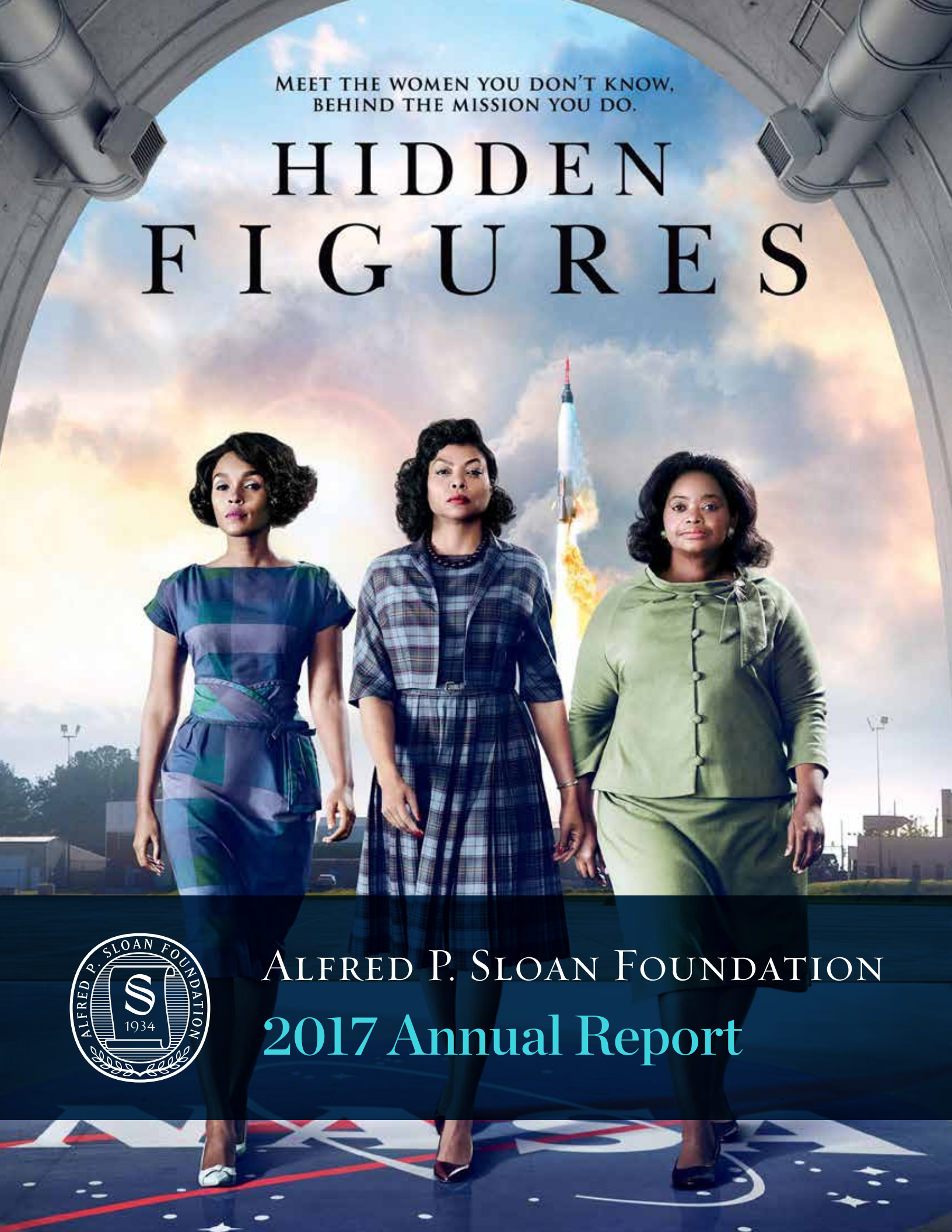

Alfred P. Sloan Foundation

2017 Annual Report

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Cover: Based on the bestselling, Sloan-supported book by Margot Lee Shetterly, *Hidden Figures*—the untold story of the black women mathematicians who helped NASA win the space race—thrilled audiences and critics alike in 2017, bringing in over $235 million worldwide and garnering three Academy Award nominations, two Golden Globe nominations, and a SAG award for best ensemble.

