Public Understanding of Science, Technology, and Economics program seeks to educate the public about scientific discoveries, the nature of scientific research, and the lives of scientists. The program not only seeks to inform the public in these dimensions but also to

demonstrate the important complementarities between science, humanities, the arts, and culture. This program is especially important today as science, experts, and fact-based policies are under attack in some quarters. Creating, building, and innovating this program requires a long-term commitment by the Foundation, which I have strongly supported.

THE SCIENCE PHILANTHROPY ALLIANCE

Prior to World War II, private philanthropy played an important role in supporting scientific research while federal government support was modest. This situation changed dramatically after World War II, as the federal government became the major funder for basic scientific research through the NSF, the NIH, NASA, and the Department of Energy. Real federal funding for basic scientific research, however, has been stagnant for the past several years and continues to be under pressure for more and larger cuts. These developments are good for neither science nor the country.

In response to these funding challenges, six foundations (Sloan, Howard Hughes Medical Institute, Moore, Simons, Kavli, and Research Corporation for Science Advancement) came together to form the Science Philanthropy Alliance. The Alliance's mission is to increase substantially philanthropic support from individuals and foundations for basic research in the natural sciences and mathematics. The Alliance website lays out the significant obstacles in the path of success: "The journey to supporting basic research can be daunting for philanthropists. The range of potential topics is so vast—from cosmology to research on materials, from genomics to plant biology—that it is difficult to know where philanthropic support can make a difference. Additionally, the mechanisms for giving are complex—from supporting a single university, to supporting individuals at many institutions—that the possibilities can seem overwhelming."[11]

Since its creation the Alliance has added one full member (Wellcome Trust) and about a dozen associate members. The members of the Alliance have organized many educational sessions and provided advice to many philanthropists about basic scientific research opportunities, how to choose among these opportunities, how to manage a grantmaking program, and how to select and use external advisory committees in science grantmaking. I am very pleased by the interest that existing and potential new philanthropists have shown in allocating a portion of their wealth to support basic scientific research.

11 http://www.sciencephilanthropyalliance.org/our-mission/

Program Development, Evaluation, and Operational Changes: Quality in Everything We Do

PROGRAM DEVELOPMENT PROCESS

When I joined the Foundation in 2008, there was no formal or transparent process in place for starting a new grantmaking program. Sloan Foundation Presidents, in consultation with the Foundation's Board of Trustees, have traditionally been given great leeway to start and end programs as they saw fit. That might sound like a good bargain from my perspective, but I was uncomfortable with such an unstructured approach to program creation. I am keenly aware that I do not have a monopoly on good ideas, even in economics. To make the best use of the funds placed in its trust, the Foundation must avail itself of help from experts in the fields that fit into its mission. Soon after I became President, I instituted a formal grant program development and review process all proposed programs must complete before the Foundation formally enters a new area of intellectual inquiry.

Many of the Foundation's most important and influential initiatives have been shaped through the counsel of outside experts. The Sloan Research Fellowships, the Foundation's signature program, were launched in the 1950s after the Foundation empaneled a blue-ribbon committee to examine gaps in U.S. funding for scientific research. In the 1970s, a panel of economists led by Robert Solow recommended that the Foundation make a major push to help reinvigorate the field of microeconomics, which then led to a major Foundation program that provided millions to promising new microeconomic researchers at University of California, Berkeley; MIT; Chicago; Princeton; Harvard; and Yale. The program development process developed and implemented during my presidency returns to that august Foundation tradition.

The process begins by identifying a potential area of inquiry and bringing to the Foundation a diverse collection of experts in that area to discuss grantmaking opportunities. These experts discuss what the pressing unanswered questions are in a field, what obstacles and barriers stand in the way of answering them, and what sort of intellectual and physical resources would be required to make meaningful progress. These observations are then distilled into a formal white paper describing the scientific rationale of a potential new grantmaking program, the ques-

tions it will attempt to answer or problems it will try to solve, the grantmaking strategies it will pursue, the other funding available, the resources it expects to commit over what period, and the risks and challenges that lie in the way of success.

The white paper is then submitted to all senior staff for comment and criticism, discussed at an all-staff meeting, revised, and then presented to the Trustees for further comment and revision. The white paper process, by bringing the widest possible range of perspectives and expertise to bear on the initial stages of program development, helps to ensure that the Foundation's grantmaking programs are sensibly conceived, prudently structured, and poised to succeed.

One important feature of the new Sloan program development process is that all new programs are conceived and planned as time-limited efforts developed with specific end dates and both interim and final impact goals. When I began at the Sloan Foundation, most grant programs had no formal end date. A program with no end date has, in effect, unlimited time and resources to fulfill its aims and can continue spending well past the point of diminishing returns. Deadlines and restrictions, on the other hand, lend a sense of urgency to a program and force program staff to set priorities and make hard choices. Under the new grant program development process, new grant programs may be approved for no longer than 10 years. This helps not only our own program staff, but our grantees as well. Because the Foundation is quite open about the fact that our programs last only 10 years, grantees can prepare for Sloan funding to cease, and grants are structured to prevent grantee dependency on Sloan funding.

Once the staff and the Trustees are happy with the white paper for a new program, the program is "launched," typically with a few exploratory grants. The new program development process also requires that all programs empanel an independent expert advisory committee to provide guidance and counsel during the program's lifetime. This ensures that the Foundation has regular injections of fresh thinking from outside and that new developments in a field do not escape our notice. By involving scholars in this way, advisory committees also provide a link between the Foundation's grantmaking programs and the wider scholarly community.

PROGRAM EVALUATION

Just as it is important to formalize the process for launching a Foundation program, it is equally important to formalize both the Foundation's exit from funding an area of research and the subsequent evaluation of its grantmaking. All Foundation programs now conduct independent evaluations of progress both during the program and after grantmaking ends. This is, once again, a return to longstanding Foundation practice. I first became acquainted with the Sloan Foundation in the mid-1980s when, as a professor at MIT, I was tapped to assess the Foundation's grantmaking in microeconomics. Regular, independent evaluations have significant benefits. Midprogram evaluations, completed at least once during a program's lifetime, allow for outside input into whether a program is achieving its goals or whether a strategic or tactical course correction is needed. Final, end-of-program evaluations allow the Foundation to take stock of its overall investment and to catalog successes and failures so that lessons learned can be used to improve future program design and grantmaking.

REVAMPED GRANT PROPOSAL PROCESS

Whether the Sloan Foundation succeeds in advancing its mission is solely determined by the quality of the grants we make. Our grantmaking process must be designed to produce grants of the highest caliber. I have instituted several reforms aimed at increasing our grants' rigor, diversity, and accessibility.

Rigor

Most of Sloan's yearly grant expenditures support scientific research. One of the Foundation's most pressing priorities is to ensure Sloan-funded research meets the highest intellectual standards. The Foundation has always made extensive use of independent outside experts to review and evaluate grants. When I joined the Foundation, however, I found that grant proposals frequently included only a cursory discussion of a research project's theoretical foundations and the attributes of its empirical methodology. This left both internal staff and outside reviewers with insufficient information to evaluate the merits of many research proposals.

Now, all Foundation research proposals must include a detailed Empirical Methods appendix. The appendix requires grantees to detail the exact methodologies to be deployed in answering a research question, including discussion of the data to be used and its limitations, experimental design, models utilized and their underlying assumptions, what analytic methods will be used and why those are appropriate, and how the researchers will treat common analytic issues like endogeneity and parameter estimation. The appendix allows for a nuanced discussion of the analytic

strengths and weaknesses of a proposal and, in many cases, a proposal has been significantly revised (and improved) in response to reviewer criticisms of a project's methodology.

Diversity

In addition to restructuring the Minority Ph.D. program (see above), I became convinced that promoting diversity and inclusion in STEM fields was too important to be siloed in a single "Underrepresented Minority" program. All Sloan's grant programs are now expected to ensure that grantees seek to engage diverse teams of faculty, students, and postdocs in the research for which they ask support. All potential grantees must submit, as part of the grant application process, an Attention to Diversity statement that details how projects will be structured to encourage diversity and inclusion of traditionally underrepresented groups in research teams, conference panels, advisory boards, and project management. Program directors are also encouraged to seek opportunities to make grants to promote further diversity in specific fields. Recent Foundation grants, for example, have supported the creation of diversity fellowship programs in the Sloan Digital Sky Survey, the Deep Carbon Observatory, and the Energy and Environment program.

My efforts to unsilo the Foundation's concern for diversity have been part of a larger effort to help shape the culture of the Foundation in ways that exemplify our values as an institution and ensure we meet the same high standards we expect of our grantees.

Accessibility

The Foundation's grantmaking must ultimately serve the interests of the public. Part of serving that interest is ensuring that the fruits of Sloan research are available to the widest possible audience. To that end, all Sloan grants must now include an Information Products appendix. This appendix asks grantees to list the likely intellectual output of their project—papers, data, software, etc.—and to commit to plans regarding how these outputs will be made accessible, be it through open source licenses, curated data archives, preprints, or some other method. This ensures that funded grant proposals are mindful and nuanced about maximizing the accessibility, dissemination, and impact of the products of Sloan grantmaking.

ANNUAL STRATEGY OFF-SITES

In 2008 we instituted an annual two-day strategy off-site. All program and senior management staff participate in the strategy off-site. The purposes of the off-sites are (a) to create an opportunity for all program staff to discuss the progress of a couple of our existing programs, (b) to have preliminary discussions of new program opportunities, (c) to invite outside speakers to discuss developments in areas that fall within our mission, and (d) to create an opportunity for our staff to get to know each other better and to bond as a group. These events are always both interesting and fun and are consistent with the Foundation's policy of cooperation between program areas both to improve quality and to make the Foundation a better place to work.

MODERNIZING THE FOUNDATION'S PHYSICAL AND INFORMATION TECHNOLOGY INFRASTRUCTURE

When I became President in 2008, the Foundation had not made any significant investments in its office space for decades. The offices were the same ones occupied by Alfred P. Sloan Jr. himself. Pictures from Sloan annual reports from the 1950s show offices that were unchanged in 2008, despite massive changes in the modern workplace. The space had inadequate light, meeting rooms, and space for servers and related equipment, and felt old and worn. Led by Senior Vice President Leisle Lin, the Foundation designed and moved to new modern office space in 2014. Our new office space is filled with light and contains new amenities, such as modern meeting rooms, that have greatly expanded the Foundation's capacity to act as a convener (of grantees, potential funding partners, etc.). The new space is also a much more pleasant place to work.

The Foundation's grants management system was also in need of modernization. Under the direction of Anne McKissick, the Foundation's Director of Grants Management and Information Systems, the Foundation fully digitized its grants management system, replacing paper files with a fully modern, web-based database system. The Sloan Research Fellowships, the Foundation's largest program and the one that accounts for the lion's share of grant applications to the Foundation each year, was modernized from a fully paper process to a fully online one. And the Foundation's website, not updated since it was first launched in the late 1990s, was redesigned (twice) to align it with best practices on the web.

I also concluded that the Foundation's governance documents and policies, employee policies, and staff training were in need of modernization. Working with our outside counsel, we created and implemented a new robust code of conduct, which includes a conflict

of interest policy, disclosure requirements, and a new whistleblower policy. We also revamped our annual employee evaluation and review process and implemented a series of emergency backup procedures to ensure the Foundation could continue operations in the event of a terrorist attack or other emergency that prevented access to the Foundation offices.

THE INVESTMENT TEAM

The Foundation's only source of revenue to support grants and operations is our endowment. As I write this in mid-2017, the Foundation's endowment stands at about $1.9 billion. Moreover, Mr. Sloan's expressed preference was that the Foundation operate in perpetuity (a preference expressed prior to the IRS adoption of minimum spending rules and excise taxes). The IRS requires private foundations to spend at least 5 percent of the value of their endowment each year and pay an excise tax of 1 to 2 percent on realized earnings. With inflation for the kind of scholarly research we support running at about 2.5 percent per year, the endowment must return at least 7.5 to 8.0 percent each year to maintain its real value. However, the real value of our endowment has declined significantly since I started as President in 2008, in part due to the financial crisis of 2008 to 2010 and in part due to a deterioration in the investment performance of the endowment. We also appear to be in a low-return environment generally that makes hitting a 7.5 percent or better target very challenging.

In 2015 I hired Elizabeth Hewitt as the Foundation's new Chief Investment Officer. She has recruited an excellent investment team, which has introduced modern analytics into the investment process to help with establishing asset allocation policies, evaluating the performance of our existing managers, and selecting new managers. While the process of restructuring the composition of investments in our portfolio is ongoing, I am optimistic that the Foundation's endowment is on a path to improved performance.

With Many Thanks

Serving as President of the Alfred P. Sloan Foundation has been extremely rewarding. I have been challenged to use my intellectual capabilities and my management and people skills in new ways. We have accomplished a lot on the program, staffing, organizational culture, and management fronts. I have also learned a lot about many subjects, about people, and about myself. I want to make it clear, however, that this has been a team effort and that I have relied on support and advice from many people over the last 10 years. I would like to finish with a word of thanks to those who have supported me during my tenure as Sloan Foundation President.

First, I thank the Board of Trustees. Over the course of my career, I have served on several corporate and nonprofit boards, and I can say from that experience that it is extremely challenging to craft a Board relationship that is productive and satisfying to both sides. I have been extremely lucky to work with the Sloan Foundation's extraordinary Board of Trustees. The Trustees have been generous with their time and counsel and have been a valuable source of guidance for me. I am also grateful to the various non-Trustee experts—Rod Berens, Richard Bernstein, Jeff Halis, Elizabeth Hilpman, Tim Peterson, Rick Salomon, and Kelly Williams—who have served as outside advisors on the Foundation's Investment Committee. The Trustees have not only performed effective oversight during my presidency, but have also become valued advisors and friends. I am particularly grateful to the Board Chairs during my presidency—Steve Brown, Sandy Moose, and Marta Tienda—for their inspiring leadership.

Second, I thank the staff of the Sloan Foundation. The Foundation is a small organization. We have only 32 full-time employees, including the six members of the investment team, which is fully integrated with the Foundation's activities and staff. The staff is responsible for oversight of the Foundation's nearly 1,500 active grants and the expenditure of roughly $80 million per year in annual grant spending. The Foundation receives thousands of grant applications each year, most of which we are unable to fund, but all of which require consideration and a timely response. The investment team must manage $1.9 billion in assets to maximize return, control risk, and ensure sufficient liquidity to meet our financial obligations. Program directors travel extensively to meet with grantees, conduct oversight and due diligence, and keep abreast of new grantmaking opportunities in their respective fields. And, of course, the Foundation is a small business and must meet all the (significant) legal and regulatory requirements in city, state, and federal commercial and labor law. It is a big job for 32 people, and working nights and weekends to get the job done is more the norm than the exception. Yet the staff performs these duties admirably. To the staff: thank you for your hard work, your competence, your professionalism, your good humor, and your dedication to the ideals of Alfred P. Sloan Jr. You should all be so proud of the work that you do.

Third, special thanks are due to Leisle Lin, the Foundation's Senior Vice President of Finance and Operations, who has been my right hand for the past seven years. Leisle has been instrumental in managing the day-to-day operations of the Foundation and its finances. The Foundation is such a well-run enterprise in large part due to her careful stewardship. She has been enormously valuable to me as a colleague, advisor, and friend. For that, she has my grateful thanks.

I also want offer thanks to Anne McKissick, the Foundation's Director of Grants Management and Information Services who has brought our grants management and IT systems to the digital frontier. The difference in these dimensions between the day I arrived at the Foundation and today is stunning. Anne has also been a trusted advisor on Foundation operating practices and personnel issues. Anne and Leisle have worked very well together to help me to make the Foundation a better place in all dimensions.

Finally, I thank Nate Williams, Communications Manager. Nate is the Foundation's sole communications professional, and his responsibilities are legion. He is a writer, editor, webmaster, communications strategist, brand manager, and *de facto* Foundation historian rolled into one. Nate produces our annual report, has redesigned the Foundation website twice, advises both grantees and program directors on communications issues, and has a hand in nearly every document the Foundation produces. On the rare occasions when I speak to the media, he sits at my side to make sure I don't say anything I will later regret. He has become one of my most trusted advisors on both program and management issues.

Turning to people outside the Foundation, let me recognize the essential role of the outside experts who serve on our program advisory committees, who sit on the Sloan Research Fellowship Selection Committees, and who lend their time and expertise to the Foundation's external proposal review process. These experts are part of the Sloan community and help us continuously improve the quality of our programs and our grants. We at the Foundation are ever mindful that no matter how much money we have or how large our staff may be, we do not have a monopoly over good ideas or over the evaluation of program and grant opportunities. The quality of what we do depends critically on the external advisors who generously provide their time to help us to ensure that the work that we support is of very high quality. These outside experts have been crucial to helping the Foundation reliably fulfill its mission.

Last, I thank the Foundation's countless grantees for their hard work. The Foundation, remember, is only a funder. The truly valuable work is done by our grantees. It is the scientist, the technologist, and the engineer who move society forward and raise standards of living through their industry and insight. It has been my great privilege to work with some of the best scientific minds in the world today.

Science has no end. There is always some question left unanswered, some mystery unsolved. It is, I admit, a bit hard to walk away. There is so much left to be done. But as I step down as President of the Foundation, I do so confident that few institutions are as ready to rise to the challenges facing science in the twenty-first century as is the Sloan Foundation. It has been my great honor to serve as President of the Alfred P. Sloan Foundation for the last 10 years. Thank you for the privilege. What an amazing institution this is.

2016 Grants by Program

About the Grants Listing

Grants listed in this report are divided into three types.

Trustee Grants are grants for amounts greater than $125,000. All trustee grants are reviewed by an independent panel of experts and are presented quarterly to the Board of Trustees for approval.

Grants Made Against Prior Authorizations are grants in any amount made from funds set aside by the Board of Trustees to be used for specific purposes. Depending on the amount or subject matter of the grant, grants made against prior authorizations may or may not have been subject to external review by an independent panel of experts. For each authorization, the Foundation reports once yearly to the Board of Trustees about grants made against the authorized funds.

Officer Grants are grants for amounts less than or equal to $125,000. Depending on the amount or subject matter of the grant, officer grants may or may not have been subject to external review by an independent panel of experts. Officer grants made by the Foundation are reported to the Board of Trustees quarterly.

Grants are listed by program, then by grant type, then alphabetically by the name of the institution receiving the grant. Not all programs make grants of each type each year.

Sloan Research Fellowships

PROGRAM DIRECTOR: DANIEL L. GOROFF

First established in 1955 by Alfred P. Sloan Jr., these $55,000 awards accelerate scientific breakthroughs by providing support and recognition to outstanding early-career faculty based on their research accomplishments and promise in eight fields: chemistry, computer science, computational and evolutionary molecular biology, economics, mathematics, neuroscience, ocean sciences, and physics. An independent panel of senior scholars in each field selects fellowship winners. Since the beginnings of the program, some $404 million (2016$) has been awarded to more than 5,500 fellows, many of whom have gone on to highly esteemed careers: 43 Sloan Research Fellows have become Nobel Laureates; 16 have received the Fields Medal in mathematics; 17 Fellows have won the John Bates Clark Medal in economics; and 69 have been awarded the National Medal of Science. Hundreds of others have received notable prizes, awards, and honors in recognition of their major research achievements.

2016 Fellows

University of Arizona
Matthias Morzfeld, *MATHEMATICS*
Eduardo Rozo, *PHYSICS*

Boston University
Catherine Espaillat, *PHYSICS*
Alexander Sushkov, *PHYSICS*

University of British Columbia
Katherine Ryan, *CHEMISTRY*

Brown University
Stefanie Tellex, *COMPUTER SCIENCE*

California Institute of Technology
Venkat Chandrasekaran, *MATHEMATICS*

University of California, Berkeley
Gloria Brar, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Hernan Garcia, *PHYSICS*
Evan Miller, *CHEMISTRY*
Surjeet Rajendran, *PHYSICS*
Nikhil Srivastava, *MATHEMATICS*
Ke Xu, *CHEMISTRY*
Nir Yosef, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Wenjun Zhang, *CHEMISTRY*

University of California, Davis
Megan Dennis, *NEUROSCIENCE*

University of California, Irvine
Franklin Dollar, *PHYSICS*
Chang Liu, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

University of California, Los Angeles
Leonardo Bursztyn, *ECONOMICS*
Artem Chernikov, *MATHEMATICS*
Elaine Hsiao, *NEUROSCIENCE*

University of California, San Diego
Julio Barreiro, *PHYSICS*
Charles Sprenger, *ECONOMICS*

University of California, San Francisco
Dengke Ma, *NEUROSCIENCE*

University of California, Santa Cruz
Kristy Kroeker, *OCEAN SCIENCES*
Andrew Skemer, *PHYSICS*

Carnegie Mellon University
Abhinav Gupta, *COMPUTER SCIENCE*
Wesley Pegden, *MATHEMATICS*

The University of Chicago
Rina Foygel Barber, *MATHEMATICS*
Loukas Karabarbounis, *ECONOMICS*
Neale Mahoney, *ECONOMICS*

The University of Chicago
Engin Ozkan, *NEUROSCIENCE*
Bozhi Tian, *CHEMISTRY*

University of Colorado, Boulder
Shaun Kane, *COMPUTER SCIENCE*
Ryan Abernathey, *OCEAN SCIENCES*
Matei Ciocarlie, *COMPUTER SCIENCE*
Cory Dean, *PHYSICS*
Roxana Geambasu, *COMPUTER SCIENCE*
Daniel Hsu, *COMPUTER SCIENCE*
Marcel Nutz, *MATHEMATICS*

Cornell University
Yimon Aye, *CHEMISTRY*
David Mimno, *COMPUTER SCIENCE*

Duke University
Jenny Tung, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Qiu Wang, *CHEMISTRY*

Emory University
Francesco Evangelista, *CHEMISTRY*

Georgia Institute of Technology
Zaher Hani, *MATHEMATICS*

Harvard University
Demba Ba, *NEUROSCIENCE*
Melissa Dell, *ECONOMICS*
Nathaniel Hendren, *ECONOMICS*
Shmuel Rubinstein, *PHYSICS*

University of Illinois at Chicago
Kevin Tucker, *MATHEMATICS*

University of Illinois, Urbana-Champaign
Elena Fuchs, *MATHEMATICS*
Kami Hull, *CHEMISTRY*
Jian Peng, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Joaquín Rodríguez-López, *CHEMISTRY*
Yue Shen, *PHYSICS*

University of Maryland, College Park
Jay Deep Sau, *PHYSICS*

Massachusetts Institute of Technology
Otto Cordero, *OCEAN SCIENCES*
Vadim Gorin, *MATHEMATICS*
R. Scott Kemp, *PHYSICS*
Yen-Jie Lee, *PHYSICS*
Gene-Wei Li, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Aleksander Madry, *COMPUTER SCIENCE*
Ankur Moitra, *COMPUTER SCIENCE*
Yogesh Surendranath, *CHEMISTRY*
Will Tisdale, *CHEMISTRY*
Mark Vogelsberger, *PHYSICS*

Michigan State University
Matthew Hirn, *MATHEMATICS*
Kendall Mahn, *PHYSICS*

University of Michigan
Michael Cafarella, *COMPUTER SCIENCE*
Honglak Lee, *COMPUTER SCIENCE*
Paul Zimmerman, *CHEMISTRY*

University of Minnesota
Ran Blekhman, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

Mount Sinai School of Medicine
Ian Maze, *NEUROSCIENCE*

New York University
Marc Gershow, *NEUROSCIENCE*
Katherine Nagel, *NEUROSCIENCE*

North Carolina State University
Zhen Gu, *CHEMISTRY*

University of North Carolina, Chapel Hill
Jillian Dempsey, *CHEMISTRY*
Alexander Miller, *CHEMISTRY*

Northwestern University
David Harris, *CHEMISTRY*
Yevgenia Kozorovitskiy, *NEUROSCIENCE*
Mar Reguant, *ECONOMICS*
James Rondinelli, *PHYSICS*

University of Notre Dame
Claudiu Raicu, *MATHEMATICS*

Old Dominion University Research Foundation
Sara Maxwell, *OCEAN SCIENCES*

University of Oregon
Benjamin Elias, *MATHEMATICS*
Kelly Sutherland, *OCEAN SCIENCES*

The Pennsylvania State University
Mikael Rechtsman, *PHYSICS*

University of Pennsylvania
Matthew Kayser, *NEUROSCIENCE*
Zongming Ma, *MATHEMATICS*
Golnaz Vahedi, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

Princeton University
Stefanos Aretakis, *MATHEMATICS*
Jose Avalos, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Barbara Engelhardt, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Mariangela Lisanti, *PHYSICS*
Benjamin Moll, *ECONOMICS*

Purdue University
David Gleich, *COMPUTER SCIENCE*
Christopher Uyeda, *CHEMISTRY*

Rice University
Adrianna Gillman, *MATHEMATICS*

Simon Fraser University
Leonid Chindelevitch, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

University of Southern California
Naomi Levine, *OCEAN SCIENCES*

Stanford University
Michael Bernstein, *COMPUTER SCIENCE*
William Chueh, *CHEMISTRY*
Thomas Church, *MATHEMATICS*
Jonathan Fan, *PHYSICS*
Noah Goodman, *NEUROSCIENCE*
Gregory Valiant, *COMPUTER SCIENCE*

University of Texas, Austin
Brett Baker, *OCEAN SCIENCES*
Jeffrey Danciger, *MATHEMATICS*
Delia Milliron, *CHEMISTRY*
Guihua Yu, *CHEMISTRY*

University of Texas, Southwestern Medical Center at Dallas
Brad Pfeiffer, *NEUROSCIENCE*

University of Toronto
Jo Bovy, *PHYSICS*
Christopher Honey, *NEUROSCIENCE*

Virginia Polytechnic Institute and State University
Amanda Morris, *CHEMISTRY*
Devi Parikh, *COMPUTER SCIENCE*

Washington University in St. Louis
Martha Bagnall, *NEUROSCIENCE*

University of Washington
Bingni Brunton, *NEUROSCIENCE*
Chris Laumann, *PHYSICS*
Matthew McQuinn, *PHYSICS*
Emina Torlak, *COMPUTER SCIENCE*

Whitehead Institute for Biomedical Research
Jing-Ke Weng, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

University of Wisconsin, Madison
Etienne Garand, *CHEMISTRY*
Ari Rosenberg, *NEUROSCIENCE*
Lu Wang, *MATHEMATICS*

Yale University
Noah Planavsky, *OCEAN SCIENCES*

STEM Research

Chemistry of Indoor Environments

PROGRAM DIRECTOR: PAULA J. OLSIEWSKI

The Chemistry of Indoor Environments program aims to grow a new field of scientific inquiry focused on understanding the fundamental chemistry taking place in indoor environments and how that chemistry is shaped by building attributes and human occupancy.

Grants in this program aim to:

- **Generate new knowledge** by directly supporting original, high-quality research to identify indoor chemical sources, characterize the chemical and physical transformations taking place indoors, and determine how indoor chemistry is shaped by building attributes and occupancy;
- **Develop a modeling consortium** to improve the cohesiveness of the community and its ability to integrate findings;
- **Build a thriving, multidisciplinary research community** of chemists; environmental, civil, and mechanical engineers; architects; atmospheric scientists; microbiologists; and environmental health experts that will endure beyond the program's timeline;
- **Train the next generation of scholars** through educating and engaging graduate and postgraduate researchers;
- **Develop community-wide research protocols, and norms.**
- **Advance capacity for discovery** through development of new tools for data collection, sampling, analysis, and visualization.

Trustee Grants

University of California, Berkeley

BERKELEY, CALIFORNIA

$750,000 over 36 months to expand understanding of the processes controlling indoor chemistry.

Project Director: Allen H. Goldstein, Professor

Yuan Fang, a Sloan-supported graduate student in the Grassian Research Group at the University of California, San Diego, cools a detector that will be used in experiments to calibrate how the rate of uptake of gases on indoor surfaces varies with relative humidity. (PHOTO BY HAIBIN WU.)

This grant funds research by Professor William Nazaroff, an expert on the physics and chemistry of indoor air pollutants, and Professor Allen Goldstein, an expert on anthropogenic and natural contributions to the chemical composition of the atmosphere. The researchers are working to expand the understanding of processes controlling abundance, sources, and fates of organic chemicals indoors, focusing on the roles of human occupants as agents influencing indoor air chemistry. Over a several-week period, the researchers will monitor the indoor air of a residence under five conditions: (a) house vacant, emphasis on spatial resolution; (b) house vacant, emphasis on temporal resolution; (c) house normally occupied, emphasis on spatial resolution; (d) house normally occupied, emphasis on temporal resolution; and (e) manipulation experiments, such as cooking, cleaning, or dishwashing. Monitoring will focus on detecting several important chemicals, including volatile organic compounds (VOCs), nitrate radicals, nitrogen oxide trace gases, carbon dioxide, and ozone. In addition, the team will sample environmental conditions such as temperature, relative humidity, ultrafine particulate concentration, and air exchange rates. Samples will then be analyzed to try to apportion VOC chemical concentrations in sampled indoor air to their sources, including outdoor air, building-associated sources present when the residence is vacant, occupant-associated sources, and secondary production from indoor chemical reactions.

This project will generate important new insights into indoor chemistry, which will be shared through peer-reviewed publications and presentations at conferences and meetings. At least three students will be trained during the course of the project.

University of Colorado, Boulder

BOULDER, COLORADO

$750,000 over 36 months to expand understanding of chemical sources, sinks, and transformations taking place indoors.

Project Director: Paul J. Ziemann, Professor

Funds from this grant support work by atmospheric chemist Paul Ziemann to expand our understanding of chemical sources, sinks, and transformations of indoor environments, and to develop physical-chemical mechanisms to describe these processes. Ziemann will conduct a series of pilot studies to examine a range of indoor environments. His studies will aim to (1) identify similarities and differences in the organic chemical composition of indoor gases, particles, and surfaces; (2) determine organic chemical contributions from various sources; (3) determine the effects of organic gases, oxidants, acids, humidity, light, and temperature on gas, particle, and surface composition; (4) determine potential effects of organic compounds emitted by humans, either directly or as a result of reactions; and (5) develop physical-chemical mechanisms to explain observed compositions and processes. The range of indoor environments to be tested includes an art museum, classrooms, offices, a student athletic center, student dining facilities, and local residences.

This project will provide new insights into the physical and chemical processes that determine the composition of indoor air and allow for development of a deeper understanding of how different indoor environments function. The results also promise to be valuable for developing models for predicting the chemical composition of indoor air and strategies for improving indoor air quality. The results will be shared through peer-reviewed publications and presentations at conferences and meetings. At least two students and one postdoctoral fellow will be trained.

University of Toronto

TORONTO, ONTARIO

$750,000 over 36 months to expand understanding of multiphase chemistry in indoor environments.

Project Director: Jonathan Abbatt, Professor

This grant funds a three-year collaboration between Jonathan Abbatt, professor of chemistry, and Jeffrey Siegel, associate professor of civil and mineral engineering, to expand our understanding of multiphase chemistry in indoor environments. The overall goal of their grant-supported work is to better understand the nature of the reactive processes that affect the composition of material deposited on indoor surfaces and to examine the associated impacts on the state of the indoor environment.

Abbatt and Siegel have chosen three common sources of materials that deposit on surfaces indoors: skin oil materials from people; particles generated by combustion processes such as cooking or cigarette smoking; and common chlorine- and nitrogen-containing cleaning agents such as household bleach. They will expose these chemicals to indoor air under both laboratory and real-world conditions and observe how such exposure leads to particulate deposits and the creation of new compounds.

Abbatt and his team will use a comprehensive range of state-of-the-art mass spectrometer instrumentation to conduct the chemical analyses. Most of these instruments have been rarely, if ever, used indoors and the team expects to develop new analytical methods for their deployment indoors. The team will share their findings through peer-reviewed publications and presentations at conferences and meetings. At least one postdoctoral fellow and three students will be trained during the project.

Grants Made Against Prior Authorizations

In March 2016, the Trustees authorized the expenditure of up to $350,000 for small grants in support of the Chemistry of Indoor Environments program. The following grants were made against these previously authorized funds.

Colorado State University

FORT COLLINS, COLORADO

$54,044 over 16 months to support an indoor chemistry data needs workshop.

Project Director: Delphine K. Farmer, Sloan Workshop

University of Colorado, Boulder

BOULDER, COLORADO

$50,000 over 6 months to support planning activities to guide community building, education and outreach activities for the Chemistry of Indoor Environments program.

Project Director: Marina E. Vance, Assistant Professor

Missouri University of Science and Technology

ROLLA, MISSOURI

$55,553 over 16 months to support an indoor chemistry modeling workshop.

Project Director: Glenn Morrison, Professor

Deep Carbon Observatory

PROGRAM DIRECTOR: PAULA J. OLSIEWSKI

The Deep Carbon Observatory (DCO) is a ten-year international collaborative research project that aims to radically transform our understanding of the quantities, movements, distribution, and properties of deep Earth carbon and its roles in the origin and limits of life, the creation of hydrocarbons, and the global carbon cycle.

Over the ten years of this program, slated to end in 2019, grantmaking aims to create an international, multidisciplinary community of geologists, mineralogists, geophysicists, chemists, biochemists, microbiologists, and technologists that will:

- Benchmark the current state of our understanding of deep carbon;
- Develop an ambitious, intellectually rigorous research agenda;
- Cooperatively raise funding and execute that research agenda;
- Synthesize and disseminate findings to the larger scientific community and the public;
- Strengthen the geophysical research community through the training of the next generation of young geoscientists and through the development of new instruments, models, and analytical methods.

The Foundation's grants to the DCO focus on providing funds for organization, institutional infrastructure, data management, and early instrument development.

To learn more about the Deep Carbon Observatory, visit the project website at deepcarbon.net

Trustee Grants

University of Arizona

TUCSON, ARIZONA

$231,050 over 26 months to elucidate the concept of carbon mineral evolution.

Project Director: Robert T. Downs, Professor

This grant funds efforts by Robert Downs of the University of Arizona and Robert Hazen, cofounder of the Deep Carbon Observatory, to undertake a systematic application of evolutionary theories to carbon minerals.

Downs and Hazen have argued persuasively that the lens of evolution fruitfully explains key aspects of diversification of mineral species, mineralization rates, and structural complexity through Earth's 4.5 billion-year history. Two-thirds of Earth's mineral species are biologically mediated, inextricably linking the geosphere and biosphere in co-evolution. Grant funds support two interconnected activities. First, Downs and Hazen will develop and exploit data resources, statistical modeling, and visualization tools to understand quantitatively Earth's changing carbon mineralogy from crust to mantle. Second, they will expand and explore the Deep-Time Data Infrastructure, which combines mineralogy, petrology, geochemistry, and proteomics resources. Planned outputs include an open-access carbon mineral data base with more than 10,000 data sets for carbon-bearing minerals that include age, locality, and depth.

University of Cambridge

CAMBRIDGE,

$99,376 over 24 months to provide strategic vision and leadership of the Deep Carbon Observatory Synthesis Group for the 2019 program finale.

Project Director: Marie Edmonds, Fellow, Queens College

The year 2019 will mark the culmination of 10 years of scientific discovery by more than 800 scientists from 40 nations who form the Deep Carbon Observatory (DCO). New discoveries are emerging about deep life, about the diversity of ways that oils and gases form, about mineral evolution, and about the co-evolution of the geosphere and biosphere. This grant supports the creation of a Synthesis Group within the DCO, led by Dr. Marie Edmonds of the University of Cambridge, U.K., which will take responsibility for ensuring that the project delivers on its commitments and that the whole of the project promises to be more than the sum of its parts. Edmonds and her team plan to explore several different possibilities for intellectual synthesis of the Deep Carbon Observatory's work. Possibilities include a dynamic model of deep carbon in Earth, a diamond-themed synthesis that uses the popular gemstone to tell us as much as possible about deep carbon, a place-based synthesis that uses geographic or geological location to tell as much as possible about deep carbon, a mineral evolution synthesis, and an "Earth in five reactions" synthesis that tells the story of deep carbon through major chemical processes like serpentinization. Over the next two years, grant funds will allow Edmonds and her team to explore and prioritize these different approaches to synthesis as well as develop synthesis-related projects for potential future support.

Deep Carbon Observatory researchers descend toward the crater of Poas volcano in Costa Rica. The field expedition is one of hundreds supported by the DCO to study volcanoes, subduction zones, and other sites that play important roles in Earth's carbon cycle. (PHOTO BY TOM OWENS)

Carnegie Institution of Washington

WASHINGTON, DISTRICT OF COLUMBIA

$2,198,534 over 24 months to provide penultimate support for the Secretariat of the Deep Carbon Observatory.

Project Director: Robert M. Hazen, Executive Director, Deep Carbon Observatory

This grant supports the continued operation of the Secretariat of the Deep Carbon Observatory DCO). The Secretariat performs a series of invaluable coordinating and steering functions for the Deep Carbon Observatory as a whole, including conducting program management and oversight; organizing the DCO International Science Meeting and other scientific meetings; coordinating all components of the

DCO to amplify its impact; assisting with research synthesis, integration, and long-term planning; expanding and strengthening the DCO partnerships and intra-community interactions; promoting program development and leveraging of DCO resources; facilitating further development of DCO-supported instruments and promoting their broad community use; engaging early-career scientists in the DCO; and reducing enterprise risks. Grant funds will support these and other activities of the secretariat as the DCO moves toward completion in 2019.

OFM Research

REDMOND, WASHINGTON

$331,064 over 32 months to integrate modeling of melts and fluids for the 4D Deep Carbon in Earth Model of the Deep Carbon Observatory.

Project Director: Mark S. Ghiorso, Research Scientist

The state of deep carbon modeling today resembles that of climate modeling 40 years ago, when models of the atmosphere, oceans, sea ice and glaciers, forests, and land surface were all partially developed but were not integrated. In today's geoscience, models exist of the workings of the Earth's core, the lower and upper mantle, the crust, and of particular processes such as volcanism and plate tectonics, but no system or framework embraces all of these, especially across time scales ranging from thousands to hundreds of millions of years. Funds from this grant support efforts to integrate two popular models: MELTS, Mark Ghiorso's model of the thermodynamic properties of magmas, and DEW, a model developed by Dmietri Sverjensky that simulates the behavior of water and water-dissolved carbon in the deep Earth.

Funds will support the development of an integrated model that will be open source, freely available, released to the scientific community, and suitable for integration into the larger Deep Carbon Observatory (DCO) system of models. Also funded is a workshop that will introduce the new model to the DCO community.

Development of comprehensive numerical simulations of the origins, movements, and forms of deep carbon has emerged over the past three years as a major, integrative goal of the Deep Carbon Observatory. The proposed integration of melts and fluid models, if successful, represents significant progress toward to achieving that goal.

University of Oxford

OXFORD,

$464,129 over 34 months to conduct a field campaign of the Deep Carbon Observatory (DCO) on differentiation of biotic and abiotic carbon uniting a dozen early career scientists representing all four DCO communities in a synoptic study exemplifying fulfillment of the DCO's decadal goals.

Project Director: Peter Barry, Postdoctoral Research Associate

Funds from this grant support a field project that aims to separate and quantify the sources, pathways, and fates of carbon that originated as mantle rock or as sedimentary biomass. The location of the fieldwork is west of Costa Rica, where the seafloor sinks or "subducts" beneath the Caribbean plate. A team led by Peter Barry of the University of Oxford will look closely at this subduction zone to see to what extent the burial of microbes (organic material rich in carbon) on the slab during oceanic sedimentation is a one-way road to death. Prior research estimates that 85 percent of the subducted carbon sinks under the tremendous pressure of gravity and the overlying plate into the deep, lifeless mantle, but recent measurements have detected unusually high carbon dioxide degassing from the zone. This opens the possibility that quite a lot of "biotic" carbon in deep seafloor mud might recycle as surface life.

The project is a continuation of ongoing work by Deep Carbon Observatory scientists to probe the limits to life and accurately characterize the outer bound of pressures and temperatures that are nonlethal to some environmental microorganisms.

Rensselaer Polytechnic Institute

TROY, NEW YORK

$750,000 over 24 months to continue to lead the data science and management dimensions of the Deep Carbon Observatory and contribute to program synthesis.

Project Director: Peter A. Fox, Constellation Professor

This grant continues support to the Data Science Team of the Deep Carbon Observatory (DCO), which provides data and computational infrastructure and services to the DCO membership. Led by Peter Fox at Rensselaer Polytechnic Institute, the Data Science Team provides key services to the DCO. Supported activities include the development and progressive improvement of deepcarbon.net, management of the

DCO's scholar database, and hosting an archive of all DCO plans, policies, publications by member scholars, and scientific data collected or generated by hundreds of individual DCO research projects. In addition, the team is responsible for the DCO's data science efforts, working with the community to turn DCO data into a searchable corpus that can be agglomerated and analyzed to reveal new geoscientific insights. Finally, the Data Management team is a crucial player in the larger effort to synthesize a series of deep Earth carbon models from knowledge gained from the DCO's decade of research. Grant funds will provide operational support for these core functions for two years.

University of Rhode Island

KINGSTON, RHODE ISLAND

$967,731 over 24 months to continue conducting engagement activities and to provide support for synthesis activities of the Deep Carbon Observatory.

Project Director: Robert Pockalny, Marine Research Scientist

Funds from this grant continue support for the Engagement Team of the Deep Carbon Observatory (DCO), which provides internal and external communications services to the international community of DCO geoscientists. Led by Sara Hickox at the University of Rhode Island, the Engagement Team provides content for the Deep Carbon Observatory website, publishes a newsletter and blog, compiles an up-to-date bibliography of DCO publications, maintains a contact database on the approximately 800 DCO researchers, oversees network-wide events, spearheads public engagement efforts, provides graphic design services for DCO researchers, and works to ensure smooth intra-DCO communication of goals, priorities, and achievements. Grant funds support the continuation of these activities for an additional two years. In addition, Hickox and the Engagement Team will provide support to the newly created Synthesis Group of the DCO, which focuses on synthesizing the diverse research accomplishments of DCO researchers in anticipation of the project's contemplated end in 2019.

Officer Grants

University of Michigan

ANN ARBOR, MICHIGAN

$125,000 over 26 months to identify the five most important reactions governing deep carbon and use these to synthesize and lift understanding of deep carbon.

Project Director: Jie Li, Professor

Universita di Roma La Sapienza

ROMA,

$102,753 over 13 months to conduct the third workshop of early career scientists of the Deep Carbon Observatory.

Project Director: Vincenzo Stagno, Assistant Professor

St. Edmunds College, University of Cambridge

CAMBRIDGE,

$55,000 over 31 months to write the first history of deep carbon science, a book titled "Carbon from Crust to Core."

Project Director: Simon Mitton, Life Fellow

Microbiologists Donato Giovannelli (Rutgers) and Karen Lloyd (University of Tennessee, Knoxville) collect samples of the hyperacidic waters in the crater lake of Poas volcano in Costa Rica. One major strand of DCO research is improving our understanding of Earth's deep life and the conditions under which microbial populations can survive.
(PHOTO BY KATIE PRATT.)

Microbiology of the Built Environment

PROGRAM DIRECTOR: PAULA J. OLSIEWSKI

This program aims to grow a new multidisciplinary field of scientific inquiry focused on understanding the microbial ecology of the built environments in which human beings work, live, and play.

Grantmaking pursues a series of mutually reinforcing strategies.

- **Generate new knowledge** by directly supporting original, high-quality research on the microbial ecology of the built environment.
- **Build a thriving, multidisciplinary network and research community** of biologists, engineers, architects, and technologists that will endure beyond the program's timeline.
- **Train the next generation of scholars and practitioners.** An important component of this program is introducing new voices into the field and training the next generation of researchers.
- **Develop community-wide research protocols, and norms.**
- **Advance capacity for discovery** through development of new instruments and tools for data collection, sampling, analysis, and visualization.
- **Attract dedicated funding from federal agencies** by demonstrating the existence of important gaps in our scientific knowledge and the potential for federal intervention to fill them.

Trustee Grants

University of California, Berkeley

BERKELEY, CALIFORNIA

$750,000 over 36 months to provide renewed support to examine the microbiology of the neonatal intensive care unit environment.

Project Director: Jillian Banfield, Professor

With Foundation support, a team led by Jillian Banfield at the University of California, Berkeley has been investigating how preterm infants, taken from their mothers at birth and placed in neonatal intensive care units (NICUs), nonetheless acquire the microbes that will become their human microbiome. Initial findings suggest microbes from the "sterile" NICU itself colonize the infants. This grant supports the continuation of Banfield's work for an additional three years.

Banfield hypothesizes that certain forms of microbial life can survive in NICU environments for months or years, travel from room to room by riding on nurses' clothing, and eventually become incorporated into infant gut, oral, or skin microbiomes. To test these hypotheses, Banfield and her team will track three rooms and their occupants in the NICU of the Magee-Women's Hospital in Pittsburgh, PA over two years. Using advanced metagenomic techniques, the team will identify persistent, room- adapted strains of microbes living in the NICU, identify which of these strains successfully colonize infant patients, and quantify the transfer of microbes via bioaerosols and travel vectors such as nurses' uniforms.

The team will share their findings through journal publications, presentations at national and international conferences, and through blogs on microBE.net.

University of California, Berkeley

BERKELEY, CALIFORNIA

$748,629 over 24 months to expand understanding of the microbial ecology of the built environment.

Project Director: Thomas D. Bruns, Professor

This grant supports two additional years of research by a team at the Berkeley Indoor Microbial Research Consortium, which aims to expand our understanding of the microbial ecology of the built environment as mediated by interactions among organisms, particulate matter, and volatile and nonvolatile chemicals. Under the direction of principal investigator (PI) Thomas Bruns, professor of plant and microbial ecology at the University of California, Berkeley, the proposed work plan is organized around four objectives:

1. Build an integrated understanding of the role of occupancy and occupant behaviors on bioaerosols and microbially derived chemical emissions in residential environments. The biological measurements will be made in collaboration with the Berkeley Chemistry of Indoor Environments (CIE) team (see Berkeley CIE proposal) as part of the intensive field campaign taking place in one-to-two residences.
2. Characterize the chemistry of biological interactions among microorganisms on residential indoor surfaces, incorporating both mVOC measurements and the study of nonvolatile chemical compounds, as measured through nanospray desorption electrospray ionization mass spectrometry (NanoDESI MS).
3. Determine the metabolic state and activity of indoor microbes.
4. Develop improved methods for sampling and assaying microbial communities in built environments.

Research findings will be shared through peer-reviewed publications, presentations at conferences and meetings, and through blogs on microBE.net. At least three postdoctoral fellows will be trained in the course of the project.

University of Colorado, Boulder

BOULDER, COLORADO

$516,490 over 18 months to conduct a longitudinal analysis of the microbiomes of dormitories and their inhabitants at the US Air Force Academy (USAFA).

Project Director: Christopher A. Lowry, Associate Professor

This grant provides partial support for a longitudinal study of the microbiomes of dormitories and their inhabitants at the U.S. Air Force Academy (USAFA). Over the course of nine weeks, a University of Colorado research team led by principal investigator Christopher Lowry and Lt. Col. Andrew Hoisington will sample indoor and outdoor surfaces at USAFA dormitories, characterize environmental conditions, and take skin and stool samples from a cohort of 48 U.S. Air Force cadets. Samples will then be analyzed to determine the degree to which the dorm room locations of cadets and their interactions with each

other influence the microbial profiles of the cadets and their dorm rooms. The uniformity of the dorm room construction and the unique standardization in diet, lifestyle, and age among cadets makes them a particularly attractive target for study that will maximize researchers' ability to detect confounding factors that impact host-derived microbial colonization of the dormitories.

The team plans to share its findings through conference presentations, open access peer-reviewed publications, social media, and websites. The team also plans a symposium to share findings and discuss how current and future research directions in human and built environment microbiomes might advance the aims of the Department of Defense.

Harvard University

CAMBRIDGE, MASSACHUSETTS

$249,999 over 24 months to determine the metabolic activity of host- and environmentally-derived microbes in the public transportation microbiome.

Project Director: Curtis Huttenhower, Associate Professor of Computation

Urban transportation systems have been studied as vectors for the transmission of infectious disease, but their role in moving harmless microbes among hosts is largely unknown. This grant funds a project by Curtis Huttenhower, associate professor of computational biology at Harvard's T.H. Chan School of Public Health and associate member of the Broad Institute, to determine the metabolic activity of host- and environmentally derived microbes in the public transportation microbiome and reconstruct associated biochemical pathways.

Huttenhower's study will determine the degree to which transit-associated microbial communities are functionally active as well as the basic microbial biochemical processes by which they persist in situ and (re-) transmit to and from human hosts. The team plans to share functional data and metadata through open access repositories. Manuscripts will be made open access whenever possible, and all software will be made freely available open source commensurate with the lab's existing work. The team expects to publish at least two papers and present the work at two conferences.

University of Texas, Austin

AUSTIN, TEXAS

$255,734 over 18 months to conduct a case study of how hidden spaces in a portable classroom building influence the indoor microbiome as a function of building ventilation and operation.

Project Director: Kerry A. Kinney, Professor

There are nearly 600,000 portable classrooms across the country. These "temporary" structures are plagued with problems: poor ventilation, water intrusion, high levels of formaldehyde, and insufficient building maintenance. The problems are particularly worrisome given that recent studies have shown that poor indoor air quality can reduce cognitive performance.

This grant funds a team led by Professor Kerry Kinney at the University of Texas, Austin, to construct a case study examining how "hidden spaces" in a temporary-yet-permanent building influence the indoor microbiome. Hidden spaces like ceiling plenums and crawl spaces can be important vectors for the spread of microbes indoors. Dark, moist, and infrequently cleaned, such spaces often contain high levels of contaminants, which may subsequently be spread throughout the building by drafts. Studying

An air vacuum sampling array detects the "microbial clouds" emitted from a cohort of houseplants, here operating during an experiment in a tightly-controlled climate chamber in Portland, OR. The experiments are being conducted by the Sloan-supported Biology of the Built Environment (BioBE) Center at the University of Oregon.
(PHOTO COURTESY OF BIOBE CENTER.)

actual portable classrooms, Kinney and her team plan to identify where microbes and other contaminants come from and where they go within classroom and hidden spaces, and then determine how positive and negative pressurization from ventilation systems affects the microbiota and other contaminants in various parts of the portable classroom.

The researchers will share their findings by publishing in building science, life science, and trade journals; in web posts; and by using social media to direct readers to these postings. The team will also make presentations at national and international meetings. Both a graduate student and a postdoctoral fellow will be trained in indoor microbiome and building science studies during the research.

University of Maryland, Baltimore

BALTIMORE, MARYLAND

$249,289 over 13 months to support a scientific meeting celebrating the accomplishments of the MoBE program in 2017.

Project Director: Lynn M. Schriml, Associate Professor

Funds from this grant support MoBE 2017, a two-day Microbiology of the Built Environment Research and Applications Symposium to be held October 11–12, 2017 at the U.S. National Academies in Washington, D.C. The purpose of the symposium is to engage and inform potential funders and community stakeholders by highlighting research findings, identifying intersections with stakeholder missions, and showcasing a National Academies consensus study, Microbiomes of the Built Environment: From Research to Application, which documents the state of knowledge on the microbiome/built environment interface, identifies knowledge gaps, and sets out a list of prioritized areas for future research.

Each day of the symposium will include one keynote speaker and four themed sessions. Topics to be discussed include the nexus of microbial exposure and building design, public health and indoor microbial communities, manipulating microbiome composition through architectural choices and material selection, and potential applications of indoor microbial research. A total of 160 guests are expected, including researchers, journalists, industry representatives, and policymakers from state, federal, and international government bodies.

MoBE 2017 promises to be an important capstone event for the Foundation's MoBE program as we near the end of planned grantmaking in 2017. If successful, it will engage and inform potential funders and community stakeholders from government agencies, philanthropic organizations, and companies, while celebrating the scientific achievements of the program.

Virginia Polytechnic Institute and State University

BLACKSBURG, VIRGINIA

$250,000 over 24 months to examine how warm ambient water temperatures and recycled water influence the building plumbing microbiome.

Project Director: Amy Pruden, Professor

Drinking water regulations focus on the quality of the water coming out of the water treatment plant, but water can pick up bacteria and other microbes as it travels from the plant to the faucet. Since 2012, the Foundation has supported researchers at Virginia Tech to characterize the plumbing microbiome and how it affects the microbial profile of household water.

This two-year grant continues Foundation support for this work. Professors Amy Pruden and Marc Edwards at Virginia Tech have designed a series of experiments to explore how warm (30°C) ambient water temperatures and use of recycled water influence the building plumbing microbiome. Over the next two years, they will use complementary batch and continuous flow experiments to study how water temperature affects abundance and diversity among bacteria and amoebae in household water and whether recycled water's distinct chemistry (relative to potable water) causes greater proliferation of bacteria and free-living amoebae in bulk water and biofilms.

The Virginia Tech team will share their findings through peer-reviewed papers and presentations at national and international conferences and through blog posts and other social media. The sequence data will be deposited in public databases. At least one student and two postdoctoral fellows will be trained under the grant.

Grants Made Against Prior Authorizations

In March 2016, the Trustees authorized the expenditure of up to $350,000 for small grants in support of the Microbiology of Built Environments program. The following grants were made against this previously authorized fund.

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$75,000 over 24 months to provide partial support for a consensus study on the management of legionella in water systems.

Project Director: Laura J. Ehlers, Senior Staff Officer

Northwestern University

EVANSTON, ILLINOIS

$40,481 over 12 months to examine how surface finishes impact the indoor microbiome and their collection of antibiotic resistant genes.

Project Director: Erica L. Hartmann, Assistant Professor

Ohio State University

COLUMBUS, OHIO

$50,142 over 22 months to support a pilot study to establish methods and feasibility for determining how diurnal variation in relative humidity affects microbial communities in carpet.

Project Director: Karen Dannemiller, Assistant Professor

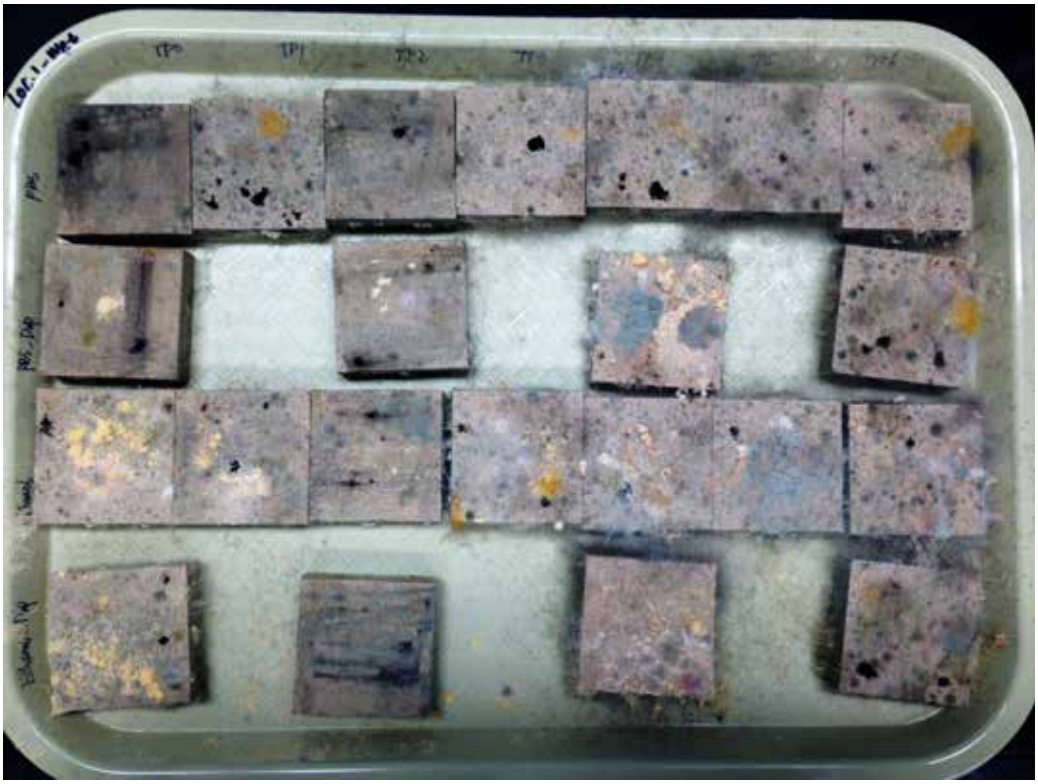
In December 2014, the Trustees authorized the expenditure of up to $300,000 for small grants that aim to foster scientific exchange between Microbiology of the Built Environment grantees and researchers abroad. The following grant was made against this previously authorized fund.

Ohio State University

COLUMBUS, OHIO

$19,987 over 12 months to support the Microbiology of the Built Environment Symposium at the National Council for Science and the Environment 2017 Conference and Global Forum.

Project Director: Karen Dannemiller, Assistant Professor



Researchers at the Illinois Institute of Technology are studying the differential growth rates of fungi on damp building materials. These samples show fungal growth on four different types of commonly used wall materials over time. (PHOTO COURTESY OF DAN ZHAO.)

Yale University

NEW HAVEN, CONNECTICUT

$69,975 over 12 months to support a MoBE workshop in Singapore to foster relationships with MoBE researchers in East Asia.

Project Director: Jordan Peccia, Associate Professor

In March 2015, the Trustees authorized the expenditure of up to $720,000 to support up to six postdoctoral fellowships for outstanding young scientists and engineers working on questions related to the microbiology of the built environment. The following grants were made against these previously authorized funds.

Michigan State University

EAST LANSING, MICHIGAN

$120,000 over 24 months to support Jean Pierre Nshimyimana in studying the role of the virome in the microbiological stability of the aquatic built environment.

Project Director: Joan B. Rose, PhD

University of Michigan

ANN ARBOR, MICHIGAN

$120,000 over 24 months to examine "Abundance, Aerosolization, and Quantitative Microbial Risk Assessment of Opportunistic Bacterial Pathogens in the Built Environment."