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 2017.

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.

From the President

ADAM F. FALK

By all rights, I should share the writing of this letter with Paul Joskow, from whom I assumed the Foundation's presidency on January 1, 2018. The year of grantmaking described herein took place entirely under his leadership. And yet this odd accident of timing gives me the rare opportunity to present this report with great pride in the work of the Sloan Foundation but without claiming personal responsibility for what's been achieved. From that perspective, I can say both that our grantmaking in 2017 represents well the impact that the Sloan Foundation is uniquely positioned to have, and also that it exemplifies why I was persuaded to leave the presidency of Williams College to come here.

My transition from higher education to philanthropy, while not exactly unusual, is also not entirely an obvious choice. On the surface, the two environments are very different. From a complex college with thousands of students, faculty, staff, and alumni to a foundation with thirty-three employees; from asking for money to giving it away. But in a deeper sense, the two have something in common: both have a significant resource they've been charged to use in service to the world. The challenge, in both cases, is to do so wisely, in a manner consistent with the purposes of their founders but adapted judiciously to the present age.

I was attracted to come to the Sloan Foundation by three central features of this institution: our *mission,* our *culture,* and our *approach* to grantmaking. Our *mission* statement, which may be found at the front of this volume, doesn't date from the time of Alfred P. Sloan but is true to the values he expressed as our founder and during his decades at the helm. It is a mission that is unambiguously focused on science, technology, and economics. While observing that the health of these disciplines is critical to the health of our society, it does not draw this connection in explicitly instrumental terms. Rather, it is "a reasoned, systematic understanding of the forces of nature and society" that is itself of value, and this systematic reasoning can be applied equally well to fields from astrophysics to labor economics.

It is a fundamental view of the Sloan Foundation that we are a better society when we base our decisions and policies on rational thought, rather than on prejudice or received wisdom. Furthermore, this rational thought comes about through work done by human beings, and so support for the "scholars and practitioners who work in [these fields]" is embraced within our mission, as is the percolation throughout society of the ideas produced by these scholars and practitioners. The scientific enterprise exists in a larger ecosystem, and to support science is to support it in its full social context.

As to the *culture* of the Foundation, it is academic, intellectual, and collaborative, very familiar to someone coming from higher education. Our team of seven program directors includes six with doctorates (in chemistry, mathematics, biology, psychology, history of science, and public policy; my own is in physics) and one Rhodes Scholar. The interest in ideas here is universal and palpable. What we value in our grantmaking we value in our scholarly work: creativity, innovation, and intellectual rigor. As a community, we love and are motivated by exciting ideas. We're interested not only in our own grantmaking but equally by what our colleagues are doing, what they're learning, and what they can teach the rest of us.

Finally, our *approach* to grantmaking reflects these cultural values. Any proposal of significant size is read and discussed by all the program directors. We believe firmly that the perspective of the interested non-expert is indispensable to awarding the very best grants, as well as to making the grants we do award the very best they can be. As a consequence, we share responsibility for the quality of all of our awards, not just those in our individual areas. This collective sense of responsibility makes it possible for key values, such as the importance of diversity and inclusion, to cut across all of our programs. In the best way, we hold each other and ourselves accountable to our common commitments.

The Sloan Foundation has had seven presidents in its eighty-four-year history, including Alfred P. Sloan himself for the first thirty-one. The values and culture that are the heart of the Foundation's strength as an organization are due to the profound influence of my six predecessors. I owe a special debt of gratitude to Paul Joskow, under whose leadership the Foundation flourished. The next decade is sure to bring new opportunities and challenges, and the Sloan Foundation could not be better positioned to respond with creativity and rigor.

Finally, the awards described in this volume reflect, above all else, the work of a collection of exceptional grantees. We are grateful for their partnership, and we look forward to continuing to work with them to use the resources bequeathed by Alfred P. Sloan to make this world, in the ways that we can, a better place.