Project Director: Yun Shen, Research Fellow

Officer Grants

Cornell University

ITHACA, NEW YORK

$125,000 over 12 months to examine how disinfectants may promote antibiotic resistance through horizontal gene transfer.

Project Director: Ilana Brito, Adjunct Assistant Professor

Emory University

ATLANTA, GEORGIA

$124,617 over 6 months to support a national workshop on the microbiology of legionella in the built environment.

Project Director: Ruth L. Berkelman, Professor

University of Tulsa

TULSA, OKLAHOMA

$99,960 over 18 months to develop a MoBE research roadmap to transition from basic research to practical applications.

Project Director: Richard Shaughnessy, Program Director, Indoor Air Research

University of Maryland, Baltimore

BALTIMORE, MARYLAND

$20,000 over 19 months to conduct planning activities for the MoBE 2017 meeting.

Project Director: Lynn M. Schriml, Associate Professor

Sloan Digital Sky Survey

PROGRAM DIRECTOR: EVAN S. MICHELSON

The Sloan Digital Sky Survey (SDSS) is one of the most detailed, highly cited astronomical surveys in the field's history. It aims to expand our understanding of the large-scale evolution and structure of the universe, the formation of stars and galaxies, the history of the Milky Way, and the science behind dark energy. Since achieving first light in 1998, SDSS has mapped and catalogued more than a third of the night sky and is answering fundamental questions about the origins of the universe.

In cooperation with the Astrophysical Research Consortium, the Foundation has helped build and operate a pioneering telescope and associated instruments at Apache Point Observatory in New Mexico to observe and archive information on millions of stars, galaxies, quasars, and other cosmological phenomena. SDSS is distinctive within the astronomical community for its participatory, bottom-up scientific planning process, and it currently involves over 50 institutional members in the collaboration. The current fourth phase of SDSS (SDSS-IV) continues the survey's rich tradition of cutting-edge data collection by partnering with the du Pont Telescope at the Las Campanas Observatory in Chile, allowing for observations of regions of the sky not visible from the Northern hemisphere and helping to fully realize the truly global nature of the collaboration. SDSS-IV now also includes programmatic activities to engage underrepresented minorities through its Faculty and Student Team (FAST) initiative.

All SDSS data is released to the public under open principles. More than 7,600 peer-reviewed papers have been written using SDSS data and those papers have in turn been cited nearly 370,000 times in the literature. SDSS legacy programs include imaging data from nearly half a billion celestial objects, and the most recent public data

release contains optical and infrared spectroscopic data on over four million objects, including stars, galaxies, and quasars. SDSS recently undertook a strategic planning process to evaluate the prospects, operational landscape, and potential options for the future of the collaboration in 2020 and beyond. SDSS is the only astronomy project supported by the Foundation and is its longest running scientific research enterprise.

Officer Grants

Astrophysical Research Consortium

SEATTLE, WASHINGTON

$107,000 over 21 months to evaluate the prospects, operational landscape, and potential options for the future of the Sloan Digital Sky Survey (SDSS) research program and its facilities in the 2020s.

Project Director: Juna Kollmeier, Astronomer

APOGEE-2, a state-of-the-art infrared spectrograph constructed by researchers at the University of Virginia, is unloaded from a truck after a two-month, 8,000-mile journey from Charlottesville to Las Campanas Observatory in Chile. The construction and installation of the instrument is part of an exciting new collaboration between US and Chilean astronomers to expand SDSS observations to the Southern hemisphere. (PHOTO BY SANJAY SUCHAK, UNIVERSITY OF VIRGINIA)

Other STEM Research Grants

The Foundation occasionally makes research grants outside its normal grantmaking programs when a unique opportunity is presented to benefit society or advance the state of scientific knowledge. The following grants made in 2015 fall outside the Foundation's other grantmaking programs.

Grants Made Against Prior Authorizations

In March 2013, the Trustees authorized the expenditure of up to $500,000 to fund exploratory grants in mathematics that directly alight with other Sloan Foundation priorities. The following grant was made against this previously authorized fund.

Mathematical Sciences Research Institute

BERKELEY, CALIFORNIA

$124,982 over 12 months to support a national festival that increases the appreciation of mathematics and mathematical research.

Project Director: David Eisenbud, Director

In June 2016, the Trustees authorized the expenditure of up to $500,000 to fund exploratory grants in mathematics that directly alight with other Sloan Foundation priorities. The following grants were made against this previously authorized fund.

University of Waterloo

WATERLOO, ONTARIO

$125,000 over 14 months to launch an organization that will compile and encode mathematical knowledge to make it more searchable, computable, linkable, checkable, and usable.

Project Director: Stephen Watt, Professor & Dean of the Faculty of Mathematics

Yeshiva University

NEW YORK, NEW YORK

$20,000 over 25 months to support collaboration between mathematicians from the US and Europe on the study of finite and infinite dimensional dynamical systems.

Project Director: Marian Gidea, Professor

Harvard University

CAMBRIDGE, MASSACHUSETTS

$20,000 over 6 months to support the Second Annual Conference on Big Data at the Harvard Center for Mathematical Sciences and Applications.

Project Director: Shing-Tung Yau, William Caspar Graustein Professor

STEM Higher Education

Education & Professional Advancement for Underrepresented Groups

PROGRAM DIRECTOR: ELIZABETH S. BOYLAN

This program area aims to increase the diversity of higher education institutions and the work force in STEM fields through college and university initiatives that support the education and professional advancement of high-achieving individuals from underrepresented groups (underrepresented minorities and women).

The program is divided into two major initiatives: the Minority PhD program and the Sloan Indigenous Graduate Partnership.

The **Minority Ph.D. program** (MPHD) aims to increase the number of underrepresented minorities who graduate from Ph.D. programs in STEM fields through the support of eight **University Centers of Exemplary Mentoring** (UCEMs). UCEMS are campus-based initiatives that provide scholarships, mentoring, and other professional support to minority graduate students in selected STEM fields. Students eligible for MPHD scholarships must self-identify as African American/black, Hispanic/Latino(a), American Indian, or Alaska Native, and must be U.S. citizens.

The **Sloan Indigenous Graduate Partnership** (SIGP) aims to increase the number of American Indian and Alaska Native students who successfully complete master's or Ph.D. programs in STEM fields through the support of four regional centers. Each of the centers provides scholarships, mentoring, and other professional support to its students, and works cooperatively with the other centers to raise awareness of the opportunities that American Indian and Alaska Native students have for financial support and professional development, all enhancing their aims to succeed in STEM graduate programs.

Students supported through the MPHD and SIGP are known as "Sloan Scholars." The National Action Council for Minorities in Engineering (NACME) provides management operations for both programs.

Partnerships also exist with two other organizations that offer further professional development opportunities to MPHD Scholars: the Southern Regional Education Board's Institute for Teaching and Mentoring and the Social Science Research Council's Sloan Scholars Mentoring Network.

In addition to the two graduate scholarship programs, the Foundation makes a number of grants to national organizations that sponsor conferences and workshops—on diversity topics and for diverse audiences. Other grants explore mechanisms by which the Foundation's goals to increase the participation of underrepresented groups can be enhanced. Two pilot grants have been made to fund post-baccalaureate research experiences for underrepresented minority students who plan to apply for doctoral programs in economics.

Sloan Scholars assemble for a group photo at the 2016 Compact for Faculty Diversity's Institute on Teaching and Mentoring, hosted by the Southern Regional Education Board. (PHOTO COURTESY OF SREB)

Trustee Grants

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$3,300,000 over 36 months to support the Alfred P. Sloan Minority Ph.D. Program (MPHD) through Phase 1 Renewal Grants for University Centers of Exemplary Mentoring (UCEMs) at Cornell University, Georgia Institute of Technology, and The Pennsylvania State University.

Project Director: Christopher Smith, Vice President

In 2013, the Foundation made grants to Cornel University, Georgia Institute of Technology, and The Pennsylvania State University for the establishment and operation of three University Centers for Exemplary Mentoring (UCEMs). Part of the Foundation's Minority Ph.D. program, UCEMs are coordinated, campus-wide initiatives aimed at promoting the success of STEM graduate students from traditionally underrepresented groups. UCEMs provide minority graduate students with a host of different benefits, including $40,000 in direct fellowship support for selected students, peer and faculty mentoring, seminars on various aspects of graduate life, a variety of professional development activities, and programs aimed at recruiting and retaining talented minority graduate students.

Directors of the Sloan Foundation's Programs of Exemplary Mentoring and Legacy Programs at the 2016 Compact for Faculty Diversity's Institute on Teaching and Mentoring. (Standing from left) **Dorothy Salomon**, Alfred P. Sloan Foundation; **Cagliyan Kurdak**, University of Michigan, Ann Arbor; **Otto Wilson**, Catholic University of America; **William Jackson**, University of California, Davis; **Erick Jones**, University of Texas, Arlington; **Timothy Grotjohn**, Michigan State University; **Rodolfo Romanach**, University of Puerto Rico, Mayaguez; **John Koshel,** University of Arizona, Tucson

(Seated, from left): **Sherry Woodley**, Arizona State University; **Isabel Lloyd**, University of Maryland, College Park; **Elizabeth Boylan**, Alfred P. Sloan Foundation; **Percy Pierre**, Michigan State University; **Denise Ellis**, NACME. (Photo courtesy of SREB.)

Funds from this grant provide three years of continued operational support for the UCEMs at Cornell, Georgia Tech, and Penn State. Grant funds are administered and dispersed by the Foundation's agent, the National Action Council for Minorities in Engineering (NACME). Additional funds from this grant will be used by NACME for evaluation and analysis of UCEM progress and to facilitate travel and information-gathering.

Social Science Research Council

NEW YORK, NEW YORK

$975,976 over 36 months to establish the structure, governance, and offerings of the Sloan Scholars Mentor Network for a three-year cycle, with an initial target audience of Sloan Scholar MPHD graduates in academic careers.

Project Director: Mary Byrne McDonnell, Executive Director

Since the Sloan Minority Ph.D. (MPHD) program began in 1995, more than 900 minority graduate students supported by the Foundation have received their Ph.D. in a STEM field. Some 450 more students are still making progress toward their degree.

Funds from this grant to the Social Science Research Council (SSRC) support the establishment of a professional development network for alumni of the Sloan Minority Ph.D. program, with a particular emphasis on those alumni who have or will continue their scholarly work in positions as college or university faculty. Over the next three years, the SSRC will spearhead the creation of the Sloan Scholar Mentor Network, and will conduct a variety of activities to grow and strengthen the network and to ensure it delivers value to its members. These include studying alumni to understand their evolving needs as researchers and faculty members, and as underrepresented minorities in STEM; building a robust and active mentoring network; working to build a common identity among alumni; offering leadership training and support to help Sloan alumni become established as leaders in their fields and workplaces, and to prepare them to become change agents within their home institutions; and establishing evaluation procedures that will enable the network to increasingly deliver value to its members. Planned activities involve "meet and greet" events at universities and disciplinary meetings, a biennial conference for alumni, a recent Ph.D. retreat for postdoctoral fellows and early-career faculty, the creation of an up-to-date directory, and a series of professional development webinars.

Grants Made Against Prior Authorizations

In December 2014, the Trustees authorized the expenditure of up to $250,000 to provide support for conferences and workshops that share the Sloan Foundation's goals with respect to increasing diversity in STEM higher education and the STEM professions. In October 2016, the Trustees authorized the expenditure of an additional $250,000 for this same purpose. The following grants were made against these previously authorized funds.

American Association for the Advancement of Science

WASHINGTON, DISTRICT OF COLUMBIA

$30,000 over 12 months to support post-workshop activities that explore the desirability and feasibility of adapting the UK's Athena SWAN diversity initiative for use in US institutions.

Project Director: Shirley M. Malcom, Directorate Head

American Indian Science and Engineering Society

ALBUQUERQUE, NEW MEXICO

$10,000 over 6 months to provide partial support for the Undergraduate Research Competition at the 2016 AISES National Conference.

Project Director: Kathy DeerInWater, Director

American Society for Engineering Education

WASHINGTON, DISTRICT OF COLUMBIA

$50,000 over 12 months to convene a planning meeting and small conference catalyzing activities within the Engineering Transitions to Inclusive and Diverse Environments (E-TIDE) Alliance.

Project Director: Norman Fortenberry, Executive Director

Gordon Research Conferences

WEST KINGSTON, RHODE ISLAND

$20,000 over 10 months to support partial travel and fees for 27 underrepresented participants to attend the Gordon Research Conference (GRC) on Undergraduate Biology Education Research (UBER) focused on improving diversity, equity, and learning.

Project Director: Susan Elrod, Provost

Genetics Society of America

BETHESDA, MARYLAND

$10,000 over 2 months to provide partial travel awards to 20 URM doctoral students in genetics to participate in The Allied Genetics Conference, July 13-17 in Orlando, FL.

Project Director: Elizabeth Ruedi, Director of Education & Prof Development

Officer Grants

Mathematical Sciences Research Institute

BERKELEY, CALIFORNIA

$125,000 over 12 months to increase the number of underrepresented minorities in graduate programs in mathematics.

Project Director: Helene Barcelo, Deputy Director

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$110,000 over 18 months to provide partial support for a study to gather, analyze, and disseminate the evidence on the most promising retention and completion strategies and practices at US minority-serving institutions (MSIs).

Project Director: Thomas Rudin, Director, Board of Higher Education & Workforce

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$16,140 over 6 months to support a student conference as part of the Undergraduate Women in Economics Challenge.

Project Director: Claudia Goldin, Director & Research Associate

The Science of Learning STEM

PROGRAM DIRECTOR: ELIZABETH S. BOYLAN

Grantmaking in this program area has targeted programs enhancing the persistence and success of undergraduate students in STEM majors through pedagogies based on principles of how people learn. It also seeks to account for differences in participation and achievement among student demographic groups, e.g. race/ethnicity and gender. Limited funding is available while the program focus is reviewed.

Officer Grants

University of California, Berkeley

BERKELEY, CALIFORNIA

$101,821 over 15 months to develop and test instruments that document increases in understanding of science concepts and scientific practices in undergraduate research experiences.

Project Director: Anne M. Baranger, Director

Mathematical Sciences Publishers

BERKELEY, CALIFORNIA

$50,000 over 36 months to enable a peer-reviewed journal for undergraduate research in mathematics (Involve) to increase its subscriptions and ensure its longevity.

Project Director: Robion C Kirby, Chairman & CEO

Public Understanding of Science, Technology, & Economics

Books

PROGRAM DIRECTOR: DORON WEBER

Books are critical entry points for the entire Public Understanding program. They allow us to delve deeply into any subject and uncover or synthesize new knowledge while imparting the profoundest understanding of issues and individuals. Books also frame important questions and concerns for the public in an enlightened and accessible context. The Foundation remains committed to books, both for their intrinsic value as a matrix of uniquely rich experience and deep learning, and for their adaptability to other media for broader dissemination and popularization.

The current book program began in 1996 and has supported over 100 authors. Previously, the Foundation supported the Sloan Series of Scientific Autobiographies in the 1980s and the Sloan Technology Series, begun in 1994, which was continued under the current program. Critically acclaimed books such as Dava Sobel's *Galileo's Daughter*, Kai Bird and Martin Sherwin's *American Prometheus*, Richard Rhodes's *Hedy's Folly*, Jared Diamond's *Collapse*, and Eric Kandel's *The Age of Insight* are among those that have been supported by the program. Recently published books include Margot Lee Shetterly's *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*, which debuted at number seven on the *New York Times* bestseller list and was adapted into an Oscar-nominated hit film; Robert Kanigel's *Eyes on the Street; The Life of Jane Jacobs*, a definitive biography of the urban planner and activist; *The Pope of Physics: Enrico Fermi and the Birth of the Atomic Age*; *Science Blogging: The Essential Guide;* and *The Correspondence of Charles Darwin, Volume 23*.

Grants Made Against Prior Authorizations

In December 2013, the Board of Trustees authorized the expenditure of up to $400,000 to provide small grants for promising new books on science, technology, engineering, and mathematics. In October 2015, the Trustees authorized the expenditure of an additional $400,000 for this same purpose. The following grants were made against these previously authorized funds.

Adam Becker

OAKLAND, CALIFORNIA

$50,000 over 8 months to research and write a book on the history of the foundations of quantum physics, with a particular emphasis on the continued dominance of the troubled "Copenhagen interpretation."

Project Director: Adam Becker, Author

Charles Graeber

BROOKLYN, NEW YORK

$50,000 over 12 months to support the writing of a book, The Breakthrough, to enhance public understanding of the science behind recent advances in cancer immunotherapy.

Project Director: Charles Graeber, Author

North Carolina State University

RALEIGH, NORTH CAROLINA

$80,000 over 21 months to support research and writing of a book, "Never Home Alone," that engages the general public in the history and science of the microbiology of the built environment.

Project Director: Robert C. Dunn, Professor

Joel N. Shurkin

BALTIMORE, MARYLAND

$46,900 over 12 months to support a book on the physicist Richard Garwin who designed the hydrogen bomb that explores the relationship between science and government.

Project Director: Joel N. Shurkin, Author

Stevens Institute of Technology

HOBOKEN, NEW JERSEY

$39,340 over 17 months to support the research and writing of a book on the role of cancer-causing viruses.

Project Director: Gregory J. Morgan, Associate Professor

Oren Harman

TEL AVIV,

$50,000 over 12 months to support the writing of a book, Evolutions, that juxtaposes the most current scientific understanding of cosmology and the evolution with myths.

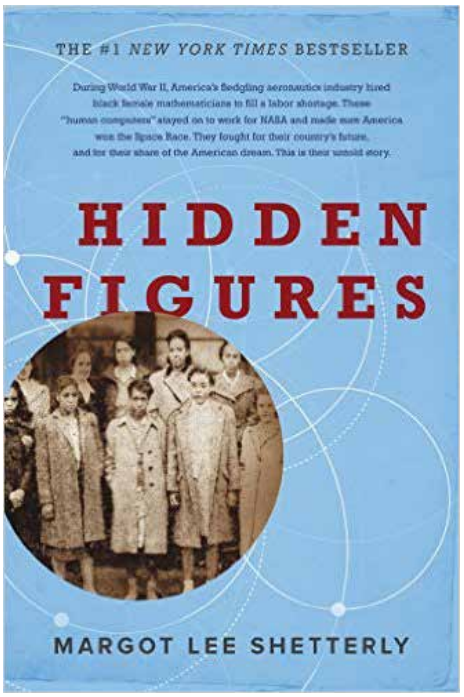
Project Director: Oren Harman, Author

Seth Stephens-Davidowitz

NEW YORK, NEW YORK

$45,620 over 13 months to support the research and writing of Needles and Haystacks: The Smart Way to Use New Data, a book on the wide-ranging applications of Big Data analysis.

Project Director: Seth Stephens-Davidowitz, Author



Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race by Margot Lee Shetterly was published on September 6, 2016 by Harper Collins. It debuted at number seven on the *New York Times* bestseller list and was adapted into an Oscar-nominated hit film.

Film

PROGRAM DIRECTOR: DORON WEBER

The goal of the Film program is to influence the next generation of filmmakers to tackle science and technology themes and characters, to increase visibility for feature films that depict this subject matter, and to produce and disseminate new films about science and technology and about scientists, engineers, and mathematicians. Film is a universal language and an unrivaled medium for advancing public understanding of the scientific and technological enterprise and of the human beings at its center.

Launched in 1996, Sloan's Film program has awarded grants to over 500 film projects from some of the nation's most innovative filmmakers, and has created a film development pipeline of multiple program partners though which Sloan nurtures and develops individual projects. Over the past 15 years the Foundation has partnered with six of the top film schools in the country and established annual awards in screenwriting and film production, along with an annual best-of-the best Student Grand Jury Prize. The Foundation also supports screenplay development programs at the Sundance Film Institute, the Tribeca Film Institute, and Film Independent's Producer's Lab and Fast Track program. In 2015, Sloan added the prestigious San Francisco Film Society (SFFS) and the Black List to its screenplay development partners and the inaugural SFFS Sloan Science in Cinema prize was awarded to *The Martian*. In 2016, the SFFS Sloan Science in Cinema Prize went to the Oscar-nominated hit film *Hidden Figures*, based on the Sloan-funded book. Two new Sloan-supported feature films, both directed by women, premiered at film festivals in 2016: Logan Kibens's *Operator* and Melissa Finell's *Sensitivity Training*. Completed feature films developed by the Sloan pipeline include Matthew Brown's *The Man Who Knew Infinity*, Morten Tyldum's *The Imitation Game,* Michael Almereyda's

Experimenter, Jake Schreier's *Robot & Frank,* Rob Meyer's *A Birder's Guide to Everything*, Musa Syeed's *Valley of Saints,* and Andrew Bujalski's *Computer Chess*. To gain distribution for Sloan films, the Foundation has expanded Coolidge Corner Theater's *Science on Screen* effort into a nationwide program that has awarded 129 grants to 57 independent cinemas, each of which shows at least one Sloan-supported film a year.

Trustee Grants

American Museum of the Moving Image

ASTORIA, NEW YORK

$399,824 over 35 months to maintain and develop the comprehensive, up-to-date, go-to site for the nationwide Sloan Film program, its participating partners and 500+ film projects and to add a Sloan Film Channel.

Project Director: Carl Goodman, Executive Director

This grant provides three years of support to the American Museum of the Moving Image (MoMI) to maintain and develop its Sloan Science and Film website, the most up-to-date and comprehensive resource for information about film projects supported through the Foundation's Film program. Funds will support a site redesign that will streamline the user interface and upgrade accessibility on mobile phones, the development of a new content management system, the creation of a Sloan Film Channel, and the hiring of a full-time managing editor who will be responsible for a host of activities, including producing audio and visual content; writing and posting articles; organizing public Science and Film events; commissioning critics and scientists to contribute to the site; liaising with Sloan film partners and with filmmakers and scientists; and promoting site content on social media.

Columbia University

NEW YORK, NEW YORK

$289,541 over 39 months to encourage the next generation of filmmakers to write screenplays and produce short films about science and technology through enhanced research, mentorship, and award opportunities.

Project Director: Trey Ellis, Associate Professor

This grant continues support for a program at Columbia University that aims to encourage the next generation of filmmakers to write screenplays and produce short films about science and technology.

Supported activities include two annual $10,000 awards given to the best student screenplay with a scientific or technological theme; two $20,000 production awards to help produce a science-themed film project; a student mentoring program and an annual information session and panel discussion introducing students to the program offerings and to working scientists; and off-campus learning activities that expose student filmmakers to the process of scientific inquiry and cutting-edge developments in modern science. Grant funds provide support for these and related activities for three years.

New York University

NEW YORK, NEW YORK

$484,596 over 36 months For an annual feature film production grant over three years to enable film students to shoot a first feature film about science and technology.

Project Director: Michael Burke, Acting Associate Dean

This grant supports an initiative at New York University's Tisch School of the Arts (NYU Tisch) to incentivize the creation of feature films about science and technology through an annual award of $100,000 given to help an outstanding science-themed student film project move to production.

Each year a distinguished committee of filmmakers and scientists from NYU's Kanbar Institute of Film and Television will publicize the award among students and accept and evaluate film treatments. Filmmakers selected as semifinalists receive a $5,000 award to produce their script and are connected with an expert scholar to serve as a mentor and to ensure the accuracy of the scientific work and

A still from Logan Kibens's *Operator*, starring Mae Whitman and *Silicon Valley*'s Martin Starr, which premiered at South by Southwest Film Festival in March 2016. (PHOTO COURTESY OF THE ORCHARD)

characters presented. The winning filmmaker from among the semifinalists will receive $100,000 to be used to move the script into production. Scripts are eligible only if they explore scientific or technological themes or employ scientists, mathematicians, or engineers as major characters. In addition, NYU holds an annual reception for the winner and engages in media outreach to publicize the awards. Grant funds provide core operating support for this awards program for three years.

Tribeca Film Institute

NEW YORK, NEW YORK

$216,320 over 19 months to support the Sloan Student Grand Jury Prize for the annual selection and development of the best-of-the-best screenplay from Sloan's six film school partners.

Project Director: Anna Ponder, Executive Director

Funds from this grant to the Tribeca Film Institute (TFI) support two years of the Sloan Student Grand Jury Prize, an annual prize awarded to the single best science-themed student screenplay produced by a student at one of the Foundation's six film school partners. The award package is $50,000 per year, of which $30,000 goes directly to the student filmmaker. The balance of the award funds support a noted industry mentor to guide the project, a committed science advisor, and other marketing and distribution efforts to maximize the screenplay's chances of production.

The aim of this effort is to stimulate greater interest and excitement among the six participating film schools and film students by awarding a "best of the best" prize and fast-tracking the winning project for development so it becomes a major career opportunity.

The Student Grand Jury Prize offers enhanced visibility, prestige, and a career boost to the student winner working on a science-themed script and fosters healthy competition within the film school program.

Officer Grants

Women Make Movies, Inc.

NEW YORK, NEW YORK

$47,770 over 12 months to support a pilot project to track what happened to scripts that won Sloan awards, to track the careers of Sloan award winners, and to track the careers of students in the Sloan programs who sought awards, but did not receive them.

Project Director: Barbara Ghammashi, Production Assistance Program Manager

Radio

PROGRAM DIRECTOR: DORON WEBER

The Foundation supports original, high-quality programming on a range of radio programs tackling science, technology, and economics and seeks to increase both the quantity and the quality of science and technology coverage. Sloan grants started the science and technology desk at National Public Radio and at Public Radio International's *The World*; have supported feature radio series, such as the Peabody-Award winning *The DNA Files;* and sponsored science coverage on commercial radio, such as *The Osgood File*.

Current partnerships include support for the innovative, award-winning podcast *Radiolab,* which the Foundation helped launch, two-time Peabody-winner *Studio 360,* Ira Flatow's perennially popular *Science Friday,* which celebrated its 25th anniversary in 2016, the Public Radio Exchange (PRX), including the female-hosted podcasts *Transistor* and *Orbital Path, Planet Money*, which won a prestigious 2016 Peabody Award for its coverage of the Wells Fargo scandal, and WNYC's healthcare podcast *Only Human.* The Foundation also supports *LA Theatre Works* to record full-length science plays with A-list actors as part of a series called *Relativity*, broadcast on public radio. The recordings include over twenty plays originally commissioned by the Foundation's theater program.

Trustee Grants

New York Public Radio

NEW YORK, NEW YORK

$400,000 over 24 months For production and enhanced distribution of Radiolab, an innovative and popular science-themed radio show, via multiple platforms.

Project Director: Jad Abumrad, Host & Executive Producer

This grant provides continuing operational support for the successful science radio show and podcast Radiolab. Expected outputs include 21 science-themed podcasts per year plus one hour-long broadcast per week (distilled from original and archival podcasts). The Radiolab production team will also continue to produce live events to supplement their online content, with eight communication events or lectures planned each year and two annual live events. Grant funds will provide core operating support for Radiolab for two years.

New York Public Radio

NEW YORK, NEW YORK

$400,000 over 24 months to support health care reporting at WNYC with a focus on the economics and policy of our healthcare system and the impact of the Affordable Care Act on consumers in New York.

Project Director: Jim Schachter, Vice President of News

This grant continues support for efforts by the WNYC Health Unit to produce high-quality radio reporting on health care economics and policy. With Sloan funds, WNYC convenes an annual workshop with leading health care practitioners, economists, and policy experts to discuss health care reform and policy change resulting from the Affordable Care Act (ACA) and to identify subjects for news coverage that focus on health care policy and the economics of the health system in New York and the tristate region. Subjects identified for coverage are then often featured on WNYC's weekly podcast, Only Human.

Potential topics to be covered over the next two years include maternal health care costs in New York, how race and income affect costs and health outcomes, the funding crisis faced by New York City's public hospitals, comparing New York's state-based health care exchanges to New Jersey's federal exchange, millennials and mental health, and the Affordable Care Act after Obama.

In addition to reporting, WNYC will also launch four community engagement projects that empower listeners with information and encourage beneficial behavioral changes and two to four public events aimed at raising public understanding and engagement with health issues.

Planet Money hosts Ailsa Chang, Jacob Goldstein, Noel King, and Robert Smith. (PHOTO COURTESY OF NPR.)

Science Friday Initiative, Inc.

NEW YORK, NEW YORK

$685,000 over 36 months to support Science Friday, focusing on science and the arts, including radio broadcasts, digital science videos, blog posts, and associated media.

Project Director: Ira Flatow, President

Funds from this grant provide continued support for the production and distribution of Science Friday, the only regular weekly public radio program that devotes two hours to all things science. Grant funds will support the production of 50 radio segments per year, 5 digital videos per year, 12 articles per year produced and disseminated through the show's website, an annual multimedia spotlight on a science topic, a yearly Book Club event, and a single special remote broadcast of the show.

Science Friday's audience—the program reaches over two million people each week via its radio show, web streaming, podcasts, blogs, online videos, mobile apps, and social media presence—makes it one of the single most effective channels for dissemination of high-quality, engaging content about the increasingly central role science plays in modern life.

Television

PROGRAM DIRECTOR: DORON WEBER

The Foundation's goal with television is to tell stories, both historical and contemporary, about science and technology, and to portray the lives of the men and women engaged in scientific and technological pursuits. Television continues to be the most powerful medium in terms of audience, with public television, where most of Sloan Public Understanding funding goes, regularly delivering several million viewers per show.

Since 1996, Sloan's Television program has been helping to integrate science and technology—and profiles of scientists, engineers, and mathematicians—into the nation's regular programming. Foundation-supported shows such as PBS's *The American Experience*, the longest running history series on television, receive support for highlighting the role of science and technology in society, and for broadening our view of the nation's history and of the central role of science, technology, and engineering in the country's narrative. The Foundation also supports *American Masters,* National Geographic Television, programs on *NOVA*, and economics coverage on *The NewsHour*. Recently aired television programs supported by the Foundation include the duPont Award-winning *Cancer: The Emperor of All Maladies* and *American Experience*'s "Space Men" and "Tesla." Television projects forthcoming in early 2017 include an *American Experience* film on Rachel Carson, a six-part series on *Africa's Great Civilizations* hosted by Henry Louis Gates Jr., and *Bombshell: The Hedy Lamarr Story*, which will premiere at Tribeca Film Festival in 2017 and air on *American Masters* in 2018. The Foundation has a longtime interest in the under-appreciated role of women and minorities in science and technology, and is supporting work about such figures as Lise Meitner, Marie Curie, Rosalind Franklin, Jane Goodall, and Hedy Lamarr. The Foundation also supports television programs based on projects it has sponsored in other media.

Trustee Grants

Greater Washington Educational Telecommunications Association Inc.

ARLINGTON, VIRGINIA

$1,000,000 over 12 months to continue weekly broadcast of Paul Solman's economic and business coverage Making Sen$e on PBS NewsHour and to support online, social media, and digital content and audiences.

Project Director: Lee Koromvokis, Producer, Business & Economics

Funds from this grant support the continued production of Making Sen$e with Paul Solman. Broadcast on the PBS NewsHour and supplemented by original content produced for the segment's website, Making Sen$e is a series of short news segments that explain business and economic news clearly and engagingly to a general audience. Topics covered by Making Sen$e segments include the contingent workforce, welfare-to-work programs, the minimum wage, the carried interest tax loophole, the foreclosure crisis, the EB-5 visa program, and the economics of terrorism, online dating, and sports gambling. Grant funds support the production of 52 segments over the next year, as well as additional funds for improved graphics and the production of high-quality web-exclusive content.

Greater Washington Educational Telecommunications Association Inc.

ARLINGTON, VIRGINIA

$525,000 over 12 months to support the scientific, technological and engineering component of a six-part public television series on the history of Africa, presented by Henry Louis Gates, Jr..

Project Director: Dalton Delan, Executive Vice President & Chief Programming Officer

This grant provides partial support for production of a six-part history of the African continent to be hosted by the prominent academic Henry Louis Gates, Jr., the Alphonse Fletcher Professor at Harvard University and director of the W.E.B. Du Bois Institute for African American Research. Foundation funds will support segments devoted to documenting the scientific, technological, and engineering achievements of various African civilizations, including such events as the founding of the world's oldest university at Al-

Image featured in *Space Men.* Major David G. Simon near the peak of his record-breaking climb to 102,000 feet in a 32-hour balloon flight, August 1957. (PHOTO COURTESY OF THE NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE.)

Karouine in Morocco in 859 AD; the advanced mathematics developed in Fes, Marakesh, and Timbuktu between the 12th and 17th centuries; and Abu Raihan al-Biruni's precise calculation of Earth's radius. The proposed documentary series not only contains interesting information about the historical development of science and technology, but also challenges widespread stereotypes of Africa as backward and undeveloped and the widespread misunderstanding of the pivotal role African civilizations have played in humanity's scientific and cultural advance.

WGBH Educational Foundation

BOSTON, MASSACHUSETTS

$1,000,000 over 24 months For a two-hour NOVA special, Beyond the Elements, that investigates the substances composed of the elements in the periodic table and accompanying educational outreach and marketing.

Project Director: Paula S. Apsell, Senior Executive Producer

Funds from this grant support the production of a two-hour NOVA special, Beyond the Elements, that will explore the millions of substances that make up everything in our world or that we create from about 100 naturally occurring elements in the periodic table. Conceived as a follow-up to NOVA's popular (and also Sloan-supported) Hunting the Elements, the special will be divided into thematic segments. One will focus on the chemistry of substances that drove trade during humanity's age of exploration, such as salt, pepper, caffeine, nicotine, morphine, silk, and porcelain. Another will focus on molecules related to life itself, such as amino acids, DNA, nitrogen, and the molecular changes caused when we cook food. A third segment will focus on synthetic molecules, such as neoprene, nylon, and Kevlar, that are produced through modern industrial processes.

This special will be hosted by popular technology writer David Pogue, and will be accompanied by significant online and on-air outreach efforts by NOVA, including a 3- to 5-minute immersive video piece about a molecule that changed the course of history, a suite of online articles on NOVA Next, a collection of PBS Learning Media resources, virtual field trips for science classrooms, and screening events at museums and science centers.

Filmmakers Collaborative

MELROSE, MASSACHUSETTS

$100,000 over 12 months to support the development of "FRONTIERS," a new television show that profiles scientists as explorers conducting research across the globe.

Project Director: Jen Myronuk, Associate Director

Theater

PROGRAM DIRECTOR: DORON WEBER

The goal of this program is to engage leading playwrights, actors, directors, and producers to create and develop new works for the theater about science and technology and about scientists, engineers, and mathematicians, and to support the production of plays with dramatically engaging high-quality science content. Over the past fifteen years, the Foundation has developed a nationwide theater program with participants in many regions anchored by two acclaimed New York City partners—Ensemble Studio Theatre and Manhattan Theatre Club. This seminal program has backed such early Tony and Pulitzer Prize-winning works as *Proof* and *Copenhagen,* and is today recognized as the leading supporter of science plays in the country.

In addition to its two main partners, the Foundation recently awarded a pilot grant to the National Theatre in London and in the past has worked with New York-based Playwrights Horizons to develop and stage new works. Sloan's theater program has provided support to plays such as Nick Payne's critically acclaimed *Incognito* and the Broadway hit *Constellations*, starring Jake Gyllenhaal and Ruth Wilson, Anna Ziegler's *Boy,* Frank Basloe's *Please Continue*, Deborah Zoe Laufer's *Informed Consent*, Nell Benjamin's *The Explorer's Club,* and Anna Ziegler's *Photograph 51*, which had an award-winning 2015 production starring Nicole Kidman in London's West End. To date the theater program has received over 2,000 submissions for new plays, has commissioned more than 300 works, and has staged more than 60 plays in New York City alone, with dozens travelling to more than 30 theaters across the country and internationally.

The 2016 Manhattan Theatre Club production of Nick Payne's *Incognito*. (PHOTO BY JOAN MARCUS)

Trustee Grants

Ensemble Studio Theatre, Inc.

NEW YORK, NEW YORK

$1,800,000 over 36 months to commission, develop, produce and disseminate new science plays in New York and across the country.

Project Director: William Carden, Artistic Director

This grant continues support for a series of initiatives by the Ensemble Studio Theatre (EST) to develop, produce, and disseminate new science plays. Each season, EST commissions between 10 and 20 new science-themed scripts from emerging and established playwrights; hosts its annual First Light festival, which celebrates science-themed plays with staged readings, workshops, and other events; sponsors events to bring the theater and scientific community together; makes seed grants to regional theaters around the country to develop science-themed plays with local writers; and produces a mainstage production of one play addressing scientific or technical themes or featuring a scientist, engineer, or mathematician as a major character. Grant funds provide support for these activities for three years.

Officer Grants

NYC Arts in Education Roundtable

NEW YORK, NEW YORK

$5,000 over 5 months For a professional development event for educators that will explore how improvisation affects the brain.

Project Director: Jennifer Clarke, Managing Director

New Media

PROGRAM DIRECTOR: DORON WEBER

The Foundation sponsors innovative efforts using a range of media and other platforms to reach a broad, cross-cultural audience or to target specific segments of the public to enhance public understanding. These efforts may take the form of conferences, multimedia events, performances, eBooks, interactive games, science and arts festivals, and more.

The Foundation is a founding sponsor of the annual World Science Festival; has funded the Science Festival Alliance; has supported an exhibition on the mathematical significance of the artist Man Ray's work; has funded an interactive virtual chemistry set developed by the Chemical Heritage Foundation; has provided support to *The Secret Lives of Scientists,* a spin-off of the Sloan-supported NOVA ScienceNOW commissioned and funded exclusively by Sloan as a web-based experiment; and has provided support to other projects such as an interactive eBook developed by the New York Hall of Science on the science of DNA and its role in overturning wrongful convictions. Most recently, the Foundation supported *The Beautiful Brain: The Drawings of Santiago Ramón y Cajal*, a catalogue and traveling exhibition featuring the stunning drawings of Santiago Ramón y Cajal, the father of modern neuroscience. In 2016, the Foundation also made its first foray into Virtual Reality (VR) with a grant to support the short VR documentary "Listening to the Universe," which allows viewers to experience the workings of the LIGO gravitational wave detector and to grasp the science behind this breakthrough discovery.

Trustee Grants

American Academy of Arts and Sciences

CAMBRIDGE, MASSACHUSETTS

$150,000 over 24 months to support a two-year study and accompanying workshop on better understanding public attitudes toward science.

Project Director: John Randell, Senior Program Director

This grant funds a two-year study by the American Academy of Arts and Sciences (AAAS) to help improve our understanding of public attitudes to science—especially how people encounter science in everyday life—and to suggest ways to improve outreach, particularly to underserved communities. This effort is part of a three-year Academy initiative, The Public Face of Science, to address various elements of the relationship between scientists and the public.

The AAAS team will first compile data on public engagement with science, broadly defined to include watching film, theater, and other storytelling media with science and technology themes, as well as attendance at zoos, aquaria, and science museums, and use of the internet and social media to access scientific content. After conducting and publishing the baseline study, the AAAS will commission six papers from leading researchers to identify gaps in the existing data and ways to address them, with an emphasis on reaching underserved communities. These six papers will be presented and discussed at an Academy workshop in 2017, which will then generate a final report with recommendations for addressing gaps.

Massachusetts Institute of Technology

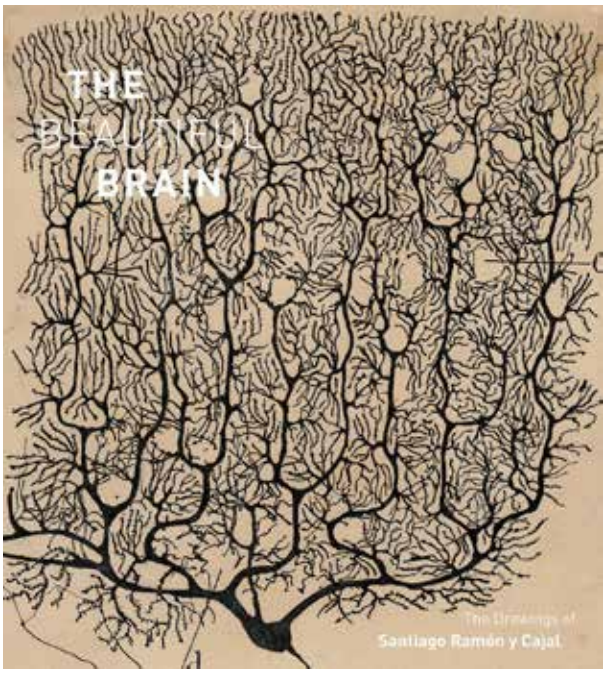
CAMBRIDGE, MASSACHUSETTS

$349,768 over 27 months to support the growth of nine new science festival initiatives in communities across the country with small resource bases.

Project Director: John Durant, Executive Director

This grant supports a collaboration between the Massachusetts Institute of Technology (MIT) and the Science Festival Alliance (SFA) to allow the SFA—a network and incubator of community-based science festivals across the country—to add nine more science festivals in communities with small resource bases.

Over the next two years, the collaboration will select and recruit nine community science festivals for inclusion in the network, providing nine challenge grants that facilitate expansion and development.



An illustration of a purkinje neuron from the human cerebellum by Cajal, featured on the cover of the *The Beautiful Brain* catalogue.

Science festival members would then be ready to mentor future new science festivals.

The project promises to accelerate the geographical spread of the science festival movement and promote science festivals as an effective instrument to advance public understanding of science.

Officer Grants

Council for the Advancement of Science Writing, Inc.

HEDGESVILLE, WEST VIRGINIA

$25,000 over 12 months to sponsor four sessions at the 2017 World Conference of Science Journalists to advance the effective use of traditional, emerging and interactive media to inform public conversation about science.

Project Director: Rosalind Reid, Executive Director

University of Maryland, Baltimore County

BALTIMORE, MARYLAND

$31,000 over 9 months to support Seeing Science: Photography, Science and Visual Culture, an online project and on-site exhibition.

Project Director: Symmes Gardner, Executive Director

University of Minnesota Foundation

MINNEAPOLIS, MINNESOTA

$75,000 over 24 months to expand public awareness of the groundbreaking work of Santiago Ramon y Cajal, the father of modern neuroscience, through an exhibition and book of his drawings.

Project Director: Lyndel King, Director and Chief Curator

The New School for Social Research

NEW YORK, NEW YORK

$34,000 over 10 months to support a two-day conference titled "Invisibility: The Power of an Idea," at The New School in New York City.

Project Director: Arien Mack, Director

Women Make Movies, Inc.

NEW YORK, NEW YORK

$125,000 over 5 months to explore the new medium of Virtual Reality with a short film allowing viewers to experience the workings of the LIGO gravitational wave detector, and to grasp the science behind this breakthrough discovery.

Project Director: Debra Zimmerman, Executive Director

Economics

Economic Institutions, Behavior and Performance

PROGRAM DIRECTOR: DANIEL L. GOROFF

The Foundation's program on Economic Institutions, Behavior, and Performance supports rigorous and objective research projects on U.S. economic structure, behavior, and performance whose findings inform and strengthen decision-making by regulators, policymakers, and the public.

Grants made through this program span four subprograms:

- **Financial and Institutional Modeling in Macroeconomics**
  Projects in this sub-program study interactions between the financial sector and the real economy, specifically the role of banks, regulators, and other institutions. Research topics include financial frictions; heterogeneous agents; intermediation; transaction costs; asymmetric information; regulatory coordination; risk measurement, capital requirements; credit ratings; interbank markets; behavioral and microeconomic foundations; liquidity and default; maturity transformation; asset valuation; etc.
- **Behavioral and Regulatory Effects on Decision-making**
  Projects in this sub-program study households and individuals, specifically the of role "choice architecture" on their economic decision-making. Research topics include risk-taking and insurance markets; time inconsistencies and the annuity paradox; cognitive biases; behavioral applications to policy; experimental testing of nudges or other regulatory interventions; behavioral welfare economics; obfuscated markets; consumer finance; probabilities and perceptions of extreme events; etc.

- **Economic Analysis of Science and Technology**
  Projects in this sub-program study universities and groundbreaking industries, specifically regarding human capital development and applications of information technology. Research topics include labor markets for scientists and engineers; high-skilled immigration; patterns of scientific publication, collaboration, and intellectual property protection; the economics of digitization; and the social returns on investments in research and development.
- **Empirical Economic Research Enablers**
  Projects in this sub-program study economic researchers, specifically with regard to their needs, opportunities, incentives, and professional practices. Research topics include administrative data protocols; data citation standards; identification and tracking systems for scholars; federal statistics; smart disclosure platforms for obfuscated markets; causal inference and econometric methods; data and metadata management protocols; privacy and access to social science datasets; the replicability of empirical research; and the economics of knowledge contribution and distribution.

Trustee Grants

The University of Chicago

CHICAGO, ILLINOIS

$493,818 over 18 months to facilitate workforce research by brokering, combining, documenting, and making available for study administrative data about labor markets from a variety of sources.

Project Director: Matthew Gee, Senior Research Scientist

This grant supports a project by data scientist Matthew Gee and labor economist Iona Marinescu to create an administrative data research facility that will compile high-quality private administrative data on various aspects of the U.S. labor force. Gee and Marinescu's Workforce Data Initiative will partner with private firms that have valuable administrative data on U.S. workers, including ADP, LinkedIn, Glass Door, O*Net, and CareerBuilder, combine these datasets with relevant publicly available data, and modify and "munge" these data into forms useable by researchers. The resulting datasets will constitute a valuable new resource for economists looking to answer pertinent questions on a host of important issues, including the post-2008 economic recovery, the resilience of local job markets, patterns in layoffs, and wage stickiness.

Georgetown University

WASHINGTON, DISTRICT OF COLUMBIA

$499,940 over 26 months to build community and consensus among Administrative Data Research Facilities by serving as a network hub and convener.

Project Director: Robert Groves, Provost & Professor

This grant funds a dozen conferences to be held over two years that are designed as community-building exercises for a new Administrative Data Research Network (ADRN). The ADRN is a linked network of Administrative Data Research Facilities, research centers devoted to facilitating the use of administrative data by researchers by lowering transaction costs and increasing the reproducibility of research conducted on administrative data. Conference topics will focus on common difficulties encountered

when working with administrative datasets, including securing data access, privacy and anonymity, data ethics, documenting and versioning data, data use agreements, and archiving. Conference outreach will target not only researchers, but key officials in government and industry who have access to administrative data. If successful, these conferences will serve as important gatherings to build consensus around standards, priorities, and best practices in the growing community of researchers working with administrative data.

Harvard University

CAMBRIDGE, MASSACHUSETTS

$326,688 over 36 months to develop behaviorally informed versions of basic macroeconomic models.

Project Director: Xavier Gabaix, Professor

This grant funds the work of theoretical macroeconomist Xavier Gabaix, who is endeavoring to explain puzzling macroeconomic phenomena by importing into macroeconomic models insights gleaned from behavioral psychology. Contrary to the prevailing wisdom among macroeconomists, Gabaix's work assumes human beings have limited attentional resources and must make choices about what to pay attention to and what to ignore. When attention is scarce, Gabaix argues, the pressing concerns of today crowd out consideration of distant tomorrows. This much microeconomists have known for some time. Gabaix's contribution has been to show how this scarcity of attention and the consequent focus on the now can, in the aggregate, have predictable macroeconomic effects. Indeed, in early work Gabaix has used these assumptions to predict certain stubborn macroeconomic facts—like the absence of inflation in the U.S. despite years of low interest rates—that have vexed more traditional economic models. Funds from this grant provide three years of support to Gabaix to expand and continue this work. Supported activities include the testing and calibrating of Gabaix's models against real-world data and the writing of a textbook that uses his framework to explain standard, well-understood macroeconomic phenomena.

University of Maryland, College Park

COLLEGE PARK, MARYLAND

$1,693,316 over 31 months to demonstrate how to estimate standard economic indicators using administrative data about business transactions.

Project Director: John Haltiwanger, Professor

The importance of macroeconomic statistics compiled by the government, such as Gross Domestic Product (GDP) and the Consumer Price Index (CPI), is difficult to overstate. The data used to calculate these statistics are collected through surveys fielded by a host of differing government agencies, including the Bureau of Labor Statistics, the Bureau of Economic Analysis, and the Census Bureau. These surveys have significant and well-known methodological limitations leading to inaccuracies, substantial lag times, sampling distortions, and the need for (often significant) revisions. The worrying methodological basis of many economic statistics stands at odds with the increasingly high-quality data available about the economy. Vast improvements in the ability of retailers, for instance, to electronically track transactions provide a wealth of data for price and quantity measurement that is several orders of magnitude richer than currently captured in government surveys.

This grant funds a pilot project by a team led by John Haltiwanger at the University of Maryland, College Park, to develop new, more accurate, and more timely methods to calculate portions of GDP and CPI using administrative data collected by retail firms. Partnering with several large retailers, the team will compile a large set of administrative data bearing on retail prices and quantities produced and sold, document how these data can be acquired and harvested, use the data to calculate portions of CPI and GDP, and then issue a report comparing and contrasting these calculations along several dimensions with current methodologies. Though it is too much to hope that such a project will, by itself, change the way government economic statistics are calculated, this project is an important proof of concept demonstrating one potential path to what all agree is badly needed reform.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$2,998,325 over 36 months to continue core support for a research network that promotes the rigorous empirical study of economic issues in North America.

Project Director: Amy Finkelstein, Ford Professor

Though considered by most economists to be the gold standard method for testing hypotheses, randomized controlled trials (RCTs) are nonetheless difficult to design, implement, or interpret in the field. That is why the Abdul Latif Jameel Poverty Action Lab (J-PAL) was founded at MIT in 2003. J-PAL has been a staunch champion of RCT methods, providing

Sloan has been a longtime supporter of The Brookings Institution and its tradition of objective, non-partisan economic and policy analysis. Foundation support for the influential Brookings Papers on Economic Activity has enabled Brookings to increase its offerings, including "live papers" that are updated as new data emerges. **(PHOTO BY MARK HOELSCHER, THE BROOKINGS INSTITUTION.)**

funds and expert guidance in the design and implementation of RCTs. Initially focused on developmental economics, the J-PAL network expanded its focus to the U.S. with the 2013 launch of J-PAL North America. The goal of this new network is to promote rigorous study of economic issues in the United States and its neighbors, both by catalyzing high-quality research directly and by strengthening the capacity of institutions and individuals to conduct and understand such work. This grant provides three years of core operating support for J-PAL North America's activities. Supported activities include salary support for core J-PAL staff, publication costs, training expenses, and development of workshops and toolkits for researchers wishing to field RCTs in North America.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$485,000 over 36 months to improve the credibility of empirical economics by turning best-practices for research transparency into common practice for research practitioners.

Project Director: Esther Duflo, Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics

This grant supports an initiative by Esther Duflo at the Abdul Latif Jameel Poverty Action Lab (J-PAL) to infuse more rigorous methodology into empirical economics. Mobilizing J-PAL's formidable research and training programs, Duflo will promote practices such as preregistration of experiment plans; prepublication re-analysis of results; and open sharing of datasets, code, and supporting documentation. Funded activities include a series of graduate fellowships for economics students who work on enhancing reproducibility and the development with MIT of a Massive Open Online Course (MOOC) on best economics research practices.

University of Michigan

ANN ARBOR, MICHIGAN

$398,516 over 24 months to facilitate data access by developing a broadly accepted system of researcher credentialing.

Project Director: Margaret Levenstein, Director

Suppose you, as a researcher, have succeeded in wrangling important and sensitive data from a government or corporate source, data that is valuable to the research community. Because your data are sensitive, however, you want to share only with appropriate-

ly trained and responsible scholars who can be trusted to treat the data ethically. Suppose now a request comes in from someone who wants to study the data. What do you do? Not every researcher is savvy about the technical, privacy, or legal compliance issues related to sensitive administrative data. You could investigate the individual and draft an agreement for them to sign. But starting from scratch to answer each new request, with all the associated inefficiencies, is time consuming and costly. Wouldn't it be much better if you could begin instead by asking your data seeker for some standard researcher certification, a kind of Good Housekeeping Seal of Approval that would indicate what kind of training and track record they have?

This grant funds a project by Maggie Levenstein, executive director of the Interuniversity Consortium for Political and Social Research (ICPSR), to design, test, implement, and promote just such a researcher credentialing system for use by her own and other institutions holding sensitive administrative data. The widespread adoption of such a system could significantly decrease the transaction costs associated with access to administrative data, increase the analysis of important though sensitive datasets, and promote responsible training and research protocols concerning preregistration, anonymization, reproducibility, and other research practices.

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$301,470 over 12 months to conduct an independent management study of processes, portfolios, and programs at the National Academy of Sciences.

Project Director: Marcia McNutt, President

The National Academy of Sciences (NAS) was chartered by Abraham Lincoln "to give advice to the nation." And, man, does it ever. Commissioned studies released during the first few days of September 2016 alone, for example, cover everything from clean electric power options to molybdenum-99 production, from eye health to eldercare.

Funders and clients alike know the Academy's work to be prestigious, authoritative, and impartial, but slow, inefficient, and expensive. Internal studies of NAS operations conducted sporadically over the years have resulted in only modest modifications. Now the incoming president, Marcia McNutt, wants to do more than that. A former editor of Science magazine and the first woman ever elected to lead the Academies, she is committed to comprehensive reform of how the NAS functions. Her first step is commissioning an outside management study by a distinguished but independent panel. The National Academy of Public Administration has agreed to carry out the project. Funds from this grant provide partial support for this independent management study.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$790,740 over 36 months to support the NBER Summer Institute.

Project Director: Janet Currie, Henry Putnam Professor of Economics & Public Affairs

The National Bureau of Economic Research (NBER) Summer Institute is arguably the most important and influential annual event for empirical economists. This grant to NBER provides partial organizational and administrative funding for the Summer Institute for the next three years.

The Summer Institute is a three-week academic festival. Over 2,400 economists participate in at least one of over 50 workshops. Directors of NBER's 20 programs organize overlapping tracks that cover labor, aging, health, and other traditional subjects. In addition, special working groups meet at the Summer Institute to exchange ideas, discuss recent scholarly work, and identify promising new topics for study. Many prominent research results are first presented at the Institute, some in preliminary form that benefit from the intense discussion both during and after a workshop. There are also popular plenary sessions, such as the annual Feldstein Lecture and the Sloan-funded Methods Lecture.

In addition to general support for the Institute, grant funds will be used to videotape sessions for wider distribution and for scholarships that underwrite the participation of emerging scholars from underrepresented groups.

NumFOCUS

AUSTIN, TEXAS

$706,608 over 36 months to improve teaching and research in quantitative economics by developing codebases and other resources that are compelling, open, and reproducible.

Project Director: John Stachurski, Professor

Funds from this grant provide three years of support for the continued development of QuantEcon.org, an online resource for code, data, tutorials, and lectures

on quantitative economic modeling. The brainchild of economists John Stachurski of Australian National University and Thomas Sargent of New York University, QuantEcon provides open source modules for economists seeking to model a variety of economic phenomena, covering topics from asset pricing to optimal savings. Grant funds will support a variety of improvements to the site, including the addition of 20 new lectures, an innovative data portal, an open notebook archive, and expanded code libraries. Additional funds will support efforts to move the site toward independent sustainability and to connect its offerings to other economic research institutions.

Funds for the development of QuantEcon have been granted to NUMFocus, a nonprofit organization that provides administrative, operational, and strategic support to scientific software projects.

University of Pennsylvania

PHILADELPHIA, PENNSYLVANIA

$264,237 over 24 months to hire, house, and manage the initial coordinator for a network of administrative data research facilitators.

Project Director: Dennis Culhane, Professor

One goal of the Foundation's grantmaking in economics is to lower barriers that impede obtaining and using naturally occurring datasets for sound and reproducible research. One strategy is to identify, strengthen, and, in some cases, create intermediaries who can manage the relationships between data generators and academic researchers. We refer to such an intermediary as an Administrative Data Research Facility (ADRF). These facilities will, in turn, work more effectively if they can be linked together into a network that facilitates the sharing of standards, best practices, and data among ADRFs. Such networks, however, require a dedicated coordinator to ensure their proper functioning. This grant to the University of Pennsylvania provides two years of (partial) salary support for a network coordinator devoted to servicing the growing needs of the ADRF community. Although this network organizer will work with various ADRFs, he or she will be initially hosted by the University of Pennsylvania's Actionable Intelligence for Social Policy (AISP) project, headed by Dennis Culhane. AISP has emerged as a leader in developing practical procedures and protocols for conducting research that uses administrative data and is thus well positioned within the community to successfully host this important position.

Stanford economist John B. Taylor at the Sloan-supported "ECB and its Watchers" conference in Frankfurt, Germany in 2017. (PHOTO COURTESY OF THE INSTITUTE FOR MONETARY AND FINANCIAL STABILITY)

Stanford University

STANFORD, CALIFORNIA

$1,807,297 over 31 months to develop services that model how access to administrative data can facilitate reliable, reproducible, and groundbreaking research in economics.

Project Director: Mark Cullen, Director PHS & Professor

Empirical economists tell tales of woe about the difficulties of accessing, processing, linking, and analyzing administrative data. Many have tried to address such impediments independently in the course of this or that research project. A piecemeal approach, however, is less effective than what might be accomplished by working together. This grant supports a project by a team of empirical economists and technologists at Stanford University to build and staff a new Stanford Data Core that will reduce social scientists' struggles, and enhance their triumphs, with administrative data. Led by principal investigator Mark Cullen, the team has already gained access to over 230 administrative datasets, more than 100 server racks, and petabytes of data storage. The team will begin by harmonizing, documenting, cleaning, and adding to these datasets and then moving computations on them to the cloud in collaboration with Google. After the data have been pulled together, the team will test this new computational environment through the launch of four pilot research projects covering topics in economics from economic opportunity to contract labor markets. Though interesting in themselves, the projects will primarily serve as useful test cases to measure the functioning of the new computational environment. Finally, the project team is particularly keen on finding, sharing, and standardizing solutions to the legal challenges that encumber research on administrative

data. Working with university lawyers at Stanford, the team will model what routine nondisclosure and data use agreements can and should look like. They will then promote this resource and these contracts to the wider scientific community.

Stanford University

STANFORD, CALIFORNIA

$591,295 over 37 months to make research on macro-financial modeling more reproducible, collaborative, and comparative.