2017: The Year in Discovery

This report tells a story about the Sloan Foundation in 2017. It's a story about the grants we made, and the projects we funded, and the people we bet on. It's about where we think the most promising opportunities lie, what technologies are ripe for advancement, and which shaded corners of the unknown are hungry for sunlight. The Alfred P. Sloan Foundation is a grantmaker and grantmaking is about looking *forward*, toward the brighter futures we hope to help bring about.

But this work is also, when you're doing it right, about looking *outward*, to the friends and allies you'll need to get you there. So we want to tell a second story, this one not about ourselves but about our grantees and the amazing things they accomplished in 2017: the surprises they uncovered, the tools they built, the discoveries they made—all the ways, large and small, they contributed to scientific progress and made it true that we knew more at the end of 2017 than we did at the beginning.

Research

The Foundation's basic research programs in the natural and economic sciences are the core of our work. The Foundation made 374 grants in 2017, totaling almost $98 million dollars. Two hundred and eighteen of those grants, some $56.6 million, went to support fundamental research in our Science, Economics, Working Longer, and Energy & Environment program areas.

Our interests are expansive. Sloan grantees' explorations range from the outer reaches of the galaxy to the innermost depths of the Earth, from the tiniest microbes in our homes to the largest structures in the Milky Way. In 2017, Sloan-funded researchers made a host of remarkable discoveries.

CHEMISTRY OF INDOOR ENVIRONMENTS & THE DEEP CARBON OBSERVATORY

Atmospheric chemist Allen Goldstein and environmental engineer Bill Nazaroff launched a proof-of-concept experiment to see if they could measure the aerosol emissions humans contribute to indoor air. Adapting the tools of outdoor chemistry to indoor study is a tricky business. The methods and instruments of atmospheric chemistry were designed for wide expanses and huge volumes. There's no guarantee they can be successful indoors in the small, still interiors of our homes and offices. Using Berkeley engineering students as subjects, Goldstein and Nazaroff found they could in fact isolate the distinct chemicals humans emit in indoor spaces. This represented a critical methodological advance both for Sloan's Chemistry of Indoor Environments program and the

field of indoor chemistry as a whole. Goldstein and Nazaroff also found that human chemical emissions do not mainly arise, as we might expect, from sweating, breathing, or other biological processes, but come from lotions, colognes, and personal care products.

On the other side of the world, Tara Djokic, an Australian graduate student working with the Deep Carbon Observatory, discovered traces of early microbial life among some very old rocks. Surprisingly, the home of these ancient fossils was in the continent's interior, not near the shores where, eons ago, they would have been submerged in the ancient oceans where most scientists believe life began. Her discovery is a tantalizing clue that life may have first evolved, not in the salty oceans of the primitive Earth, but in hot freshwater pools on land.

Microbiologist Ilana Brito, at Cornell University, made a stunning discovery in 2017 about how we clean hospitals. Exposure to common bleach, she found, facilitates horizontal gene transfer among microbes. This is the process by which tiny organisms pick up foreign genes, particularly those that lead to antibiotic resistance. Brito's discovery is profound, as it suggests that our attempts to disinfect hospitals may instead help transform them into breeding grounds for the deadliest of bacteria, and it points the way towards building better, safer hospitals.

Finally, Amy Pruden and a team of researchers at the Virginia Polytechnic Institute investigated indoor plumbing in the wake of the *Legionella* crisis in Flint, Michigan. They found that hot water temperatures in home water heaters must stay above 53 degrees Celsius to reduce *Legionella* bacteria to undetectable levels. Water that is only slightly cooler—49 degrees—they found to be optimal for creating and breeding pathogens. The finding is particularly important in light of recent trends in the installation of energy efficient water heating systems, many of which save energy by heating water to a lower set point.

SLOAN DIGITAL SKY SURVEY

For almost twenty-five years, the Foundation has been a proud supporter of the Sloan Digital Sky Survey (SDSS), a pioneering astronomical collaboration that scans the cosmos using two telescopes, one in New Mexico and a second in Chile. In 2017, the Foundation was proud to make a $16 million grant, our largest in more than a decade, to support the launch of SDSS-V, the collaboration's fifth phase, which includes ambitious plans to probe the history of the Milky Way and decipher some of the mysteries of black holes. Over its long history, SDSS has been a model of open science. All data collected by the telescope is released to the entire astronomical community and made available for public use. This supercharges discovery and has led to thousands of papers and more than 400,000 citations based on SDSS data.

We can reference only a few examples of the many exciting discoveries enabled by SDSS in 2017. Researchers working with SDSS data discovered one of the largest structures in the universe, a supercluster of galaxies that extends over 600 million light-years and contains the mass equivalent of 20 quadrillion suns. They also found a rare oxygen-deficient galaxy that holds clues to the nature of the early pre-oxygen universe. Also in 2017, SDSS astronomers were able use quasars or the first time to map the large-scale structure of the universe based upon the location of quasars, supermassive black holes that emit tremendous amounts of energy. Lastly, researchers in France and the U.K. used SDSS data to discover wispy threads of matter connecting galaxies, enough of them to account for about half of all the matter we can see.

ECONOMIC INSTITUTIONS, BEHAVIOR, AND PERFORMANCE

In what has already become seminal work, Caltech professor Cameron Camerer re-ran 18 famous experiments in economics in an attempt to replicate their findings. Working in conjunction with the authors to ensure that the new experiments were faithful to the originals, Camerer and his team were able to replicate 11 of the 18 studies (61%). Following up on Camerer's work, Stefano DellaVigna and Devin Pope at the University of Chicago also conducted a series of replications of economics experiments, but with a twist. They asked economic experts to predict which experiments would replicate successfully and which would not. As it turns out, the economists were quite accurate in their predictions, suggesting that professionals can distinguish solid from shaky results in the published economics literature.

Interested to learn more about how science gets funded, an enterprising graduate student, Emily Ijeoma Nwakpuda, compiled and analyzed a database of some 5,000 donations to universities over a ten-year period. She found that compared to other areas of research, physical science was the least likely to be supported by high net worth individuals, suggesting—much to our chagrin here at the Foundation—that institutions like Sloan have work to do to convince others of the value of supporting basic scientific research. Her database is open to other researchers and is a major resource for the study of trends in private philanthropy.

WORKING LONGER

Nicole Maestas, previously at the RAND Corporation and now at Harvard Medical School, assembled a team to investigate the ways older workers differ from younger workers, particularly with respect to the kinds of working environments they value. Linking and analyzing five different surveys on the workplace, Maestas found that older workers are much more economically sensitive to working conditions than younger workers and would be more willing to trade, for instance, salary for paid time off. The finding suggests that employers can keep older employees in the workforce cost effectively by attending to conditions of work rather than simply to compensation.

Economist David Neumark wanted to take a closer look at hiring discrimination against older workers. With Sloan's help, he launched a massive audit study, submitting fictional resumes to open positions in all fifty states to investigate whether the response rate of employers differed based on the age of the candidate. Prior studies of this kind had found significant age discrimination in responses to applications, but Neumark was interested in looking at whether states with strict anti-discrimination laws or regulations exhibited less hiring bias than those with weaker protections. Surprisingly and sadly, he found that states with strict protections for older workers exhibited bias at the same rates as states with lax protections. He also found that discriminatory hiring was gendered, with resumes submitted by older women receiving significantly fewer callbacks than identical resumes submitted by older men. Neumark's work is a powerful but sobering reminder that policymakers and employers alike have much more work to do in the fight against age-based hiring discrimination.

ENERGY & ENVIRONMENT

The Foundation's Energy & Environment program is unique in its focus on supporting research across multiple disciplines, eschewing explicit advocacy of policy positions. There are difficult and complicated choices to be made in energy and climate policy. Doing so sensibly requires deep and rigorous understanding of the tradeoffs inherent in making decisions about energy systems, such as how to develop and deploy new energy technologies, how to measure the energy and environmental consequences associated with changes in the transportation sector, how technology adoption affects the energy system as a whole, and how to evaluate without bias which energy efficiency interventions work effectively to reduce carbon emissions.