Project Director: John B. Taylor, George P. Shultz Senior Fellow in Economics

Better management of the economy requires better macroeconomic models that can be used to predict the consequences of this or that economic policy choice, proposal, or regime. Better economic models, in turn, require the ability to compare, contrast, and evaluate the predictions of various models across a variety of scenarios. How do professional economists, financial regulators, and central bankers compare one macroeconomic model to another? As it turns out, they don't. Not only are there no widely accepted ways to compare models, there is little agreement about what criteria make one model better than another.

Enter economist Volker Wieland, who is approaching this problem head-on. Collaborating with a wide network of economists in Europe and the U.S., Wieland has developed what he calls the Macro Model Database (MMD), a software platform that can upload, store, and run different macroeconomic models, allowing researchers to confront models with the same historical or synthetic scenarios and compare the predictions subsequently produced. Funds from this grant support a project to make the Macro Model Database fully open source, documenting and disseminating the underlying code to any expert interested in using it. By making it easier for researchers to upload and explore models, Wieland and his team (including Stanford economist John Taylor) plan to double the number of models available on its platform. Additional grant funds support the establishment of a research network based at the Center for Economic Policy Research (CEPR) in London to further promote the MMD's use within the research community.

Sloan grantee Alanna McCargo of the Urban Institute moderates a convening of the Institute's mortgage servicing collaborative in May, 2017. The collaborative studies the economics and regulation of mortgage markets. (PHOTO BY LYDIA THOMPSON, VISUAL COMMUNICATIONS SPECIALIST, URBAN INSTITUTE)

The Urban Institute

WASHINGTON, DISTRICT OF COLUMBIA

$263,000 over 12 months to develop, document, and make freely available both linked mortgage datasets, as well as new tools for analyzing large collections of administrative data.

Project Director: Alanna McCargo, Co-Center Director

This grant funds a project led by Alanna McCargo and Laurie Goodman at the Urban Institute's Housing Finance Policy Center, to create a relational research database that links mortgage data made available through the Home Mortgage Disclosure Act with geographic and other data from the Census Bureau's American Community Survey (ACS). The resulting dataset promises to provide economists and other researchers with a powerful new resource for investigating questions related to loan markets, geographic variations in housing prices, and consumer demand for credit. The Urban Institute team will design and implement a distributed, cloud-based architecture to house the database, and provide online computational access to the data through the Institute's Spark Social Science computational platform. The team will also create and disseminate public guidelines and best practices for solving common problems with distributed, cloud-based data storage and the analysis of massive datasets.

In addition to the value of the dataset itself to researchers, the project will bolster the Urban Institute's institutional expertise in addressing legal, security, privacy, and data acquisition and management issues related to large administrative datasets.

Yale University

NEW HAVEN, CONNECTICUT

$996,922 over 36 months to conduct research and professional training on the theory and global practice of macroprudential regulation.

Project Director: Andrew Metrick, Deputy Dean & Michael H. Jordan Prof. of Finance

This grant provides support to the Yale Program on Financial Stability (YPFS), a research and professional training program that exposes financial regulators to the best current theory and global practice in macroprudential regulation. Grant funds provide three years of support for the program's summer school. Supported activities include a two-week Systemic Risk Symposium that brings regulators together with senior researchers to analyze past cases of regulatory intervention in such areas as asset crashes, liquidity crises, and the shadow banking sector; an academic conference on Fighting a Financial Crisis in which program participants serve as discussants of new, cutting-edge academic research; a Ph.D. dissertation workshop to expose students to regulatory datasets and career paths; and a Financial Crisis Forum that brings in highly regarded financial regulators like Ben Bernanke, Tim Geithner, Hank Paulson, and Stanley Fisher to discuss macroprudential regulation and the challenges and obstacles that stand in the way of effective regulatory intervention during financial crises.

Led by Professor Andrew Metrick, the Yale Program on Financial Stability is the only program of its kind. Its continued success holds the potential to build bridges between the academic and regulatory communities, spur further research, and equip the next generation of financial regulators with the tools they need to better fight future financial crises.

Grants Made Against Prior Authorizations

In June 2013 the Board of Trustees authorized the expenditure of up to $750,000 to fund joint or exploratory small grants in economics, in particular to fund grants resulting from a joint initiative with the Russell Sage Foundation to identify unique research opportunities in behavioral economics. The following grants were made against this previously authorized fund.

American Friends of the Hebrew University

NEW YORK, NEW YORK

$14,800 over 6 months to support broad participation by behavioral and experimental economists in the Economic Science Association's annual conference.

Project Director: Eyal Winter, Silverzweig Professor of Economics

Carnegie Mellon University

PITTSBURGH, PENNSYLVANIA

$20,000 over 13 months to advance research on belief-based utility in behavioral economics by holding a conference for leading economists and psychologists.

Project Director: Russell Golman, Assistant Professor

Rutgers, The State University of New Jersey

PISCATAWAY, NEW JERSEY

$111,665 over 31 months to develop conceptual and empirical frameworks that advance the study of STEM labor markets.

Project Director: Harold Salzman, Professor

In October 2015, the Trustees authorized the expenditure of up to $500,000 for grants to encourage the development and use of new data sources, particularly for research on the economics of science. The following grants were made against this previously authorized fund.

University of California, Berkeley

BERKELEY, CALIFORNIA

$95,158 over 9 months to develop, document, and freely distribute linked administrative data derived from federal tax and educational records.

Project Director: Emmanuel Saez, Professor

FPF Education and Innovation Foundation

WASHINGTON, DISTRICT OF COLUMBIA

$125,000 over 7 months to survey corporations about best practices for sharing their administrative data with academic researchers.

Project Director: Jules Polonetsky, Chief Executive Officer

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$115,000 over 14 months to enable academic research on Nielsen's commercial data about what consumers watch and buy.

Project Director: Andrew Sweeting, Associate Professor

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$68,531 over 13 months to support workshops for planning data collection and causal research about scientific fellowships and careers.

Project Director: Paula E. Stephan, Professor

University of Pennsylvania

PHILADELPHIA, PENNSYLVANIA

$15,000 over 6 months to support a conference on the use of administrative data in social science research.

Project Director: Dennis Culhane, Professor

Officer Grants

Brandeis University

WALTHAM, MASSACHUSETTS

$45,500 over 13 months to support an international conference on heterogeneous agents and agent-based modeling in macroeconomics.

Project Director: Blake D. LeBaron, Professor of International Economics

University of California, Riverside

RIVERSIDE, CALIFORNIA

$19,990 over 7 months to support a conference on causal inference methodologies both in computer science and in the social sciences.

Project Director: Kevin Esterling, Professor and Interim Dean

Cornell University

ITHACA, NEW YORK

$19,967 over 6 months to support a workshop for researchers and practitioners on how social science experiments can serve the public interest.

Project Director: Adam Levine, Assistant Professor

University of Georgia Research Foundation, Inc.

ATHENS, GEORGIA

$19,754 over 13 months to test how behavioral factors can predict insurance choices.

Project Director: Marc Ragin, Assistant Professor

Harvard University

CAMBRIDGE, MASSACHUSETTS

$19,460 over 7 months to compile, edit, and workshop the first Handbook in Behavioral Economics.

Project Director: David Laibson, Robert I. Goldman Professor

Mathematical Sciences Research Institute

BERKELEY, CALIFORNIA

$124,982 over 25 months to inform graduate students about mathematical theories, applications, and opportunities associated with high dimensional data analysis by holding a two-week summer workshop.

Project Director: Helene Barcelo, Deputy Director

University College London

LONDON, LONDON, CITY OF

$20,000 over 13 months to support Microeconomic Insights, an online source for accessible summaries of high quality microeconomic research.

Project Director: Richard Blundell, David Ricardo Professor

American Educational Research Association

WASHINGTON, DISTRICT OF COLUMBIA

$5,000 over 12 months to support the American Educational Research Association's Brown Lecture.

Project Director: Felice Levine, Executive Director

Third Way Foundation

WASHINGTON, DISTRICT OF COLUMBIA

$93,500 over 13 months to develop, test, and calibrate models of how administrative data from online platforms relate to official employment statistics.

Project Director: Michael Mandel, Chief Economic Strategist

Working Longer

PROGRAM DIRECTOR: KATHLEEN E. CHRISTENSEN

The goal of the Working Longer program is to expand and deepen scholarly, policy, and public understanding of older Americans' labor market activities and to identify ways in which institutional adjustments may facilitate employment of those who need or want to work beyond conventional retirement ages. Launched in 2010, our Working Longer program is examining one of today's most pressing social issues: older workers who need or want to work beyond conventional retirement ages. According to the U.S. Bureau of Labor Statistics, by 2020, one of four people working will be 55 years old or older. Research in this multidisciplinary program is creating a body of knowledge about how the labor market functions for older workers, the companies that employ them, as well as what can be done to support and strengthen this shift in how Americans work. Adjusting U.S. labor market institutions for the new demographic realities is a tier-one challenge for the 21st century.

An older worker at Metro Optics, a vision care and eye wear company, in the Bronx, which was one of the winners of the Age Smart Employer Awards, run by the Columbia Aging Center and funded by the Alfred P. Sloan Foundation. (PHOTO COURTESY OF COLUMBIA AGING CENTER. PHOTOGRAPHY BY FLOOR FLURIJ.)

Grants in this program aim to

- Fund original, high quality scientific research that examines both the supply and demand side of older worker labor markets;
- Evaluate policy options to remove barriers to working longer;
- Identify critical labor market institutions' activities that reflect a deeper understanding of the consequences of an aging workforce;
- Create new federal and administrative data sources that bear on answering questions about older workers;
- Foster a robust, thriving multi-disciplinary community of scholars investigating issues at the intersection of aging and work;
- Promote in-depth, insightful coverage in top media outlets of issues related to the delayed retirement, economic security, and working longer.

Trustee Grants

The Brookings Institution

WASHINGTON, DISTRICT OF COLUMBIA

$400,000 over 20 months to measure how employers' benefit costs change with age of employees.

Project Director: Gary Burtless, Senior Fellow

Funds from this grant support work by Gary Burtless to measure how employers' benefit costs vary with age of employees. Burtless will use data from nationally representative microcensus files to obtain reliable estimates of the costs facing employers who hire or retain older workers rather than equally qualified younger workers who are paid the same wage. Cost differences to be examined include health insurance coverage for workers at different ages; compensation for scheduled and unscheduled leave, in particular for sickness; costs associated with the possibility that an older worker's career will end sooner than that of an equally qualified younger worker; and retirement benefit costs, particularly under defined-benefit plans. Once calculated, these costs will be evaluated against a series of alternate policies that could reduce differences between older and younger workers.

Columbia University

NEW YORK, NEW YORK

$449,944 over 12 months to build on the momentum of the previous Age Smart Employer Awards to raise awareness of employers about the value of an age-diverse workforce and effective strategies to recruit, engage, and retain older workers.

Project Director: Ruth Finkelstein, Associate Director

This grant supports a third year of the Age Smart Employer Awards, an annual awards program that honors innovative New York City employers who have adopted effective strategies to recruit, engage, and retain older workers.

Emerging research shows that older workers offer distinct advantages to employers. As a group, they are viewed by managers and human resource professionals as motivated, reliable, loyal, and superior in interpersonal communication skills compared to younger workers. Additional research suggests that workforces that are heterogeneous in terms of age are more creative than homogeneous ones. Additionally, because older workers mirror aging consumers, they relate to customers in a growing "silver economy." Yet, these advantages are often discounted or offset by employers' concerns about the costs of employing older workers. The Age Smart Employer

Awards aim to combat these concerns by honoring those employers who are successfully facilitating age-diverse workforces.

Grant funds will support the administration of a third year of the awards; outreach and publicity efforts; the development of a new tool to help employers understand, identify, and articulate Age Smart practices and policies; expansion of the awards to three new localities; and efforts to expand the Awards' institutional partners.

Michigan State University

EAST LANSING, MICHIGAN

$487,203 over 24 months to advance our understanding of how establishments respond to changes in pensionable ages implemented through public pension reform and phased over a 13-year period.

Project Director: Peter Berg, Professor

This grant supports the research of Peter Berg at Michigan State University, who is examining how changes in pensionable ages implemented through public pension reform in Germany affected the managerial strategies businesses adopted in response to longer work lives. The work is the first microeconomic examination of the effects of increases in social security age on establishments' internal labor markets.

Berg and his team will use linked employer-employee data (LIAB) provided by the Research Data Center (FDZ) at the Institute for Employment Research (IAB) in Germany. This LIAB will then be combined with administrative establishment data from the Establishment History Panel (BHP) to construct the projected policy impact variable. These unique data will allow Berg to examine of how changes in pensionable age differentially affect business establishments; how they affect hiring, promotion, and compensation decisions; and whether they are linked to store or factory closure. The team will also catalogue and assess the diversity of establishment responses to increases in the pensionable age.

North Carolina State University

RALEIGH, NORTH CAROLINA

$539,767 over 36 months to provide a comprehensive analysis of public employees' transition between career employment and full retirement.

Project Director: Robert L. Clark, Zelnak Professor

Though public sector workers make up 15 percent of the U.S. workforce, little is known about how public sector workers make retirement-related choices and transition from full-time employment to full retirement. Funds from this grant support research by North Carolina State University (NCSU) economist Robert Clark to address this knowledge gap.

Using original panel survey data and extensive administrative data from the North Carolina Retirement System, Clark and his research team will examine several important issues, including how older public workers in North Carolina plan for work-to-retirement transitions; how they execute plans to leave career jobs; how they move into new types of employment; and how they ensure income security in complete retirement. In addition to producing research addressing these issues, the grant will also result in a longitudinal panel dataset that, upon application, will be available to scholars interested in the public sector workforce.

RAND Corporation

SANTA MONICA, CALIFORNIA

$399,958 over 24 months to find out how labor force participation at older ages has increased even as some determinants of participation have worsened, and whether the trend towards working at older ages is likely to continue in the future, especially in view of adverse trends in health.

Project Director: Susann Rohwedder, Senior Economist

The ability to accurately predict the U.S. labor force participation rate among older workers is important, not least because it bears significantly on the finances of the Social Security system. Traditional methods for predicting this crucial statistic involve extrapolating from past trends. Past trends, however, may not continue. Over the past 25 years, for instance, the labor force participation rate of the population aged 60 to 69 has been increasing, in part because Americans in their 60s were getting progressively healthier. But recent studies suggest this is no longer the case. What effects, if any, will the halting of this trend toward better health in older Americans have on labor force participation rates?

This grant funds the work of researchers Susann Rohwedder and Michael Hurd, who are examining this issue. Using twelve waves of data from the Health and Retirement Study (HRS), Rohwedder and Hurd will study how labor force participation at older ages has increased even as some determinants of participation have worsened and examine whether the trend toward working at older ages is likely to

An older worker at the Brooks Brothers factory in Long Island City, New York. The factory produces all of the company's neck ties and more than 40% of its workers are over 50. (PHOTO COURTESY OF COLUMBIA AGING CENTER. PHOTOGRAPHY BY FLOOR FLURIJ.)

continue, especially in view of adverse trends in health. One particular focus of their work will be the relationship between labor force participation rates and individuals' forecasts about how long they will continue to work as they age, examining how predictive these forecasts have been in the past and how their predictive power varies along multiple dimensions. Once this relationship is better understood, the hope is to use this knowledge to inform forecasts of labor force participation rates going forward.

The Urban Institute

WASHINGTON, DISTRICT OF COLUMBIA

$204,951 over 9 months to identify policy reforms that could reduce work disincentives at older ages and more equitably and efficiently provide retirement benefits to older adults.

Project Director: Richard W. Johnson, Senior Fellow

This grant supports the planning of a project led by Richard Johnson and Eugene Steuerle of the Urban Institute to identify, simulate, and evaluate policy reforms that, taken alone, as well as simultaneously, would reduce work disincentives at older ages and more equitably and efficiently provide retirement benefits to older adults. In so doing, this larger project would provide important new information about the likely costs and benefits of reforming Social Security, Medicare, employer-sponsored retirement plans, and tax incentives for retirement saving.

The larger project will use DYNASIM, the Urban Institute's dynamic microsimulation model, to simulate the likely impact of potential retirement program reforms across a vast array of dimensions, including effects on employment at older ages; on older adults' household wealth; on annual income; on lifetime Social Security benefits; on income tax payments; and on out-of-pocket spending on medical care. The team will also model the effects of hypothetical reforms on government revenues and outlays. The planning activities funded by this grant will lay the groundwork for the larger project by implementing necessary enhancements to DYNASIM, specifying criteria for evaluating policy reforms, and making the case for the need to reform retirement programs to eliminate work disincentives.

Grants Made Against Prior Authorizations

In December 2015, the Trustees approved the expenditure of up to $350,000 for projects to deepen our understanding of the demand and supply side of the older worker labor market. The following grant was made against this previously authorized fund.

Stanford University

STANFORD, CALIFORNIA

$80,668 over 9 months to convene a conference of academic researchers and human resource practitioners to discuss practical ideas to apply emerging academic research to managing an aging workforce.

Project Director: John B. Shoven, Charles Schwab Professor of Economics

Officer Grants

The University of Chicago

CHICAGO, ILLINOIS

$125,000 over 24 months to investigate the impact of the Social Security Retirement Earnings Test, which creates substantial disincentives for work, on the elderly employment rate.

Project Director: Damon Jones, Assistant Professor

Manhattan Action Fund

NEW YORK, NEW YORK

$20,000 over 3 months to support Up with Aging, a healthy brain aging fair designed to invigorate the lives of older adults and alter the negative attitudes toward aging that are common among older adults.

Project Director: Adele Bartlett, Fund Chair

RAND Corporation

SANTA MONICA, CALIFORNIA

$125,000 over 12 months to analyze how technological change affected the retirement behavior of older workers in the last three decades with a case study of computerization, arguably the most important technological change of our era.

Project Director: Peter Hudomiet, Economist Associate

Stanford University

STANFORD, CALIFORNIA

$14,500 over 3 months to include the current and former NBER pre- and post-doc Aging Fellows in the group of participants at the October 6th and 7th, 2016 Working Longer Conference held at SIEPR.

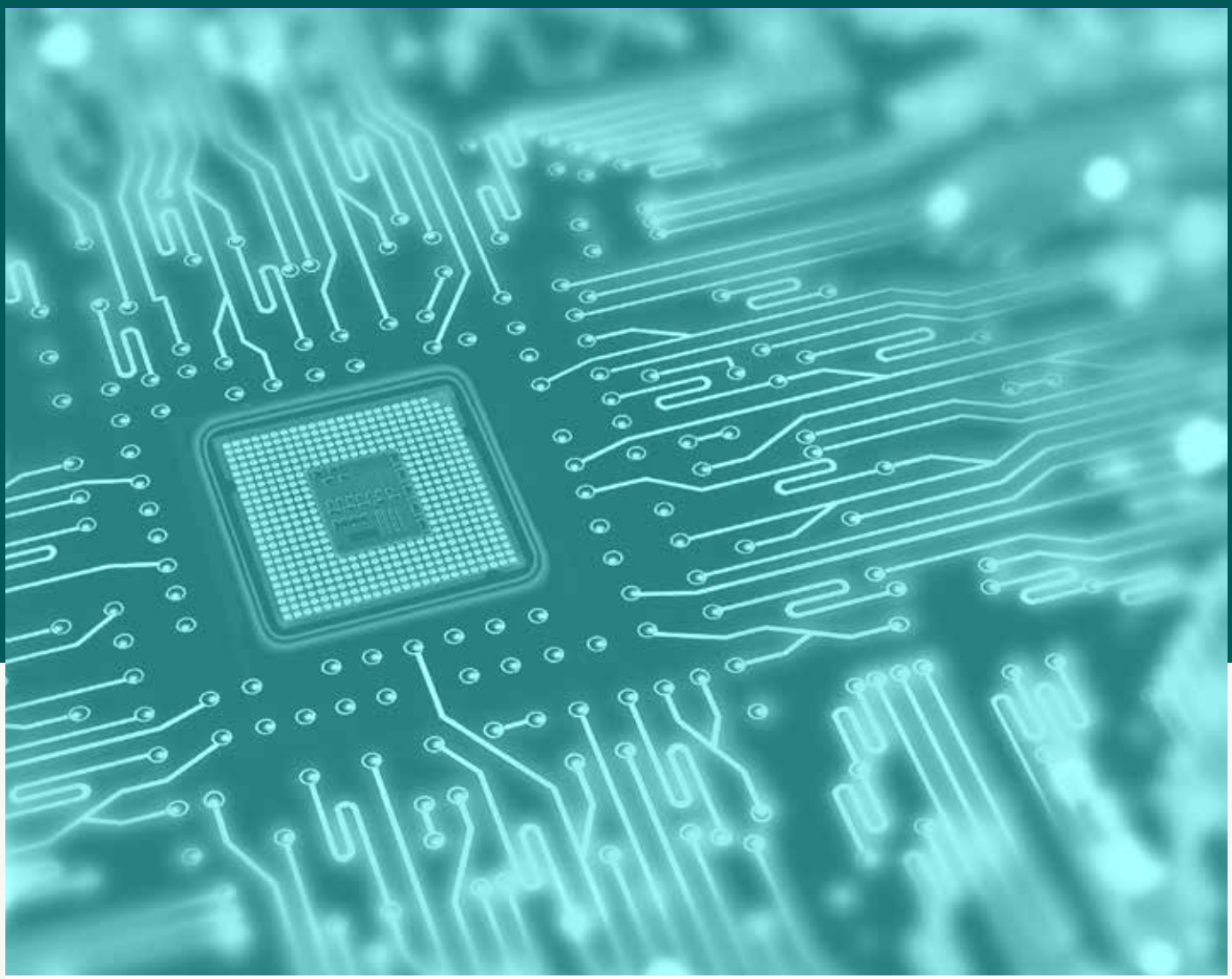
Project Director: John B. Shoven, Charles Schwab Professor of Economics

ProPublica

NEW YORK, NEW YORK

$125,000 over 12 months to research and publish data-driven systems investigations of the major trends, structures and programs shaping the lives of Americans age 60 forward with an eye to uncovering where these arrangements might limit opportunities or fail to adequately serve both 60-plus individuals and the broader society.

Project Director: Peter Gosselin, Contributing Reporter



Digital Information Technology

Data and Computational Research

PROGRAM DIRECTOR: JOSHUA M. GREENBERG

The goal of this program is to accelerate scientific discovery by helping researchers fully exploit the opportunities created by recent advances in our ability to collect, transmit, analyze, store, and manipulate data. Grantmaking aims to support the efficient management and sharing of research data and code at every point in the scientific pipeline—from acquisition through analysis to archiving—and to grow the current and future scientific data workforce.

Grants in this program fall into four broad categories:

- **Software grants** support technology development projects ranging from building of prototypes, to iterative redevelopment, to providing resources for scaling;
- **Training grants** support workforce training and curricular initiatives as well as targeted efforts to speed adoption of new technologies by research communities;
- **Research grants** bring historical, ethnographic, and economic research methods to bear on our understanding of how scholars use technology and how technology is changing scholarship;
- **Community grants** build networks for knowledge exchange across research disciplines and help strengthen institutions that incubate sustainable research and software projects while producing the next generation of data scientists.

Trustee Grants

Abt Associates

CAMBRIDGE, MASSACHUSETTS

$958,389 over 24 months to complete an evaluation of the Moore-Sloan Data Science Environments.

Project Director: Luba Katz, Senior Associate

In 2013, the Foundation partnered with the Gordon and Betty Moore Foundation to launch a five-year, $37.8 million initiative that aspired to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths. The initiative led to the funding of three university partnerships, one with New York University, one with the University of California, Berkeley, and one with the University of Washington, to create Data Science Environments (DSEs) that would innovate new models for advancing data science at American universities. The centers would focus on three core goals: crafting meaningful interactions between data scientists and disciplinary scientists, experimenting with long-term, sustainable career paths for data scientists in the university system, and developing new analytical tools and research practices that will empower scholars to work effectively with data.

Funds from this grant support a team at Abt Associates to document and evaluate the individual and joint progress of the three Moore-Sloan Data Science Environments. Combining qualitative and quantitative data collection and analysis, the Abt team will document DSE goals and activities, provide annual reports to each DSE on its progress, and produce three major reports: a landscape survey of data science efforts in top U.S. research universities broadly (to contextualize the DSE activities); an implementation study of the actual execution of the DSE activities at the three universities; and an impact study that aims to understand the consequences of the unique DSE interventions on individual career paths and research outcomes as well as on institutional structures.

University of California, Berkeley

BERKELEY, CALIFORNIA

$1,100,000 over 24 months to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths.

Project Director: Saul Perlmutter, Director

In 2013, the Foundation partnered with the Gordon and Betty Moore Foundation to launch a five-year, $37.8 million initiative that aspired to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths. The initiative led to the funding of three university partnerships, one with New York University, one with the University of California, Berkeley, and one with the University of Washington, to create Data Science Environments (DSEs) that would innovate new models for advancing data science at American universities. The centers would focus on three core goals: crafting meaningful interactions between data scientists and disciplinary scientists, experimenting with long-term, sustainable career paths for data scientists in the university system, and developing new analytical tools and research practices that will empower scholars to work effectively with data.

Initial funding in 2013 was for three years. This grant provides the anticipated final two years of funding.

Mozilla Foundation

MOUNTAIN VIEW, CALIFORNIA

$750,000 over 24 months to increase open source project and community management capacity and build community among scientific software developers.

Project Director: Stephanie Wright, Lead

As computers and computational analysis becomes an increasingly central part of scientific practice, more and more scientists are becoming better and better at writing and amending software and code. What scientists often don't know how to do, however, is to transition a piece of software from something built in their own lab to a sustainable open source, community-driven project. Open source software development, however, has proven to be one of the singularly most influential paths to widespread adoption, dissemination, and innovation in software development. In order for open source to be a viable sustainability strategy for some scientific software, there needs to be better support and training for scientists to "do open source."

This grant funds an initiative at the Mozilla Foundation to help train scientists in the launch and management of open source software development projects. Funded activities include the development of an expanded open science curriculum that details best practices for open source software development, project management, community organizing and facilitation, engaging noncoders, and data manage-

ment. Additional grant funds support a series of workshops, online chats, and conference calls on these and related topics and and a community-based mentorship program.

New York University

NEW YORK, NEW YORK

$1,100,000 over 24 months to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths.

Project Director: Juliana Freire, Executive Director

In 2013, the Foundation partnered with the Gordon and Betty Moore Foundation to launch a five-year, $37.8 million initiative that aspired to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths. The initiative led to the funding of three university partnerships, one with New York University, one with the University of California, Berkeley, and one with the University of Washington, to create Data Science Environments (DSEs) that would innovate new models for advancing data science at American universities. The centers would focus on three core goals: crafting meaningful interactions between data scientists and disciplinary scientists, experimenting with long-term, sustainable career paths for data scientists in the university system, and developing new analytical tools and research practices that will empower scholars to work effectively with data.

Initial funding in 2013 was for three years. This grant provides the anticipated final two years of funding.

NumFOCUS

AUSTIN, TEXAS

$598,000 over 24 months to build capacity for business planning and industry engagement within NumFOCUS.

Project Director: Leah Silen, Executive Director

NumFOCUS (the NumPy Foundation for Open Code for Usable Science) is a nonprofit founded to handle funds and act as a fiscal sponsor for many essential projects in the open source data science

Participants in the soldering workshop at the 2017 Gathering for Open Science Hardware (GOSH), a Sloan-supported event that brings together developers, researchers, and technologists to explore how open principles can be brought to the design, construction, licensing, and use of scientific hardware. (PHOTO COURTESY OF GOSH. PHOTO BY SHANNON DOSEMAGEN)

software stack, including several Sloan grantees. Projects choose to affiliate with NumFOCUS for mostly logistical reasons: lower overhead costs than universities; less-bureaucratic finance operations; and greater flexibility for operating across countries and organizations (e.g., hiring a research assistant at a third-party organization). The collection of so many open source projects under one umbrella, however, promises the opportunity to rapidly circulate best practices among member projects. One of the biggest issues shared across the NumFOCUS portfolio is project sustainability. Fund from this grant will help NumFOCUS build capacity in the areas of business planning and industry outreach to serve its portfolio of projects. Funding includes two years of support for a projects director, for efforts to build relationships with industry sponsors, for an annual workshop on business models and sustainability strategies for member projects, and to provide business plan and sustainability mentoring for projects that request it.

University of Washington

SEATTLE, WASHINGTON

$1,100,000 over 24 months to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths.

Project Director: Ed Lazowska, Bill and Melinda Gates Chair in Computer Science and Engineering

In 2013, the Foundation partnered with the Gordon and Betty Moore Foundation to launch a five-year, $37.8 million initiative that aspired to advance data-intensive scientific discovery, empowering researchers to be vastly more effective by utilizing new methods, new tools, new partnerships, and new career paths. The initiative led to the funding of three university partnerships, one with New York University, one with the University of California, Berkeley, and one with the University of Washington, to create Data Science Environments (DSEs) that would innovate new models for advancing data science at American universities. The centers would focus on three core goals: crafting meaningful interactions between data scientists and disciplinary scientists, experimenting with long-term, sustainable career paths for data scientists in the university system, and developing new analytical tools and research practices that will empower scholars to work effectively with data.

Initial funding in 2013 was for three years. This grant provides the anticipated final two years of funding.

Woodrow Wilson International Center for Scholars

WASHINGTON, DISTRICT OF COLUMBIA

$500,000 over 24 months As a final grant to support the growth and expansion of citizen science within and outside of government.

Project Director: Anne Bowser, Senior Program Associate

Citizen science projects advance scientific inquiry by enlisting large crowds of volunteers to clean, code, and categorize large datasets in areas where humans still outperform machines. Though the usefulness of citizen science is no longer seriously in doubt, obstacles remain that prevent it from reaching its full potential. A lack of common standards for citizen science data projects makes it difficult to share or repurpose data; regulatory barriers inhibit federal agencies from using citizen science effectively; and the lack of a common repository of information on citizen science projects prevents researchers from taking advantage of what has already been learned.

This grant supports efforts by the Commons Lab at the Woodrow Wilson International Center for Scholars to ease some of these barriers. Over the next two years, a team led by Anne Bowser will join with members of the citizen science community to spearhead a grassroots effort to develop common metadata standards; create a database of citizen science projects, develop a platform and API to facilitate citizen science data-sharing, examine the ethical and regulatory barriers to using unpaid volunteers in research projects, and conduct outreach to federal agencies and policymakers about the way in which citizen science can and is being used to further the aims of federal initiatives.

Grants Made Against Prior Authorizations

In March 2016, the Trustees authorized the expenditure of up to $250,000 for small grants within Data and Computational Research. The following grants were made against this previously authorized fund.

Abt Associates

CAMBRIDGE, MASSACHUSETTS

$124,966 over 6 months to complete planning and pilot baseline data collection for an evaluation of the Moore-Sloan Data Science Environment grants.

Project Director: Joseph Taylor, Principal Associate/Scientist

University of Michigan

ANN ARBOR, MICHIGAN

$13,943 over 6 months to support a workshop of "rising star" researchers in Computer-Supported Cooperative Work.

Project Director: Stephanie Teasley, Research Professor

University of Minnesota

MINNEAPOLIS, MINNESOTA

$88,725 over 14 months to plan a consortial model for data curation resource sharing among academic libraries.

Project Director: Lisa Johnston, Research Data Management/Curation Lead

Rensselaer Polytechnic Institute

TROY, NEW YORK

$16,275 over 6 months to partially sponsor the public activities of the 2016 International Data Week.

Project Director: Mark Parsons, Associate Director

Officer Grants

University of Illinois

URBANA, ILLINOIS

$20,000 over 15 months to partially fund the 2016 Working towards Sustainable Software for Science: Practice and Experiences meeting.

Project Director: Daniel Katz, Assistant Director

Johns Hopkins University

BALTIMORE, MARYLAND

$10,000 over 6 months to partially support the 2016 IEEE eScience Conference.

Project Director: Alexander Sandor Szalay, Director

University of Missouri, Columbia

COLUMBIA, MISSOURI

$104,906 over 14 months to study health and sustainability of open online communities and develop a set of indicators thereof.

Project Director: Sean Goggins, Associate Professor

University of Texas, Austin

AUSTIN, TEXAS

$19,583 over 6 months to support a small summit of ethnographers of data and software practices.

Project Director: James Howison, Assistant Professor

University Corporation for Atmospheric Research

BOULDER, COLORADO

$20,000 over 18 months to support a workshop and related activities on the rescue of at-risk data.

Project Director: Matthew Mayernik, Project Scientist, Research Data Svcs Spec

Scholarly Communication

PROGRAM DIRECTOR: JOSHUA M. GREENBERG

The goal of this program is to empower researchers by supporting the development and adoption of new resources for managing the increasingly diverse array of digital communication channels, enabling scientists to more effectively locate relevant research, network with other researchers, and disseminate their work to the scientific community and the public. Grantmaking aims to improve the discovery and review of diverse scholarly materials and establish new forms of publication connecting data, research software, and analysis—particularly to support the reproducibility of research.

Grants in this program fall into four broad categories:

- **Software grants** support technology development projects ranging from building of prototypes, to iterative redevelopment, to providing resources for scaling;
- **Training grants** support workforce training and curricular initiatives as well as targeted efforts to speed adoption of new technologies by research communities;
- **Research grants** bring historical, ethnographic, and economic research methods to bear on our understanding of how scholars use technology and how technology is changing scholarship;
- **Community grants** build networks for knowledge exchange across research disciplines and help strengthen institutions that incubate new forms of scholarly communication.

Trustee Grants

American Astronomical Society

WASHINGTON, DISTRICT OF COLUMBIA

$448,500 over 18 months to advance the discovery, tracking, and preservation of scientific software by improving software citation practices.

Project Director: Julie Steffen, Director of Publishing

Recent technological advances have made it possible to assign Digital Object Identifiers (DOIs) to software projects, allowing authors to cite them in just the same way they have traditionally cited a journal article or study. Yet we have not seen much movement toward the actual citation of software by authors—a problem, since citation remains the primary way to acknowledge valuable work among scientists. The problem appears to be cultural, not technical, and it thus makes sense to focus on change at a disciplinary level.

Astronomy presents an ideal opportunity to model a best-practice approach to software citation in the sciences. This grant funds an effort by the American Astronomical Society (AAS) to develop and implement a new "software broker" system that would automate the creation and management of metadata about software versions, licensing, and authorship. The move would prompt software developers to fully document their code in structured ways that could easily be imported into discovery tools like the Astronomical Data Service (ADS), which tracks citations across formal and preprint articles and serves as a search interface across the astronomy literature.

Though developed within astronomy, most of the systems and workflows to be developed are generic and applicable much more broadly.

Cornell University

ITHACA, NEW YORK

$445,244 over 18 months to support the planning and technical prototyping of the next generation arXiv preprint server.

Project Director: Oya Rieger, Associate University Librarian

Created by Paul Ginsparg, arXiv is a popular preprint platform that has become an essential scholarly communication tool in much of physics, mathematics, and computer science. It is also running on 25-year-old software written in a language (Perl) for which developers are becoming hard to find, and thus maintenance is increasingly expensive. arXiv's Cornell-based leadership team is embarking on a campaign to support a soup-to-nuts rebuild of arXiv's database, submission and review workflows, and public interface. In 2016, the team conducted a user survey to identify features most in demand and hosted a technical workshop to identify the challenges of a redesign. The next step is to move from general principles to initial design and prototyping, testing various infrastructure options for the full rebuild. Funds from this grant will support this 18-month planning effort.

Hypothesis Project

SAN FRANCISCO, CALIFORNIA

$394,465 over 12 months to establish sustainable business models for the Hypothes.is web annotation platform.

Project Director: Dan Whaley, CEO

Hypothes.is is a web-based annotation platform that enables users to annotate online documents and share their annotations with others. Supported by the Sloan Foundation from conception through prototyping, the platform now has 10,000 regular users and is seeing increasing use among lawyers, journalists, and academic researchers. Interest from the academic publishing community has been particularly noteworthy, as several publishers have developed their own, expensive, internal annotation systems as part of their publication review and editing process. This grant supports efforts by Hypothes.is to move the platform away from philanthropic support and toward independent financial sustainability. Grant funds support the hiring of a head of business development, software modifications that will allow the platform to function on a software-as-a-service model; and the creation of administrative interfaces for client publishers.

Phoenix Bioinformatics

REDWOOD CITY, CALIFORNIA

$814,300 over 24 months to firmly establish a nonprofit subscription funding model as a viable option for sustaining research repositories.

Project Director: Eva Huala, Executive Director

A 2015 Sloan Foundation grant to nonprofit Phoenix Bioinformatics supported the development and initial deployment of a paywall service for scientific databases. Sloan support enabled the organization to generalize its technical infrastructure to offer database providers fine-grained metering of access (and the ability to flexibly set the boundary between

free and paid access), and develop customer-facing tools to allow institutional and national subscribers to manage and report on subscription use. Based on an assessment of its operating costs and likely growth opportunities, the organization has developed a realistic, fee-based funding model that promises to deliver long-term, independent sustainability within the next two years. Funds from this grant provide operational bridge funding to the organization while it implements this plan.

University of Texas, Austin

AUSTIN, TEXAS

$635,261 over 36 months to raise the visibility of and improve incentives for software work as a contribution in the scientific literature.

Project Director: James Howison, Assistant Professor

The writing of scientific software is an increasingly important part of modern scientific practice. Properly rewarding such activity requires the wide adoption of new citation practices where authors formally recognize the software they use in their work. Yet a change in citation practices would leave untouched the scientific literature produced to date, which is filled with explicit or implicit mentions of software in the body, footnotes, figures, or acknowledgments sections of articles. Funds from this grant support a project by James Howison of the University of Texas, Austin, School of Information, to develop means to identify software citations from the current corpus of scientific papers. Howison will assemble a team that includes technologists Heather Pirowar and Jason Priem, compile a gold-standard dataset of software references in the scientific literature, and then develop a machine learning system trained on that dataset to recognize software references in scientific articles. The team will then deploy, test, and refine this system in three different prototypes.

Grants Made Against Prior Authorizations

In March 2016, the Trustees authorized the expenditure of up to $250,000 to support small grants within the Scholarly Communication program. The following grants were made against this previously authorized fund.

University of California, Davis

DAVIS, CALIFORNIA

$20,000 over 14 months to support a workshop to enhance and extend the functionality of the mybinder notebook computing platform.

Project Director: Charles Titus Brown, Associate Professor

FORCE11

SAN DIEGO, CALIFORNIA

$20,000 over 6 months to partially support the 2016 Future of Research Communication and eScholarship meeting.

Project Director: Maryann Martone, President

National Science Communication Institute

SEATTLE, WASHINGTON

$20,000 over 6 months to partially support the inaugural meeting of the Open Scholarship Initiative.

Project Director: Glenn Hampson, Executive Director

Princeton University

PRINCETON, NEW JERSEY

$20,000 over 24 months to develop and test open source software to enable an open review process for academic books.

Project Director: Matthew Salganik, Professor

University of Washington

SEATTLE, WASHINGTON

$124,370 over 14 months to develop up-to-date pricing and quality metrics that enable researchers to better compare Open Access journals to other Open Access and non-Open Access journals.

Project Director: Jevin West, Assistant Professor

Wikimedia Foundation

SAN FRANCISCO, CALIFORNIA

$20,000 over 6 months to help support a meeting on the citation of academic research in Wikipedia.

Project Director: Dario Taraborelli, Director

Officer Grants

Brave New Software

LOS ANGELES, CALIFORNIA

$124,770 over 25 months to improve the discovery, assessment of value, and impact of open source software.

Project Director: Benjamin Nickolls, Head of Product, Libraries.io

University of California, San Francisco

SAN FRANCISCO, CALIFORNIA

$101,858 over 24 months to partially fund the planning and piloting of a preprint service for the life sciences.

Project Director: Ronald D. Vale, Professor, HHMI Investigator

Harvard University

CAMBRIDGE, MASSACHUSETTS

$19,840 over 12 months to support workshops on the creation of standards for entering temporal data into timeline visualization tools.

Project Director: Alyssa Goodman, Robert Wheeler Wilson Professor

University of Maryland, College Park

COLLEGE PARK, MARYLAND

$50,000 over 12 months to support development and outreach activities of the SocArXiv preprint server.

Project Director: Philip Cohen, Professor

Universal Access to Knowledge

PROGRAM DIRECTOR: DORON WEBER

The goal of the Universal Access to Knowledge program is to facilitate the openness and accessibility of all knowledge in the digital age for the widest public benefit under reasonable terms and conditions, including the digitization of scientific and cultural knowledge under best practices and standards. Current grantmaking focuses on identifying and crafting solutions to the economic, legal, and institutional barriers to universal access to knowledge and on supporting broadly collaborative efforts such as the Digital Public Library of America (DPLA), championed by the Foundation since its inception, to become the leading repository for the nation's—and ultimately the world's—scientific and cultural heritage in all its forms. The DPLA serves as a link to thousands of libraries and cultural institutions across the country, and it contains millions of digitized items.

The Foundation supports DPLA's work on the Open eBooks Initiative, launched in 2016 with First Book, the New York Public Library, and the White House to provide low-income students with popular and classic eBooks for free. In 2016, the Foundation made a grant to leverage DPLA's national network for the creation of a free eBook collection available in 50 states and a pilot eBook marketplace for thousands of libraries and schools

Since 2008, the Foundation has been the lead funder and trusted advisor to Wikipedia, which is now the largest encyclopedia in human history and the fifth largest website in the world, available in 294 languages, and a model of open, collaborative text production. Most recently, the Foundation made a grant to transform Wikipedia Commons' media files from free text into machine-readable, structured data, enabling new uses for millions of media files on Wikipedia and across the web. Wikimedia Commons is the world's largest re-

pository of freely licensed educational media, with 34 million files of photos, videos and audio, and growing by 5 million files a year.

In 2016, the Foundation made a grant to Annual Reviews, a non-profit publisher of a prestigious series of multi-author reviews in 47 discipline-specific fields in science and social science, to launch a digital magazine that unlocks scientific research to inform the public discourse in multiple subjects with compelling, timely, and impartial knowledge. The digital magazine is expected to launch in the fall of 2017.

Trustee Grants

Annual Reviews

PALO ALTO, CALIFORNIA

$800,000 over 12 months to publish a digital magazine that unlocks scientific research to inform the public discourse in multiple subjects with compelling, timely, and impartial knowledge.

Project Director: Richard Gallagher, President & Editor-in-Chief

Annual Reviews is a nonprofit publisher of a prestigious series of multi-author reviews in 46 discipline-specific fields in natural and social science. From analytic chemistry to economics to virology, these reviews are considered authoritative syntheses of scientific developments in each field as determined by 600 leading scientists and academics. Funds from this grant provide partial support for the launch of a digital magazine that would utilize its treasure trove of research to inform the public discourse. This new, web-based magazine will use essays, interviews, videos, podcasts, infographics, and animations to engage a broad audience and will feature the latest scientific research on a wide range of subjects, highlighting the real-world significance of scientific research and demonstrating how it can illuminate subjects that might otherwise appear opaque, confusing, or controversial. Beyond the research community, the magazine is aimed at non–research professionals, the media, educators and students, policy specialists, patients and patient advocates, and the general public.

The magazine would produce five to ten substantive text and multimedia items per week, plus one long video per month and weekly short videos. All items will be supported by two to three AR reviews freely available for a specified period, allowing readers a deep dive into popular social issues. In addition, all magazine content will be free to read and with appropriate attribution to republish online and in print, significantly increasing its value for research, education, and innovation and multiplying the readership, especially on social media.

Digital Public Library of America, Inc.

CAMBRIDGE, MASSACHUSETTS

$1,497,674 over 30 months to leverage DPLA's national network for the creation of a free eBook collection available in 50 states and a pilot eBook marketplace for thousands of libraries and schools.

Project Director: Daniel Cohen, Executive Director

Funds from this grant support a two-pronged initiative by the Digital Public Library of America (DPLA) to significantly expand access to eBooks for thousands of libraries and schools across the country. First, DPLA plans to improve the curation and distribution of open eBook content by creating a new DPLA eBook collection, which it will make available to 16,000 libraries across the country. Working with authors, publishers, and both corporate and nonprofit partners, the DPLA collection will include at least 3,000 popular fiction and nonfiction titles, textbooks, and educational resources, all formatted in the highly flexible EPUB format. Second, the DPLA will pilot a new spin-off entity, which will use market-based methods to increase the availability and reduce the price of eBooks from publishers and potentially generate revenue for DPLA and its library partners. Building on work done with the New York Public Library, the DPLA will explore different revenue models for a nationwide marketplace for buying eBooks, with licensing restrictions, that aims to enable low-cost bulk purchases of eBooks for statewide virtual libraries, promising to significantly expand access to eBooks to millions across the country.

Wikimedia Foundation

SAN FRANCISCO, CALIFORNIA

$3,015,000 over 36 months to transform Wikipedia Commons' media files from free text into machine-readable, structured data, enabling new uses for millions of media files on Wikipedia and across the web.

Project Director: Katherine Maher, Executive Director

Wikimedia Commons is the world's largest repository of freely licensed educational media, with 34 million photo, video, and audio files, and is growing by some five million files a year—faster than Wikipedia itself—as people submit photos and image-rich institutions their collections. Unfortunately, most of those files are not accessible either to Wikipedia text searches or to the rest of the internet because they lack good metadata. To address the lack of metadata, the Wikimedia Foundation has launched the Structured Data on Commons Project, an ambitious attempt to create infrastructure and tools that will transform all the media files on Wikimedia Commons into an accessible form—known as structured, linked data—that is machine readable and will enable easy search of the Commons by Wikipedia readers and contributors; by educational, cultural, and scientific organizations; and by anyone with access to the web.

Once cleaned and integrated, the structured data for each file can be understood by machines and linked to other content on the wider internet. The structured data can also be instantly available in any language, answering a huge need for the 289 languages that comprise Wikipedia and facilitating greater interoperability among language communities. Structured data will also allow developers both within and outside Wikipedia to create software tools to help with use and reuse of these files. It will help contributors more effectively illustrate Wikipedia content and it will enable readers to more quickly and easily find the right media and share it. It will also allow for more partnerships with content providers and provide incentives for these providers to structure their media when releasing it to the public.

Group photo from Wikipedia's annual conference, Wikimania, held in Esino Lario, Italy in 2016. (PHOTO UPLOADED TO WIKIMEDIA COMMONS BY NICCOLÒ CARANTI. CC BY-SA 4.0)

Energy & Environment

Energy & Environment

PROGRAM DIRECTOR: EVAN S. MICHELSON

This program aims to advance our understanding about the economic, environmental, security, and policy tradeoffs associated with the increased deployment of low-and no-carbon resources and technologies across the energy system.

Formally launched in early 2015, this 10-year program will make progress toward achieving this overarching goal by providing support across the following five core outcome areas:

- **Generate Novel Research and Knowledge:** The main focus of this program is to build an impartial scientific and economics knowledge base through the publication of results in peer-reviewed journals, working papers, and widely available reports as a public good.
- **Train Next Generation of Scholars and Practitioners:** An important program element is introducing new voices into the field and training the next generation of individuals capable of anticipating and addressing emerging energy challenges and opportunities.
- **Build Multidisciplinary Networks and Communities:** Grantmaking aims to build and strengthen research networks and create longstanding communities of practice that will last beyond the program's duration.
- **Educate Stakeholders and Disseminate Information for Decision-Making:** Through conferences and workshops, high quality grantees will be engaged to apply impartial research findings to inform the development of policies and practices that address the deployment of low- and no-carbon technologies and resources.

- **Attract Additional Resources:** This program aims to seed new ideas that stimulate additional support for research on these topics by government, industry, and philanthropy.

Using the energy system as a guiding framework, the Foundation will investigate previously underexplored and targeted research questions in select areas related to energy sources (supply), energy transmission and distribution, and energy use (demand), along with other cross-cutting topics and systemic opportunities. Thematic areas explored in this program include, but are not limited to: assessment of new energy technologies, electricity distribution systems, economics of energy efficiency, and transportation economics. The program seeks to connect researchers and practitioners from different disciplines and sectors across the natural and social sciences.

Due to the significant funding available from both public and private sources for energy and environmental research, the Foundation is very selective in the grants it makes in this area. Support is only provided for non-partisan, balanced, evidence-based analysis, and the Foundation does not and will not support energy policy advocacy.

Trustee Grants

The Aspen Institute

NEW YORK, NEW YORK

$500,000 over 36 months to support a dialogue process that applies research findings to inform the development of best practices for the governance of shale gas and oil.

Project Director: David Monsma, Executive Director

This grant funds the Aspen Institute to host a three-year dialogue series, The Aspen Series on Energy Governance, which will synthesize the disparate strands of research that Sloan and other funders have supported in recent years on hydraulic fracturing and shale oil and gas development. The series will consist of three annual forums and two smaller-scale dialogue series that will bring together scholars and practitioners from different fields to develop a set of guidelines and recommendations related to how to oversee shale oil and gas production at the local, state, and federal levels. Discussion papers will be prepared to inform each of the meetings in the series, and a rapporteur will produce a report to summarize the collective results. The Aspen Institute will also develop a web resource that will include materials created for each session in the series and that will serve as a one-stop-shop for all of the publicly available research that the Sloan and Mitchell Foundations have supported on shale gas and oil development. Findings from the discussion series will be presented at public panels and workshops, both in Washington, D.C. and in regions where shale gas and oil development has taken place.

Carnegie Mellon University

PITTSBURGH, PENNSYLVANIA

$387,546 over 31 months to study the current and future factors contributing to the technological viability, economic impact, and environmental consequences of fuel cell technologies.

Project Director: Jay Whitacre, Professor

Fuel cells, which use chemistry rather than combus-

Ellen Williams, Director of ARPA-E, the Advanced Research Projects Agency- Energy, delivers her keynote address at a Sloan-supported conference on energy technology research priorities hosted by Columbia University's Center on Global Energy Policy.
(PHOTO COURTESY OF THE CENTER ON GLOBAL ENERGY POLICY.)

tion to generate electricity, have a wide range of potential applications, from large arrays that can be integrated into the electricity grid to small cells that can power vehicles. Experts in the field, however, remain uncertain about a number of important issues, including how efficient fuel cells will become, how much costs will drop, and to what degree hypothesized benefits will be achieved when fuel cells leave the lab and enter the real world.

This grant supports an emerging cohort of scholars at Carnegie Mellon University's Scott Institute for Energy Innovation plan to clarify these uncertainties. A team led by Jay Whitacre will conduct an expansive literature review and background assessment, laying out the current state of development of various fuel cell technologies, their advantages, their drawbacks, and what is and is not known about each. The team will then undertake an in-depth expert elicitation process that utilizes surveys, in-person interviews, and group discussions to identify consensus and critical uncertainties associated with the different fuel cell technologies being studied. The iterative expert elicitation process will provide a method for aggregating this diverse array of expert perspectives and will result in a series of high-profile, peer-reviewed journal articles that will cover topics related both to stationary fuel cell applications and the use of fuel cells in transportation. The effort promises to clarify the current state of fuel cell research, identify gaps in our knowledge, and expose promising ways forward.

Columbia University

NEW YORK, NEW YORK

$350,226 over 24 months to improve the training of energy journalists through an introduction to high quality research in energy economics, geopolitics, and innovation.

Project Director: Jason Bordoff, Founding Director

This grant funds an annual three-day seminar, hosted by Columbia University's Center on Global and Energy Policy (CGEP), that aims to train and inform journalists tasked with covering multifaceted developments in energy economics, energy markets, energy geopolitics, and energy innovation. Using active discussion and interactive modules, the seminars will introduce participating journalists to emerging re-

search findings on a broad number of complex topics, including oil price volatility, solar energy, and shale gas development, presented by leading experts from academia, industry, and government. Approximately 15 journalists will be selected to participate each year through a competitive application process and selected participants will be asked to commit to producing a substantial number of articles that reflect the training program's focus on providing a multidisciplinary view of key energy issues.

Environmental Defense Fund Incorporated

NEW YORK, NEW YORK

$400,000 over 18 months to undertake exploratory pilot research projects examining the environmental impacts of shale oil and gas development that include the development of improved wastewater characterization techniques and biological treatment methodologies.

Project Director: Steven Hamburg, Chief Scientist

This grant supports two projects led by the Environmental Defense Fund to investigate the environmental impacts of the wastewater used in the extraction of shale gas and oil. In the first project, EDF will partner with chemist Michael Thurman from the University of Colorado, Boulder to develop standard methods for identifying the chemical characteristics of wastewater generated by hydraulic fracturing. Fracking wastewater can differ significantly from site to site due to procedural and environmental factors. Wastewater from different sites might have vastly different environmental impacts, and thus necessitate different treatment and disposal procedures. Thurman's research will allow for the characterization of wastewater samples from across different fracking sites and enable the creation of standardized reference benchmarks that researchers can use to better determine the constituents of fracking wastewater.

In the second project, EDF will work with environmental engineer Karl Linden of the University of Colorado, Boulder, and molecular biologist Kartik Chandran of Columbia University to develop better treatment and disposal techniques for wastewater produced by hydraulic fracturing. In a series of experiments, Linden and Chandran will explore how biological treatment processes could be used to metabolize the organic compounds present in such wastewater.

In addition to providing scientific and technical input to their scientific partners, EDF will help manage each collaboration, and assist in disseminating the research results.

Indiana University

BLOOMINGTON, INDIANA

$259,900 over 24 months to conduct public perception surveys and public finance research on the siting of energy infrastructure.

Project Director: David Konisky, Project Director

There are few, if any, reputable studies examining the public perception and public finance dimensions associated with the siting of energy infrastructure, which includes projects such as transmission lines, oil and natural gas pipelines, natural gas export terminals, large-scale wind and solar facilities, and other large power plants. The studies that have been conducted have tended to focus on a single energy infrastructure project instead of looking across multiple projects simultaneously and have asked about hypothetical energy infrastructure developments instead of real-world examples.

This grant funds a team led by David Konisky at Indiana University to conduct highly localized public opinion surveys related to 15 energy infrastructure projects that are currently in the planning stages across seven populous states. In addition to surveying local residents, the team will field complementary national surveys that will examine how public perceptions differ across infrastructure types. Finally, the team will develop a series of local public finance case studies laying out the likely economic impacts of a subset of these infrastructure projects, drawing on information from permit applications, siting and development plans, evidence from public hearings, and interviews with local officials and other stakeholders.

All of the survey data, codebooks, and finance analysis will be publicly released at the end of the project, with the material to be archived at Harvard's Dataverse.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$1,000,000 over 30 months to conduct an assessment of the opportunities and challenges associated with the future of next generation nuclear energy technologies.

Project Director: Jacopo Buongiorno, Associate Department Head

Though most of the 99 operating nuclear reactors in the United States are likely to be retired by 2050, only four new nuclear plants are currently under construction. Since nuclear accounts for 20 percent of all U.S. electricity generation, significant new invest-

ment in nuclear generating technology is needed if the United States and the world are to keep a key source of no-carbon power generation. Doing so will require addressing cost, safety, waste, and proliferation concerns and a keen assessment of new reactor designs, technology development needs, new business models, and regulatory barriers.

This grant provides partial support to MIT to examine the potential of alternative nuclear generation technologies from cost, safety, reliability, waste, and proliferation perspectives. The study will also examine the associated research and development needs, regulatory reforms, and industrial support infrastructure needed to commercialize these new technologies. A faculty committee of top researchers from multiple disciplines has been assembled for the study, including Jacopo Buongiorno, Dennis Whyte, and Richard Lester of MIT and Michael Corradini of the University of Wisconsin, Madison. David Petti, of Idaho National Laboratory, will oversee the operational and management dimensions of the study as its executive director. An expert advisory board comprised of senior scholars and practitioners in the field will provide regular oversight of the overall project. The study is a crucial and necessary step in evaluating what role nuclear should play in the future of U.S. electricity generation.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$249,550 over 24 months to conduct a randomized controlled trial to study how people respond to and value information about their driving habits.

Project Director: Christopher Knittel, Professor of Energy Economics

This grant supports energy economist Christopher Knittel in his plans to implement a randomized controlled trial to study how individuals respond to information about their driving habits and how the provision of such information affects energy use and automobile fuel economy. In partnership with a company named Automatic, which manufactures and installs driving activity monitoring devices and provides that information to drivers, Knittel will examine how individual driving behavior is influenced by different kinds of information, packaged in a variety of ways.

Automatic's devices can detect and alert drivers during hard accelerations, hard braking, and speeds over 70 miles per hour. Knittel will study how different ways of presenting these data differentially affect driving behavior. Treatment groups will receive weekly aggregated summaries and comparisons of their driving habits to other drivers. In addition, Knittel will study how sustained exposure to these alerts (at either three or six months) changes driving habits. Though Automatic's sensors will be installed free of charge to participants, individuals will be given the opportunity to purchase the devices, at different prices, at the study's conclusion, allowing Knittel to estimate participants' willingness to pay for this information.

The transportation sector is the second largest energy consumer in the United States and accounts for over a quarter of all U.S. greenhouse gas emissions. This innovative RCT will help us understand better what interventions might lead consumers to change their driving habits in ways that reduce those emissions.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$234,100 over 24 months to advance knowledge about the economic efficiency and distributional equity tradeoffs associated with energy policy interventions in the United States.

Project Director: Don Fullerton, Gutgsell Professor of Finance

This grant supports a series of research projects coordinated by researchers at the National Bureau of Economic Research examining the distributional and efficiency tradeoffs and implications of U.S. energy policy. Sixteen researchers will carry out eight different studies that will look at a variety of interrelated issues, including whether the energy reductions achieved by current policies could be obtained at lower cost, how the costs of current energy policies are distributed across and within different income groups, and whether and to what extent these burdens could be upset by additional tax and transfer policies. Policies to be examined include vehicle and appliance efficiency standards, renewal energy subsidies, electric and hybrid automobile purchasing subsidies, and green building codes. The resulting research papers will be published in a special peer-reviewed issue of the Journal of the Association of Environmental and Resource Economists.

Though the papers concern U.S. energy policies and will have obvious relevance to environmentalists and policymakers, the focus of each will be strictly empirical. No policy recommendations will be made.

Pecan Street, Inc.

AUSTIN, TEXAS

$450,000 over 24 months to improve its Dataport software and data visualization, expand available energy data content, and increase academic researcher use of the database.

Project Director: Brewster McCracken, President & CEO

High-quality, easily searchable data on the transmission, distribution, and use of electricity are hard to come by. Existing data sources usually fall short in a number of ways. Many data sets report electricity usage statistics only at monthly or yearly intervals, making it impossible to measure how demand varies from day-to-day, hour-to-hour, or minute-to-minute. Usage data are often aggregated at the household level, not broken down by individual appliance, making it difficult to study consumer behavior. Often, data are only available in hard-to-use formats that are not amendable to manipulation, combination, or visualization.

Pecan Street has created a data analytics tool, called Dataport, to provide timely, disaggregated electricity usage information to researchers. Data are collected from more than 1,000 homes outfitted with appliance-level sensors that report energy usage at fine-grained intervals. These data are also presented in a way that can be easily queried and visualized. Funds from this grant support three initiatives aimed at strengthening Dataport and increasing its usefulness to researchers. First, the Dataport team will implement several technical improvements to the platform, including better visualization tools, an improved user interface, and a new capacity that allows researchers to draw information from multiple data sources simultaneously. Second, Pecan Street will expand and diversify available data through importing and integrating electricity usage and pricing data from several government, utility, and regional transmission sources. Third, Pecan Street will extend its academic outreach and education activities to expand use of the platform, including on-campus training sessions, a research conference, and a paper competition for papers using Dataport data.

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$450,000 over 36 months to conduct research on the economics of transportation by studying consumer demand for new vehicle technologies and alternative fuel vehicles.

Project Director: Joshua Linn, Senior Fellow

Richard Newell, President and CEO of Resources for the Future, presents research findings on how shale oil and gas development impacts local governments and communities. (PHOTO COURTESY OF RESOURCES FOR THE FUTURE)

Transportation accounts for a large fraction of both U.S. petroleum consumption and greenhouse gas emissions, and continues to be an important contributor to local concentrations of nitrogen oxide and ozone. This grant funds a project by Resources for the Future (RFF) that will examine and assess consumer demand for low-carbon vehicles, be they electric cars or nonelectric cars with high fuel economy ratings. Partnering with Maritz CX Research, a private market research firm with detailed information on individual consumer purchasing decisions of new vehicles and their attributes, the RFF team will analyze more than five years of records related to how consumers make decisions about vehicle purchases, totaling nearly one million observations of car purchasing decisions. While this remains a small fraction of total domestic car purchases over that time period, the data set is larger and of higher quality than any publicly available data source that has been explored in the transportation economics literature to date. RFF will examine this rich data set by exploring how consumers value low-carbon vehicle attributes, consumer demand for innovations in the electric vehicle market, and the interactions between fuel prices and greenhouse gas mitigation standards that have been set for the transportation sector.

Stanford University

STANFORD, CALIFORNIA

$600,000 over 38 months to develop and apply a framework that classifies, assesses, and compares the explicit and implicit subsidies provided for different energy sources.

Project Director: Frank Wolak, Professor

Federal and state governments provide a wide array of direct and indirect subsidies to many energy supply technologies. Since these subsidies affect the economic competitiveness of different energy sources, it is important to develop objective and accurate estimates of their magnitude. Funds from this grant support work by Frank Wolak, a senior energy economist at Stanford, to develop a standardized schema for the categorization of different forms of government subsidy. Wolak will then collaborate with other leading energy economists to apply this framework and undertake a series of technology-specific analyses that will quantify the extent of subsidies provided to various energy sources, such as coal, natural gas, oil, wind, solar, and nuclear. All participating researchers will then convene at a workshop to review and compare each of these analyses and suggest areas of improvement. Finally, Wolak will develop a general equilibrium model that extends the results of these source-specific subsidy analyses and accounts for interactions between subsidies for different energy sources. He will consider, for example, how changes in the subsidies provided for wind power impact subsidies provided for other energy sources, such as oil or gas. This general equilibrium methodology will be the subject of a second review workshop, and the whole project will culminate in a series of final conferences that will lay out the ultimate findings for researchers and policymakers.

University of Texas, Austin

AUSTIN, TEXAS

$300,000 over 24 months to curate, merge, anonymize, and examine residential smart meter data in the competitive electricity market areas of Texas.

Project Director: Michael E. Webber, Deputy Director, Energy Institute

The answers to a host of pressing questions in energy policy, such as how best to help consumers use electricity more efficiently or where to site new electricity distribution infrastructure, depend crucially on a nuanced understanding of how consumers use electricity and how that demand differs from household to household. New opportunities to study differences in household electricity consumption have arisen in recent years thanks to the increasingly widespread installation of smart electricity meters that track household energy use at finely grained intervals, in some cases measuring energy consumption as frequently as every 15 minutes.

Partnering with the Electric Reliability Council of Texas (ERCOT), Michael Webber, deputy director of the Energy Institute at the University of Texas, Austin, plans to explore household electricity usage patterns by integrating ERCOT's 15-minute residential smart meter data with other relevant data sets, such as local tax records, demographic statistics, meteorological data, and locational marginal pricing information. Webber has identified a set of initial hypotheses to be tested through an examination of the integrated data set, including how energy use varies with income, time of day across different locations in Texas, and the introduction of demand response programs. Funds from this grant will help Webber and his team take in the over 45 terabytes of ERCOT smart meter data, suitably anonymize the data set, merge it with additional information sources, and disseminate it for use by other researchers.

Grants Made Against Prior Authorizations

In March 2015, the Trustees authorized the expenditure of up to $300,000 to provide small grants for workshops and conferences that advance the development of energy and environment research, focus on trade-offs, and involve advanced students and early-career scholars. The following grants were made against this previously authorized fund.

Center for Strategic and International Studies

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 12 months to support the Energy Futures Forum in identifying and elaborating on medium-term issues in the energy sector.

Project Director: Sarah Ladislaw, Director & Senior Fellow

The University of Chicago

CHICAGO, ILLINOIS

$55,000 over 5 months to convene academic economists and power system engineers from distribution utilities to identify critical research questions and opportunities for collaboration.

Project Director: Steven Cicala, Assistant Professor

Stanford University

STANFORD, CALIFORNIA

$20,000 over 7 months to support participation of students and post-doctoral researchers at the 2016 Behavior, Energy and Climate Change Conference and to organize a strategic planning workshop at the conference to determine potential future pathways.

Project Director: James L. Sweeney, Director & Professor

Environmental Law Institute

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 10 months to organize a workshop that will help increase understanding of the energy and environmental implications of the sharing and digital economy.

Project Director: David Rejeski, Director, Foresight and Governance Project

In March 2016, the Trustees authorized the expenditure of up to $1,100,000 to support four research projects on the economics of energy efficiency. The following grants were made against this previously authorized fund.

University of California, Berkeley

BERKELEY, CALIFORNIA

$99,922 over 29 months to advance research on the economics of energy efficiency by managing a Request for Proposals solicitation, auditing the implementation of energy efficiency programs, and facilitating connections between researchers.

Project Director: Catherine Wolfram, Professor

University of California, Davis

DAVIS, CALIFORNIA

$91,063 over 36 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, focused on understanding how the targeting and timing of energy efficiency information provision impacts program participation.

Project Director: Kevin Novan, Assistant Professor

University of Illinois, Urbana-Champaign

CHAMPAIGN, ILLINOIS

$349,700 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, focused on evaluating the projected and realized savings from the Weatherization Assistance Program.

Project Director: Erica Myers, Assistant Professor

Wake Forest University

WINSTON-SALEM, NORTH CAROLINA

$249,933 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, focused on determining how management practices in the industrial sector impact energy efficiency.

Project Director: Mark Curtis, Assistant Professor

Western Washington University

BELLINGHAM, WASHINGTON

$309,304 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, focused on quantifying the impact of energy efficiency on housing values.

Project Director: Sharon Shewmake, Assistant Professor

Officer Grants

University of California, Berkeley

BERKELEY, CALIFORNIA

$50,000 over 20 months to support two sessions of the Energy Institute at Haas' Energy Camp in order to bring together top energy economists to discuss and explore new research ideas on energy markets.

Project Director: Lucas Davis, Associate Professor

Carnegie Mellon University

PITTSBURGH, PENNSYLVANIA

$124,916 over 20 months to assess the contribution of light water small modular nuclear reactors to reduce carbon emissions from the United States energy system by 2050.

Project Director: Granger Morgan, Professor

Columbia University

NEW YORK, NEW YORK

$50,000 over 12 months to provide continuing support for the Center on Global Energy Policy's external speaker series and roundtable discussions to inform dialogue about critical energy issues.

Project Director: Jason Bordoff, Founding Director

Harvard University

CAMBRIDGE, MASSACHUSETTS

$90,070 over 6 months to conduct research and organize a conference examining the risks and benefits of solar geoengineering research.

Project Director: Gernot Wagner, Research Associate and Lecturer

University of Massachusetts, Amherst

AMHERST, MASSACHUSETTS

$19,971 over 12 months to identify whether and how different survey methodologies affect the results of expert elicitations focused on energy technologies.

Project Director: Erin Baker, Professor

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$40,000 over 14 months to disseminate the results of a study assessing approaches to update the estimate of the social cost of carbon.

Project Director: Jennifer Heimberg, Senior Staff Officer

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$124,188 over 8 months to research and estimate the macroeconomic and wealth transfer effects of unanticipated oil supply disruptions.

Project Director: Richard Morgenstern, Senior Fellow

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$100,000 over 36 months to support dissemination of RFF research to policymakers and the public through the Sharp Policy Engagement Fund.

Project Director: Richard Newell, President

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$59,983 over 12 months to assess changes in local public finance issues in key shale gas and oil producing regions.

Project Director: Richard Newell, President

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$10,000 over 12 months to support the 2017 Molly K. Macauley Award for Research Innovation and Advanced Analytics for Policy.

Project Director: Margaret Walls, Research Director & Senior Fellow

Initiatives

New York City Initiatives

PROGRAM DIRECTOR: PAULA J. OLSIEWSKI

Since its founding in 1934, the Alfred P. Sloan Foundation has been proud to call New York City home. With its Civic Initiatives Program, the Foundation responds to unique opportunities to benefit the New York City metro area with an eye toward advancing the Foundation's other interests in science, technology, and economic performance.

Major projects supported through this program include:

- **Sloan Public Service Awards:** Annual awards that honor the lifetime contributions of six NYC civil servants.
- **Sloan Awards for Excellence in Teaching Science and Mathematics:** Annual awards that recognize extraordinary science and math teachers in NYC public schools.
- **InsideSchools.org:** Not-for-profit website that provides independent information on each of NYC's 1,800 public schools.
- **The DNA Learning Lab:** A new, Manhattan branch of Cold Spring Harbor Laboratory's DNA Learning Center, which will bring innovative, high-quality, genomics education to NYC students.
- **New York Genome Center:** A new, state-of-the-art genomic research and sequencing facility in Manhattan that provides services to a consortium of a dozen prominent NYC research organizations.
- **BioBus:** Educational organization that uses a bus retrofitted into a mobile biology lab to bring fun, hands-on biology education to New York City students.

In recent years, grantmaking in this program has focused on revitalizing the NYC science, technology, and engineering sector.

Though the Civic Initiatives program is the only Sloan grant program specifically designed to benefit New York, it is not the only way the Foundation contributes to the state. Many of the grants in our other programs go to New York institutions. Approximately one out of every four Foundation grant dollars goes to an institution based in New York.

Trustee Grants

Council for Economic Education

NEW YORK, NEW YORK

$290,000 over 26 months to promote economics education in metropolitan New York high schools by recognizing innovative teachers, spreading successful methods, and motivating diverse students.

Project Director: Christopher Caltabiano, Chief Program Officer

Administered by the Council for Economic Education (CEE), the Sloan Teaching Champion Awards recognize excellent high school economics teachers from the New York metropolitan area. The candidates are selected annually based on their effectiveness, creativity, and ability to motivate underserved students. Three winning teachers receive a cash award of $5,000, and their schools each receive $2,500 to support economics education. Honorees are recognized at the CEE's Visionary Awards dinner, which is attended by academic and practicing economists as well as business and civic leaders. Funds from this grant support administration of the Sloan Teaching Champion Awards for two years. Additional funds support a series of activities by CEE aimed at strengthening economic education in the New York metropolitan area, including six professional development workshops for economics teachers, a three-day teacher boot camp, a pilot program to test innovative economics curricula, and outreach efforts to increase participation.

New York University

NEW YORK, NEW YORK

$250,000 over 12 months to conduct a pilot project to discover protists in the pets (cats, dogs) and pests (rats, mice, cockroaches, pigeons) of New York City.

Project Director: Jane Carlton, Director

Most of the advances in microbiology over the past 15 years have focused on bacteria and, to a lesser extent, on archaea and viruses. Protists (microbial eukaryotes), on the other hand, are relatively unstudied, in part because their genomes are large, complex, and poorly represented in the reference genome collections.

Funds from this grant support work by Professor Jane Carlton, a leading protist metagenomic expert, to conduct a pilot project to discover protists in pets and pests in all five boroughs of New York City.

Carlton will team up with researchers at Fordham University, Barnard College, Hunter College, and the Department of Environmental Protection to collect samples from 20 cats, 20 dogs, 20 rats, 20 mice, 20 cockroaches, and 20 pigeons from each of the five boroughs of New York City, for a total of 600 samples. The team will then use wet-lab methods and computational pipelines to characterize protists found in sewage collected from 14 NYC treatment plants, which service the five NYC boroughs. These data will then be used to amplify and characterize the 18S rRNA marker gene from the pet and pest samples to characterize community diversity and look for associations between the protists found in sewage and the pets and pests that harbor them. The overarching goal is to develop and demonstrate the viability of methods to reliably discover protists in host organisms.

Officer Grants

DataKind

NEW YORK, NEW YORK

$100,000 over 8 months to pilot continued sustainability models for novel machine learning and analytical solutions to reduce pedestrian deaths in New York City and other US cities.

Project Director: Julia Rhodes Davis, Managing Director

Cooper Union for the Advancement of Science and Art

NEW YORK, NEW YORK

$124,000 over 13 months to support two sessions of the Cooper Union STEM Saturdays program to engage talented at risk NYC high school students in engineering activities.

Project Director: George Delagrammatikas, Associate Professor

Patrice Bridgewater-Daniel, a math teacher at Bedford Stuyvesant High School in Brooklyn, was one of six teachers honored in 2016 with a Sloan Award for Excellence in Teaching Science and Mathematics. The awards recognize exceptional science and math instruction in New York City public schools. **(PHOTO BY SARAH SHATZ.)**

Other Initiatives

The Foundation occasionally makes small, out-of-program grants in support of the philanthropic community, science philanthropy, or to take advantage of unique philanthropic opportunities. In recent years, grants have focused on support for the Science Philanthropy Alliance, an organization devoted to increasing charitable contributions to basic scientific research, and to a host of institutions that provide support services to philanthropy and philanthropists.

Grants Made Against Prior Authorizations

In June 2015, the Trustees authorized the expenditure of up to 185,000 for grants to support work on behalf of the nonprofit and charitable community. The following grants were made against this previously authorized fund.

Council on Foundations, Inc.

ARLINGTON, VIRGINIA

$25,000 over 12 months to support work on behalf of the nonprofit and charitable community.

Project Director: Phillip Blackmon, Membership Associate

Foundation Center

NEW YORK, NEW YORK

$75,000 over 12 months to support work on behalf of the nonprofit and charitable community.

Project Director: Bradford K. Smith, President

GuideStar USA, Inc.

WILLIAMSBURG, VIRGINIA

$10,000 over 12 months to support work on behalf of the nonprofit and charitable community.

Project Director: Beth Suarez, Director

Philanthropy New York

NEW YORK, NEW YORK

$28,000 over 12 months to support work on behalf of the nonprofit and charitable community.

Project Director: Kristen Ruff, Vice President

Technology Affinity Group

WAYNE, PENNSYLVANIA

$5,000 over 12 months For 2016 Membership Dues.

Project Director: Lisa Dill Pool, Executive Director

In October 2013, the Trustees authorized the expenditure of up to $550,000 to encourage charitable giving in support of basic scientific research through the Foundation's membership in the Science Philanthropy Alliance. The following grant was made against this previously authorized fund.

New Venture Fund

WASHINGTON, DISTRICT OF COLUMBIA

$203,000 over 12 months to encourage charitable giving in support of basic scientific research through Sloan membership in the Science Philanthropy Alliance.

Project Director: Bruce Boyd, Managing Director & Principal

Officer Grants

Open Space Institute

NEW YORK, NEW YORK

$25,000 over 12 months to create permanent scientifically accurate interpretive and orientation exhibits at the new visitor center currently under construction at the park.

Project Director: Erik Kulleseid, Senior Vice President

St. Joseph Hospital Foundation

ORANGE, CALIFORNIA

$2,500 over 12 months to support the work of St. Joseph Hospital Foundation in memory of Robert Lin.

Project Director: Stephen Hollister, Grants Director

2016 Financial Review

The financial statements and schedules of the Foundation for 2016 and 2015 have been audited by Grant Thornton LLP. They include the consolidated statements of financial position, consolidated statements of activities, consolidated statement of cash flows, notes to consolidated financial statements and supplementary information including the schedule of management and investment expenses and the schedule of grants and appropriations.

Investment income for 2016 was $7,800,413, a decrease of $344,487 from $8,144,900 in 2015. After the deduction of investment expenses and provision for taxes, net investment income was ($1,959,534) in 2016 as compared to ($2,659,235) for the prior year. Investment expenses for 2016 consisted of $4,461,493 of direct investment expenses and $2,048,454 for investment management fees. Total investment expenses and provision for taxes equaled $9,759,947 versus $10,804,135 in 2015. Total investment gains for 2016 were $101,099,880 as compared with a loss of ($9,374,906) in 2015.

Grants authorized (net of grant refunds) and management expenses during 2016 totaled $84,170,086 as compared to $91,175,108 for the prior year. Of this total, grants authorized (net of refunds) amounted to $72,814,814 and management expenses were $11,355,272. For the prior year, grants authorized (net of refunds) amounted to $81,489,885 and management expenses were $9,685,223.

Grant payments in 2016 were $73,410,178 compared to $79,029,542 for the prior year. Together with management expenses, investment expenses, and provision for taxes, the total of cash expenditures net of grant refunds in 2016 was $94,525,397 while in 2015 the amount was $99,518,900.

Grants authorized and payments made during the year ended December 31, 2016 are summarized in the following table:

Grants unpaid at December 31, 2015	$	55,082,558
Authorized during 2016		72,814,814
Payments during 2016		(73,410,178)
Grants unpaid at December 31, 2016	$	54,487,194

The fair value of the Foundation's total assets was $1,794,057,711 at December 31, 2016 including investments valued at $1,792,794,186 as compared with total assets of $1,776,096,938 at December 31, 2015.

Consolidated Financial Statements and
Supplementary Information Together with
Report of Independent Certified Public Accountants

ALFRED P. SLOAN FOUNDATION

December 31, 2016 and 2015

Audited Financial Statements and Schedules

TABLE OF CONTENTS

Audit • Tax • Advisory

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REPORT OF INDEPENDENT CERTIFIED PUBLIC ACCOUNTANTS

To the Board of Trustees of
Alfred P. Sloan Foundation:

We have audited the accompanying consolidated financial statements of the Alfred P. Sloan Foundation (the "Foundation"), which comprise the consolidated statements of financial position as of December 31, 2016 and 2015, and the related consolidated statements of activities and cash flows, for the years then ended, and the related notes to the consolidated financial statements.

MANAGEMENT'S RESPONSIBILITY FOR THE FINANCIAL STATEMENTS

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

AUDITOR'S RESPONSIBILITY

Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's

internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

OPINION

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the consolidated financial position of the Alfred P. Sloan Foundation as of December 31, 2016 and 2015, and the changes in their net assets and their cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

SUPPLEMENTARY INFORMATION

Our audit was conducted for the purpose of forming an opinion on the basic 2016 consolidated financial statements as a whole. The schedule of management and investment expenses for the years ended December 31, 2016 and 2015 on page 110 and the schedule of grants and appropriations for the year ended December 31, 2016 on pages 111 through 116 are presented for purposes of additional analysis and are not a required part of the basic consolidated financial statements. Such supplementary information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic consolidated financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic consolidated financial statements and certain additional procedures. These additional procedures included comparing and reconciling the information directly to the underlying accounting and other records used to prepare the consolidated financial statements or to the consolidated financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America established by the American Institute of Certified Public Accountants. In our opinion, the supplementary information is fairly stated, in all material respects, in relation to the consolidated financial statements as a whole.

New York, New York
June 16, 2017

Alfred P. Sloan Foundation

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

As of December 31, 2016 and 2015

	2016	2015
ASSETS		
Cash	$ 1,263,525	$ 1,300,268
Investments (Note 3):		
Direct investments—equities	113,525,052	175,558,458
Direct investments—fixed income	137,525,804	115,816,392
Direct investments—mutual and exchange traded funds	90,722,502	131,616,774
Alternative investments	1,451,020,828	1,351,805,046
Total investments	1,792,794,186	1,774,796,670
Total assets	$ 1,794,057,711	$ 1,776,096,938
LIABILITIES AND NET ASSETS		
LIABILITIES		
Grants payable (Note 8)	$ 54,487,194	$ 55,082,558
Federal excise tax payable (Note 5)	14,440,403	12,523,918
Deferred compensation arrangements	1,041,000	205,250
Accrued postretirement health benefit obligation (Note 7)	9,212,504	8,129,782
Other liabilities	94,433	71,150
Total liabilities	79,275,534	76,012,658
Commitments (Notes 3, 4, and 9)		
NET ASSETS—unrestricted	1,714,782,177	1,700,084,280
Total liabilities and net assets	$ 1,794,057,711	$ 1,776,096,938

The accompanying notes are an integral part of these consolidated financial statements.

Alfred P. Sloan Foundation

CONSOLIDATED STATEMENTS OF ACTIVITIES

For the years ended December 31, 2016 and 2015

	2016	2015
INVESTMENT INCOME		
Interest and dividends	$ 7,800,413	$ 8,144,900
Less:		
Investment expenses	(6,509,947)	(7,574,135)
Provision for taxes (Note 5)	(3,250,000)	(3,230,000)
	(9,759,947)	(10,804,135)
Net investment income	(1,959,534)	(2,659,235)
Other income	23,975	4,051
Net total income	(1,935,559)	(2,655,184)
EXPENSES		
Grants, net of refunds of $447,034 in 2016 and $351,424 in 2015	72,814,814	81,489,885
Management expenses	11,355,272	9,685,223
	84,170,086	91,175,108
Excess of expenses over net investment income	(86,105,645)	(93,830,292)
INVESTMENT GAINS		
Net realized gain on disposal of investments	140,217,704	114,119,654
Unrealized loss on investments, net of deferred federal excise tax expense of $8,450,612 and $9,248,935 in 2016 and 2015, respectively	(39,117,824)	(123,494,560)
	101,099,880	(9,374,906)
Increase (decrease) in net assets before postretirement benefit adjustments	14,994,235	(103,205,198)
Amounts not yet recognized as a component of net periodic benefit cost	(296,338)	(295,429)
Increase (decrease) in net assets	14,697,897	(103,500,627)
Net assets at beginning of year	1,700,084,280	1,803,584,907
Net assets at end of year	$ 1,714,782,177	$ 1,700,084,280

The accompanying notes are an integral part of these consolidated financial statements.

Alfred P. Sloan Foundation

CONSOLIDATED STATEMENTS OF CASH FLOWS

For the years ended December 31, 2016 and 2015

	2016	2015
CASH FLOWS FROM OPERATING ACTIVITIES		
Increase (decrease) in net assets	$ 14,697,897	$ (103,500,627)
Adjustments to reconcile (decrease) increase in net assets to net cash used in operating activities:		
Net realized gain on disposal of investments	(140,217,704)	(114,119,654)
Unrealized loss on investments	39,916,147	126,014,857
Decrease in other assets	—	20,329,713
Increase in federal excise tax payable	1,916,485	197,006
(Decrease) increase in grants payable	(595,364)	2,460,343
Increase in accrued postretirement health benefit obligation	1,082,722	967,597
Increase in deferred compensation arrangements	835,750	65,900
Increase (decrease) in other liabilities	23,283	(55,731)
Net cash used in operating activities	(82,340,784)	(67,640,596)
CASH FLOWS FROM INVESTING ACTIVITIES		
Proceeds from sales of investments	90,104,454	75,729,200
Purchases of investments	(7,800,413)	(8,144,898)
Net cash provided by investing activities	82,304,041	67,584,302
Net decrease in cash	(36,743)	(56,294)
Cash at beginning of year	1,300,268	1,356,562
Cash at end of year	$ 1,263,525	$ 1,300,268

The accompanying notes are an integral part of these consolidated financial statements.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

1. ORGANIZATION

The Alfred P. Sloan Foundation is a philanthropic private foundation which makes grants to support original research and broad-based education related to science, technology, and economics that aim to improve the quality of American life. The Alfred P. Sloan Foundation is unique in its focus on science, technology, and economic institutions. It believes the scholars and educators who work in these fields are chief drivers of the nation's health and prosperity. The Foundation also believes that broad- based education of the public about science, technology and economics, and the scholars who do research in these areas, is an essential complement to research and practice in these areas. In each grant program, the Foundation seeks proposals for original projects led by outstanding individuals or teams that will advance these goals. The Alfred P. Sloan Foundation is interested in projects that it expects will result in significant benefits to society, and for which funding from the private sector, the government, or other foundations is not widely available. The Alfred P. Sloan Foundation's investment portfolio provides the financial resources to support its activities. The investment strategy for the investment portfolio is to invest prudently in a diversified portfolio of assets with the goal of maintaining or growing the real value of the portfolio over long term periods.

In June 2009, Sloan Projects LLC was established under the Delaware Limited Liability Company Act. The Alfred P. Sloan Foundation and Sloan Projects LLC share the common charitable and educational purpose of supporting, among other projects, film, theatrical, and television projects that promote education about science, technology, economics, and the scholars who do research in these areas. Sloan Projects LLC is a single member limited liability company ("LLC") with the sole member being the Alfred P. Sloan Foundation. Sloan Projects LLC is consolidated with Alfred P. Sloan Foundation for financial statement and tax purposes.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Accounting

The accompanying consolidated financial statements have been prepared on the accrual basis of accounting and include the assets, liabilities, net assets, and financial activities of Alfred P. Sloan Foundation and Sloan Projects LLC (collectively, the "Foundation"). All significant inter-organization balances and transactions have been eliminated in consolidation.

Income Taxes

Alfred P. Sloan Foundation is exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code (the "Code") and is a private foundation as defined in Section 509(a) of the Code. Sloan Projects LLC is a single member LLC and is a disregarded entity for tax purposes. The Foundation recognizes the effect of income tax positions only if those positions are more likely than not of being sustained.

Fair Value Measurements

Fair value is defined as the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. Fair value is a market-based measurement, not an entity-specific measurement, and sets out a fair value hierarchy with the highest priority being quoted prices in active markets. The Foundation discloses fair value measurements by level within that hierarchy. The fair

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

value hierarchy maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that the most observable inputs be used when available. Observable inputs are those that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Foundation as of the reporting date. Unobservable inputs reflect the Foundation's assumptions about the inputs market participants would use in pricing the asset or liability developed based on the best information available in the circumstances. The fair value is categorized into three levels based on the inputs as follows:

Level 1 — Valuations based on unadjusted quoted prices in active markets for identical assets or liabilities that the Foundation has the ability to access at the measurement date. An active market for the asset or liability is a market in which transactions for the asset or liability occur with sufficient frequency and volume to provide pricing information on an ongoing basis. A quoted price in an active market provides the most reliable evidence of fair value and shall be used to measure fair value whenever available. Since valuations are based on quoted prices that are readily available and regularly available in an active market, valuation of these securities does not entail a significant degree of judgment.

Level 2 — Valuations based on quoted prices in markets that are not active or for which all significant inputs are observable, either directly or indirectly.

Level 3 — Valuations based on inputs that are unobservable and significant to the overall fair value measurement. Unobservable inputs shall be used to measure fair value to the extent that observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at the measurement date.

The categorization of a financial instrument within the fair value hierarchy is based upon the pricing transparency of the instrument and does not necessarily correspond to the Foundation's perceived risk of that instrument. As permitted by ASU 2015-07, the Foundation has excluded investments that are measured at fair value using the net asset value ("NAV") per share practical expedient from the fair value hierarchy.

The Foundation follows the accounting standards of the Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") Subtopic, 820-10-35-59, *Fair Value Measurement and Disclosures – Fair Value Measurements of Investments in Certain Entities That Calculate Net Asset Value per Share (or its Equivalent)*. This allows for the estimation of the fair value of investments in investment companies, for which the investment does not have a readily determinable fair value, using net asset value per share or its equivalent, as provided by the investment managers. The Foundation reviews and evaluates the values provided by the investment managers and agrees with the valuation methods and assumptions used in determining the net asset values of these investments as of the measurement date. These estimated fair values may differ significantly from the values that would have been used had a ready market for these securities existed.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

Investments

Investments in equity securities with readily determinable fair values are reported at fair value based on quoted market prices. Investments in debt securities are measured using quoted market prices where available. If quoted market prices for debt securities are not available, the fair value is determined using an income approach valuation technique that considers, among other things, rates currently observed in publicly traded markets for debt with similar terms to companies with comparable credit risk, the issuer's credit spread, and illiquidity by sector and maturity.

Gains and losses on disposal of investments are determined on the first-in, first-out basis on a trade date basis.

Concentrations of Credit Risk

Financial instruments which potentially subject the Foundation to concentrations of credit risk consist of cash and cash equivalents, equity and fixed-income securities and alternative investments. The Foundation maintains its cash in various bank deposit accounts which, at times, may exceed federally insured limits. The Foundation's cash accounts were placed with high credit quality financial institutions. The Foundation has not experienced, nor does it anticipate, any losses with respect to such accounts. The Foundation has a significant investment in equities, fixed income securities, mutual and exchange-traded funds and alternative investments, both marketable and non-marketable, and is therefore subject to concentrations of credit risk.

Grants

Grants are recorded as an expense of the Foundation when authorized by the Board of Trustees and the grantee has been selected and notified. In certain instances (e.g. Sloan research fellowships), grants are recorded as an expense and liability when the Board of Trustees appropriates amounts for selected projects. Refunded grants are recorded as a reduction to grant expense. Conditional grants are not recorded until the conditions are substantially met.

Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from these estimates.

Reclassifications

Certain reclassifications of prior year amounts have been made to conform to the current year presentation. Such reclassifications did not change total assets, liabilities, revenues, expenses or changes in net assets as reflected in the fiscal 2015 consolidated financial statements.

Subsequent Events

The Foundation evaluated its December 31, 2016 consolidated financial statements for subsequent events through June 16, 2017, the date the consolidated financial statements were available to be issued. The Foundation is unaware of any events that would require disclosure in the accompanying consolidated financial statements.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

3. INVESTMENTS

The following tables present the fair value hierarchy of investments, the only financial instruments of the Foundation that are measured at fair value on a recurring basis, at December 31, 2016 and 2015:

	Fair Value Measurements at December 31, 2016				
	Total	Level 1	Level 2	Level 3	Net Asset Value*
Direct investments:					
Equities:					
Domestic	$ 82,037,922	$ 82,037,922	$ —	$ —	$ —
International	31,487,130	31,487,130	—	—	—
	113,525,052	113,525,052	—	—	—
Fixed income:					
U.S. government	137,525,804	137,525,804	—	—	—
Mutual & exchange-traded funds:					
Equities	38,770,851	38,770,851	—	—	—
Fixed income	51,951,651	51,951,651	—	—	—
	90,722,502	90,722,502	—	—	—
Alternative investments:					
Equities:					
Domestic	351,582,863	—	—	—	351,582,863
International	298,593,228	—	—	—	298,593,228
Absolute return	347,882,638	—	—	—	347,882,638
Hybrid	255,683,883	—	—	—	255,683,883
Real estate	18,595,620	—	—	1,774,257	16,821,363
Private equity	178,682,596	—	—	—	178,682,596
	1,451,020,828	—	—	1,774,257	1,449,246,571
	$ 1,792,794,186	$ 341,773,358	$ —	$ 1,774,257	$ 1,449,246,571

* In accordance with ASC Subtopic 820-10, investments measured at fair valuing using NAV per share as a practical expedient have not been categorized in the fair value hierarchy as permitted by ASU 2015-07.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

	Fair Value Measurements at December 31, 2015				
	Total	Level 1	Level 2	Level 3	Net Asset Value*
Direct investments:					
Equities:					
Domestic	$ 125,355,398	$ 125,355,398	$ —	$ —	$ —
International	50,203,060	50,203,060	—	—	—
	175,558,458	175,558,458	—	—	—
Fixed income:					
U.S. government	115,816,392	115,816,392	—	—	—
Mutual & exchange-traded funds:					
Equities	80,602,245	80,602,245	—	—	—
Fixed income	51,014,529	51,014,529	—	—	—
	131,616,774	131,616,774	—	—	—
Alternative investments:					
Equities:					
Domestic	299,440,478	—	—	—	299,440,478
International	277,384,558	—	—	—	277,384,558
Fixed income:					
Global sovereign bonds	54,626,654	—	—	—	54,626,654
Absolute return	241,692,044	—	—	—	241,692,044
Hyrbid	292,116,343	—	—	—	292,116,343
Real estate	15,502,662	—	—	2,254,781	13,247,881
Private equity	171,042,307	—	—	—	171,042,307
	1,351,805,046	—	—	2,254,781	1,349,550,265
	$ 1,774,796,670	$ 422,991,624	$ —	$ 2,254,781	$ 1,349,550,265

* In accordance with ASC Subtopic 820-10, investments measured at fair valuing using NAV per share as a practical expedient have not been categorized in the fair value hierarchy as permitted by ASU 2015-07.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

The following table presents a reconciliation for all Level 3 assets measured at fair value at December 31, 2016:

	Beginning Balance	Purchases	Settlements/ Redemptions	Total Net Realized and Unrealized Gains	Transfers In/(Out)	Ending Balance
Alternative Investments:						
Real estate	$ 2,254,781	$ —	$ (682,317)	$ 201,793	$ —	$ 1,774,257
	$ 2,254,781	$ —	$ (682,317)	$ 201,793	$ —	$ 1,774,257

The following table presents the reconciliation for all Level 3 assets measured at fair value at December 31, 2015:

	Beginning Balance	Purchases	Settlements/ Redemptions	Total Net Realized and Unrealized Gains	Transfers In/(Out)	Ending Balance
Alternative Investments:						
Real estate	$ 7,650,662	$ —	$ (6,038,671)	$ 642,790	$ —	$ 2,254,781
	$ 7,650,662	$ —	$ (6,038,671)	$ 642,790	$ —	$ 2,254,781

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

The following table lists the redemption terms and unfunded commitments for the alternative investments as of December 31, 2016 and 2015:

	2016					
	# of Funds	Fair Value	Unfunded Commitments (in millions)	Redemption Frequency	Redemption Notice Period	Lock-up Period
Alternative investments:						
Equities:						
Domestic	15	$ 351,582,863	$ —	monthly, quarterly, other	30-60 days	None
International	5	298,593,228	—	monthly, quarterly, other	10-60 days	None
Absolute return	15	347,882,638		daily, monthly, quarterly, annually, other	0-60 days	none, rolling 2-year
Hybrid	15	255,683,883	71	monthly, quarterly, other	45-180 days	none, rolling 2-year
Private equity	44	197,278,216	161	None	N/A	N/A
Total		$ 1,451,020,828	$ 232			

	2015					
	# of Funds	Fair Value	Unfunded Commitments (in millions)	Redemption Frequency	Redemption Notice Period	Lock-up Period
Alternative investments:						
Equities:						
Domestic	15	$ 299,440,478	$ —	monthly, quarterly, other	30-60 days	None
International	5	277,384,558	—	monthly, quarterly, other	10-60 days	None
Fixed income:						
Global sovereign bonds	1	54,626,654	—	monthly	10 days	none
Absolute return	10	241,692,044	—	daily, monthly, quarterly, annually, other	0-60 days	none, rolling 2-year
Hybrid	13	292,116,343	2	monthly, quarterly, other	45-180 days	none, rolling 2-year
Private equity	38	186,544,969	78	None	N/A	N/A
Total		$ 1,351,805,046	$ 80			

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

Equities: Alternative investments in this category invest predominantly in equity securities including U.S., international developed and emerging markets, benchmarked against MSCI All Country World Index. Equity funds range from no lock-up provisions to no more than 3 years.

Fixed Income: Alternative investments in this category invest in domestic and international fixed income securities, benchmarked against Barclays Intermediate US Aggregate.

Absolute Return: Absolute return funds include investments such as low net exposure equity hedge funds, relative value, merger arbitrage, and diversifying funds. Such strategies are expected to generate steady risk-adjusted returns, but with low correlation to the equity markets.

Hybrid: Hybrid investments sits within Global Equites and will provide equity-like returns over a full market cycle. Strategies include public and private debt, direct lending and other opportunistic credit investing. The hybrid portfolio contains 8 funds in a drawdown structure.

Real Estate: Includes funds that invest primarily in commercial real estate, all of which are illiquid investments.

Private Equity: Includes buyout, venture capital, real estate and natural resources funds, all of which are illiquid investments.

Private foundations are required by the Internal Revenue Service to distribute 5% of average assets during the year. In order to plan and budget in an orderly manner, the Foundation implements the 5% rule by using a 12-quarter rolling average of the fair value of its investment portfolio to determine the distribution level for the year. The last quarter on the 12-quarter rolling average is September 30th.

4. FINANCIAL INSTRUMENTS WITH OFF-BALANCE-SHEET CREDIT OR MARKET RISK

The Foundation's investment strategy has the ability to incorporate certain financial instruments that involve, to varying degrees, elements of market risk and credit risk in excess of the amounts recorded on the consolidated financial statements.

During 2015, the Foundation sold options contracts. S&P 500 Index put options sold were valued at approximately $4.2 million at December 31, 2015. The Foundation does not anticipate that losses, if any, resulting from its market or credit risks would materially affect its consolidated financial statements.

5. TAXES

The Foundation is liable for a federal excise tax of 2% of its net investment income, which includes realized capital gains. However, this tax is reduced to 1% if certain conditions are met. The Foundation did not meet the requirements for the 1% tax for the years ended December 31, 2016 and 2015. Therefore, current taxes are estimated at 2% of net investment income for 2016 and 2015. Additionally, certain of the Foundation's investments give rise to unrelated business income tax liabilities. Such tax liabilities for 2016 and 2015 are not material to the accompanying consolidated financial statements; however, the provision for taxes, as of December 31, 2016 and 2015, includes an estimate of tax liabilities for unrelated business income.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

Deferred taxes principally arise from differences between the cost value and fair value of investments. Since the qualification for the 1% tax is not determinable until the fiscal year in which net gains are realized, deferred taxes represent 2% of unrealized gains at December 31, 2016 and 2015.

6. RETIREMENT PLAN

The Foundation has a defined contribution retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund and Fidelity Investments. Retirement plan expense was $868,441 and $803,920 in 2016 and 2015, respectively.

7. POSTRETIREMENT BENEFITS OTHER THAN PENSIONS

The Foundation provides healthcare benefits for qualified retirees. The Foundation records annual amounts relating to the plan based on calculations that incorporate various actuarial and other assumptions, including discount rates, mortality, turnover rates, and healthcare cost trend rates.

The Foundation reviews its assumptions on an annual basis and makes modifications to the assumptions based on current rates and trends as appropriate. The effect of modifications to those assumptions is recorded as a charge to net assets and amortized to net periodic cost over future periods using the corridor method. The net periodic costs are recognized as employees render the services necessary to earn the postretirement benefits.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

The following table sets forth the financial information for the plan for 2016 and 2015:

	2016	2015
Change in accrued postretirement benefit obligation:		
Benefit obligation at beginning of year	$ 8,129,782	$ 7,162,185
Service cost	334,048	224,623
Interest cost	341,469	272,010
Actuarial loss	772,399	771,490
Benefits paid	(365,194)	(300,526)
Benefit obligation at end of year	$ 9,212,504	$ 8,129,782
Components of net periodic postretirement benefit cost reported:		
Service cost	$ 334,048	$ 224,623
Interest cost	341,469	272,010
Amortization of transition obligation	476,061	476,061
Amortization of gain	(47,947)	(101,879)
Net periodic postretirement benefit cost	$ 1,103,631	$ 870,815
Benefit obligation weighted average assumptions at December 31, 2016 and 2015:		
Discount rate	4.10%	4.29%
Periodic benefit cost weighted average assumptions for the years ended December 31, 2016 and 2015:		
Discount rate	4.29%	3.88%

The medical trend and inflation rate is 7.25% in 2017 grading down to 5.50% in 2020 and 5% ultimately.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

Assumed healthcare cost trend rates have a significant effect on the amounts reported for the postretirement health benefit plan. The effects of a 1% increase (decrease) in trend rates on total service and interest cost and the postretirement health benefit obligation are as follows:

	2016		2015	
	1% Increase	1% Decrease	1% Increase	1% Decrease
Effect on total service and interest cost	$ 190,423	$ (89,071)	$ 103,881	$ (100,648)
Effect on postretirement benefit obligation	1,692,495	(1,221,826)	1,394,627	(1,094,176)

Projected premium payments for each of the next five fiscal years and thereafter are as follows:

Year ending December 31:	
2017	$ 382,945
2018	382,350
2019	400,310
2020	403,916
2021	403,504
Thereafter through 2026	2,140,379
	$ 4,113,404

The accumulated amount not yet recognized as a component of net periodic benefit cost was $435,605 and $91,320 at December 31, 2016 and 2015, respectively. The components are as follows:

	2016	2015
Transition obligation	$ 1,511,101	$ 1,987,162
Net actuarial gain	(1,075,496)	(1,895,842)
	$ 435,605	$ 91,320

The transition obligation and actuarial gain that will be amortized into net periodic benefit cost in 2017 will be $476,061 and $47,947, respectively.

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2016 and 2015

8. GRANTS PAYABLE

The Foundation estimates that the grants payable balance as of December 31, 2016 will be paid as follows:

Year:		
2017	$	38,845,075
2018		14,442,119
2019		1,200,000
	$	54,487,194

The Foundation awards multi-year grants for certain programs with continued annual funding contingent upon the respective grantee satisfying certain performance criteria as outlined in the executed grant agreement; accordingly, the Foundation has not recorded a liability for these conditional awards which are subject to annual review. There were no conditional grant commitments at December 31, 2016.

9. LEASE

Rent expense for 2016 and 2015, including escalations, was $1,823,305 and $1,346,014, respectively. On November 21, 2013, the Foundation modified the original lease. As a result of the lease modification, rent commencement on the substitute premises began on February 27, 2015 for a period of fifteen years ending on February 28, 2030. The fixed rent payable under the lease is an amount equal to (a) $1,740,492 per annum for the period commencing on February 27, 2015 and ending on February 26, 2020 and (b) $1,874,376 per annum for the period commencing on February 27, 2020 and ending on February 26, 2025 and (c) $2,008,260 per annum for the period commencing on February 27, 2025 and ending on February 28, 2030.

10. LINE OF CREDIT

The Foundation established a $40,000,000 line of credit with Bank of New York Mellon to provide bridge funding of grants and to finance short-term working capital needs of the Foundation. To date, the Foundation has not yet used the line of credit. The interest rate is calculated using the Mellon Monthly LIBOR plus 75 basis points, with a fallback rate of Wall Street Journal Prime minus 125 basis points. The interest rate was 2% at December 31, 2016 and 2015. If the line is used, interest will be payable monthly on the 15th of each month and principal will be due on demand. If payment is not made within 15 days following the payment date, a $25 late fee will be assessed.

SUPPLEMENTARY INFORMATION

Alfred P. Sloan Foundation

SCHEDULE OF MANAGEMENT AND INVESTMENT EXPENSES

For the years ended December 31, 2016 and 2015

	2016	2015
Management expenses:		
Salaries and employees' benefits:		
Salaries	$ 7,770,239	$ 7,124,026
Employees' retirement plan and other benefits	3,045,451	2,707,796
Total	10,815,690	9,831,822
Rent	1,823,305	1,346,014
Program expenses	961,917	1,030,824
Office expenses	688,293	790,373
Website and publications	89,988	92,812
Professional fees	1,437,572	1,393,599
Total management expenses	15,816,765	14,485,444
Less direct investment and other management expenses allocated to investments	(4,461,493)	(4,800,221)
Management expenses	$ 11,355,272	$ 9,685,223
Investment expenses:		
Investment management fees	$ 2,048,454	$ 2,773,914
Direct investment and other management expenses allocated to investments	4,461,493	4,800,221
Investment expenses	$ 6,509,947	$ 7,574,135

This schedule should be read in conjunction with the accompanying consolidated financial statements and notes thereto.

Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
Abt Associates	$ —	$ 1,083,355	$ 524,966	$ 558,389
American Academy of Arts and Sciences	50,000	150,000	160,000	40,000
American Association for the Advancement of Science	579,812	30,000	609,812	—
American Astronomical Society	—	448,500	448,500	—
American Educational Research Association	—	5,000	5,000	—
American Film Institute	190,000	—	100,000	90,000
American Friends of the Hebrew University	—	14,800	14,800	—
American Indian Science and Engineering Society	—	10,000	10,000	—
American Museum of the Moving Image	—	399,824	145,229	254,595
American Society for Engineering Education	—	50,000	50,000	—
Annual Reviews	—	800,000	550,000	250,000
Arizona State University	—	21,621	21,621	—
Arizona, University of	—	341,050	225,000	116,050
Astrophysical Research Consortium	2,550,000	107,000	2,657,000	—
Aspen Institute	—	500,000	250,000	250,000
Baylor University	93,250	—	93,250	—
Becker, Adam	—	50,000	—	50,000
Behavioral Science & Policy Association	19,700	—	19,700	—
Benefits Data Trust	77,473	—	46,958	30,515
Boston College	232,630	—	170,000	62,630
Boston University	404,982	165,000	415,000	154,982
Brandeis University	—	45,500	45,500	—
Brave New Software	20,000	124,770	144,770	—
British Columbia, University of	—	55,000	55,000	—
Brown University	—	55,000	55,000	—
Business-Higher Education Forum	250,000	—	—	250,000
California, University of, Berkeley	1,844,516	4,135,530	3,190,268	2,789,778
California, University of, Davis	1,097,485	221,063	1,277,485	41,063
California, University of, Irvine	213,006	110,000	130,000	193,006
California, University of, Los Angeles	2,305,311	110,000	1,935,012	480,299
California, University of, Riverside	—	19,990	19,990	—
California, University of, San Diego	—	110,000	110,000	—
California, University of, San Francisco	—	156,858	156,858	—
California, University of, Santa Barbara	—	16,532	16,532	—
California, University of, Santa Cruz	—	160,000	160,000	—
Cambridge, University of	—	99,376	99,376	—

This schedule should be read in conjunction with the accompanying consolidated financial statements and notes thereto.

Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
California Institute of Technology	$ 133,935	$ 55,000	$ 188,935	$ —
Carnegie Institution of Washington	625,000	2,198,534	1,625,000	1,198,534
Carnegie Mellon University	958,083	661,004	1,233,048	386,039
Catticus Corporation	500,000	—	400,000	100,000
Cell Motion Laboratories, Inc.	750,000	—	500,000	250,000
Center for Strategic and International Studies	—	20,000	20,000	—
Chicago, University of	1,848,546	1,026,351	1,469,411	1,405,486
Colorado State University	—	54,044	54,044	—
Colorado, University of, at Boulder	258,301	1,390,684	888,985	760,000
Columbia University	884,636	1,469,711	1,606,885	747,462
Coolidge Corner Theatre Foundation	398,392	—	249,100	149,292
Cooper Union for the Advancement of Science and Art	—	124,000	124,000	—
Cornell University	300,000	744,634	1,044,634	—
Corporation for Atmospheric Research, University	—	20,000	20,000	—
Council for Economic Education	63,980	290,000	163,980	190,000
Council for the Advancement of Science Writing, Inc.	—	25,000	25,000	—
Council on Foreign Relations	314,059	—	314,059	—
Council on Foundations, Inc.	—	25,000	25,000	—
Council on Library and Information Resources	173,753	—	173,753	—
Creative Visions	200,000	—	200,000	—
CUNY TV Foundation	200,000	—	200,000	—
Datakind	—	100,000	100,000	—
Digital Public Library of America, Inc.	901,709	1,497,674	500,000	1,899,383
Drexel University	121,425	—	121,425	—
Duke University	208,903	110,000	218,903	100,000
Emory University	—	179,617	179,617	—
Ensemble Studio Theatre, Inc.	—	1,800,000	600,000	1,200,000
Environmental Defense Fund Incorporated	—	400,000	200,000	200,000
Environmental Law Institute	—	20,000	20,000	—
Film Independent, Inc.	125,000	—	125,000	—
Filmmakers Collaborative	—	100,000	100,000	—
FORCE11	—	20,000	20,000	—
Forsyth Institute	60,000	—	60,000	—
Foundation Center	—	75,000	75,000	—
FPF Education and Innovation Foundation	—	125,000	125,000	—
Fund for the City of New York	1,355,000	—	535,000	820,000
Fund for Public Health in New York, Inc.	544,516	—	300,000	244,516

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Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
Genetics Society of America	$ —	$ 10,000	$ 10,000	$ —
Georgia Institute of Technology	—	103,695	103,695	—
Georgia, University of, Research Foundation Inc.	—	19,754	19,754	—
George Mason University	304,840	—	204,613	100,227
Georgetown University	—	499,940	350,000	149,940
Gordon Research Conferences	—	20,000	20,000	—
Graeber, Charles	—	50,000	—	50,000
Graduate Center of The City University of New York	15,000	—	15,000	—
Greater Washington Educational Telecommunications Association Inc.	100,000	1,525,000	1,225,000	400,000
GuideStar USA., Inc.	—	10,000	10,000	—
Harman, Oren	—	50,000	—	50,000
Harvard University	2,901,461	1,302,493	2,553,214	1,650,740
Hypothesis Project	—	394,465	394,465	—
Illinois, University of	—	20,000	20,000	—
Illinois, University of, Chicago	—	55,000	55,000	—
Illinois, University of, Urbana-Champaign	—	569,700	420,000	149,700
Indiana, University of	—	259,900	150,000	109,900
Institut de Physique du Globe de Paris	200,000	—	200,000	—
Institute for the Future	35,000	—	35,000	—
Institute of International Education Inc.	250,000	—	250,000	—
International Energy Policy and Programme Evaluation Conf.	20,000	—	20,000	—
Johns Hopkins University	—	115,000	115,000	—
L.A. Theatre Works	125,000	—	125,000	—
Loyola University Chicago	94,875	—	94,875	—
Manhattan Action Fund	—	20,000	20,000	—
Manhattan Theatre Club	400,000	—	200,000	200,000
Marine Biological Laboratory	600,000	—	600,000	—
Maryland, University of, Baltimore	—	269,289	269,289	—
Maryland, University of, Baltimore County	—	31,000	31,000	—
Maryland, University of, College Park	—	1,798,316	952,513	845,803
Massachusetts Institute of Technology	538,954	5,383,093	2,630,768	3,291,279
Massachusetts, University of, Amherst	—	19,971	19,971	—
Mathematical Sciences Publishers	—	50,000	50,000	—
Mathematical Sciences Research Institute	—	374,964	374,964	—
Miami Foundation, Inc.	160,000	—	160,000	—

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Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
Michigan State University	$ —	$ 717,203	$ 468,572	$ 248,631
Michigan, University of	433,239	870,193	1,023,873	279,559
Minnesota, University of	—	198,725	198,725	—
Minnesota, University of, Foundation	—	75,000	—	75,000
Missouri, University of	—	55,553	55,553	—
Missouri, University of, Columbia	—	104,906	104,906	—
Mount Sinai School of Medicine	—	55,000	55,000	—
Mozilla Foundation	—	750,000	300,000	450,000
Mycological Society of America	28,500	—	28,500	—
National Academy of Sciences	270,000	526,470	796,470	—
National Action Council for Minorities in Engineering, Inc.	2,933,075	3,300,000	3,133,075	3,100,000
National Bureau of Economic Research, Inc.	1,988,654	1,474,061	1,977,645	1,485,070
National Information Standards Organization	48,943	—	48,943	—
National Public Radio, Inc.	250,000	—	250,000	—
National Science Communication Institute	—	20,000	20,000	—
New School for Social Research	400,000	34,000	234,000	200,000
New Venture Fund	—	203,000	203,000	—
New York Botanical Garden	255,244	—	255,244	—
New York Public Radio	400,000	800,000	850,000	350,000
New York University	1,647,021	2,021,982	2,576,517	1,092,486
North Carolina State University	—	674,767	231,568	443,199
North Carolina, University of, at Chapel Hill	—	110,000	110,000	—
Northern Arizona University	100,000	—	100,000	—
Northwestern University	158,536	260,481	300,000	119,017
Notre Dame, University of	—	55,000	55,000	—
NumFOCUS	—	1,304,608	702,450	602,158
NYC Arts in Education Roundtable	—	5,000	5,000	—
OFM Research	—	331,064	331,064	—
Ohio State University	—	101,233	101,233	—
Old Dominion University Research Foundation	—	55,000	55,000	—
Open Knowledge Foundation	250,000	—	250,000	—
Open Space Institute	—	25,000	25,000	—
Oregon, University of	700,000	160,000	610,000	250,000
Oxford, University of	—	464,129	285,000	179,129
Pecan Street, Inc.	—	450,000	250,000	200,000
Pennsylvania State University	—	55,000	55,000	—
Pennsylvania, University of	476,472	444,237	412,118	508,591

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Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
Philanthropy New York	$ —	$ 28,000	$ 28,000	$ —
Phoenix Bioinformatics	—	814,300	400,000	414,300
Pittsburgh, University of	123,728	—	123,728	—
Princeton University	223,655	290,000	290,000	223,655
ProPublica	—	125,000	125,000	—
PRX Incorporated	250,000	—	250,000	—
Purdue University	108,961	110,000	218,961	—
RAND Corporation	147,872	524,958	473,016	199,814
Rice University	—	55,000	55,000	—
Rensselaer Polytechnic Institute	—	766,275	516,275	250,000
Research Foundation of the City University of New York	376,925	—	376,925	—
Resources for the Future, Inc.	395,346	744,171	989,517	150,000
Rhode Island, University of	—	967,731	500,000	467,731
Rockefeller University	1,150,000	—	350,000	800,000
Rutgers, The State University of New Jersey	—	111,665	55,833	55,832
San Francisco Film Society	200,000	—	200,000	—
Science Festival Foundation	600,000	—	350,000	250,000
Science Friday Initiative, Inc.	—	685,000	228,500	456,500
Shurkin, Joel N.	—	46,900	46,900	—
Simon Fraser University	—	55,000	55,000	—
St. Joseph Hospital Foundation	—	2,500	2,500	—
St. Edmunds College, University of Cambridge	—	55,000	55,000	—
Stephens-Davidowitz, Seth	—	45,620	25,620	20,000
Stevens Institute of Technology	—	39,340	39,340	—
Social Science Research Council	—	975,976	320,000	655,976
Southern California, University of	223,612	89,577	213,189	100,000
Southern Regional Education Board	699,645	—	300,000	399,645
Stanford University	1,008,857	3,443,760	2,208,599	2,244,018
Sundance Institute	200,000	—	200,000	—
System, University, of Maryland Foundation, Inc.	124,775	—	124,775	—
Technology Affinity Group	—	5,000	5,000	—
Texas, University of, Austin	280,060	1,430,578	832,336	878,302
Texas, University of, Southwestern Medical Center at Dallas	—	55,000	55,000	—
The Brookings Institution	200,000	400,000	386,771	213,229
The Conversation	150,000	—	75,000	75,000
Third Way Foundation	—	93,500	93,500	—

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Alfred P. Sloan Foundation

SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2015	2016 Authorized	2016 Payments	Unpaid December 31, 2016
Toronto, University of	$ —	$ 860,000	$ 475,000	$ 385,000
Tribeca Film Institute	400,000	216,320	510,000	106,320
Tulsa, University of	—	99,960	99,960	—
Urban Institute	174,087	467,951	642,038	—
Universita di Roma La Sapienza	—	102,753	102,753	—
University College London	50,000	20,000	50,000	20,000
Virginia Polytechnic Institute and State University	—	360,000	360,000	—
Wake Forest University	—	249,933	150,000	99,933
Washington, University of	250,000	1,389,370	1,039,370	600,000
Washington University in St. Louis	—	55,000	55,000	—
Waterloo, University of	—	125,000	125,000	—
WGBH Educational Foundation	1,650,000	1,000,000	1,550,000	1,100,000
Western Washington University	—	309,305	200,000	109,305
Whitehead Institute for Biomedical Research	—	55,000	55,000	—
Wikimedia Foundation	1,000,000	3,035,000	520,000	3,515,000
Wisconsin, University of, Madison	156,686	165,000	321,686	—
WNET.ORG	100,000	—	50,000	50,000
Women Make Movies, Inc.	—	172,770	172,770	—
Woodrow Wilson International Center for Scholars	—	500,000	250,000	250,000
Yale University	357,224	1,169,160	873,738	652,646
Yeshiva University	—	20,000	—	20,000
TOTAL	$ 47,539,650	$ 73,112,587	$ 74,047,583	$ 46,604,654
Sloan research fellowships to be granted in ensuing year	$ 6,930,000	$ 630,000	$ —	$ 7,560,000
Other appropriations authorized but not committed	612,908	554,244	844,612	322,540
	55,082,558	74,296,831	74,892,195	54,487,194
Refunded grants	—	(447,034)	(447,034)	—
Reduction for grant transfers	—	(1,034,983)	(1,034,983)	—
	$ 55,082,558	$ 72,814,814	$ 73,410,178	$ 54,487,194

This schedule should be read in conjunction with the accompanying consolidated financial statements and notes thereto.

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