For example, in 2017, a Sloan-supported team of researchers working at the University of California, Davis, Arizona State University, and Rice University developed a model to analyze the role lower-carbon alternative fuels, particularly natural gas, might play in the heavy-duty freight and long-haul transport sector. This model integrated information about the location of truck refueling stations, the economics of various fuel markets, and data about demand for these new transportation technologies. Analysis showed that the viability of alternative fuel networks mainly depends on the volume of freight traffic flows. High volumes of truck traffic along California's major coastal highways or across the upper Midwest interstate are the most viable candidates to support this alternative, lower-carbon fueling infrastructure.

In another initiative, the Foundation has been supporting the Environmental Defense Fund in its efforts to develop new methods and technologies for measuring methane emission from production to transmission to end use. The importance of this research project rests on the fact that while methane burns much cleaner than oil or coal, and thus might be a bridge toward a more carbon neutral economy, methane itself is an extremely potent greenhouse gas. How environmentally friendly natural gas methane is as a fuel depends critically on how much of it leaks into the atmosphere at different stages of the supply chain. A team of researchers at the University of Purdue used innovative new methods of aerial observation to study fugitive methane emissions from refineries and natural gas power plants and found that measured emissions were as much as one hundred times higher than previous EPA estimates.

THE SLOAN RESEARCH FELLOWS

Investing in science means investing directly in scientists themselves. The Foundation is particularly interested in helping young scientists by providing assistance at the early, critical stage in the development of their research programs. Sloan has a long history of support for early-career scholars, most notably through our Sloan Research Fellowships, which provide funds and recognition each year to the best young minds in science.

We can only mention a few of this year's remarkable Fellows. In 2017, the Foundation was excited to award a fellowship to Kerstin Perez, an MIT physicist who is flying high-sensitivity detectors in the whisper-thin atmosphere over the arctic in the hopes of achieving a first in experimental physics: the detection of a so-far-theoretical particle called an anti-deuteron. We're

also supporting the work of Temple University mathematician Chelsea Walton, who as a junior scholar solved an open problem in algebra that had stumped mathematicians for 20 years. Reed Walker is a young economist and Sloan Fellow at UC Berkeley who, while studying the effects of pollution, uncovered the disturbing fact that premature births spike among pregnant women who live downwind of the New Jersey Turnpike.

The Foundation supports one hundred and twenty-six fellows each year. Many—in fact, most—will go on to scholarly careers of real significance. In 1966, the Foundation gave a Sloan Research Fellowship to a young theoretical physicist named Kip Thorne, who was interested in the theory of gravitational waves and how we might detect them. Thorne's work became the foundation for the construction of the LIGO gravitational wave observatory, one of the largest collaborations in the history of astrophysics. Over a billion dollars was spent to create what is arguably the most sensitive instrument ever created by humankind, and in 2016, LIGO was the first experiment to detect a gravitational wave directly. In 2017, Thorne's contributions to the project were recognized with the Nobel Prize in physics. He was the 45th Sloan Research Fellow to be so honored.

Higher Education

The Foundation believes in the transformative potential of science to lift us up and improve the quality of our lives, a potential that can only be fully achieved if smart, passionate, creative people become scientists. For sixty years, the Foundation has strived to broaden the diversity of those who participate in STEM higher education by helping administrators, educators, and researchers create scientific institutions that are welcoming, inclusive, and attractive to everyone regardless of race, ethnicity, gender, or other characteristics by which people have historically been marginalized. Through our Minority PhD program, the Foundation is the proud supporter of nine *University Centers of Exemplary Mentoring* (UCEMs). UCEMs are campus-based initiatives that provide scholarships, faculty and peer mentoring, professional development activities, and seminars and other resources aimed at promoting the successful completion of graduate study. Supported students, called Sloan Scholars, receive a full support package from their university and additionally between ten and forty thousand dollars of support for the scholarly work that will be the basis of their degrees.

As of 2017, UCEMs around the country were supporting 313 minority graduate students in the sciences, mathematics, and engineering, nearly half of whom are women, in addition to 22 who have already received their Ph.D. These students join the 1730 minority scholars supported through Foundation grants and fellowships from 1995 through 2013, of whom 1,126 have earned their PhDs.

A smaller but similar program designed to support American Indian and Native Alaska scholars, the Sloan Indigenous Graduate Partnership (SIGP), operates on four separate campus systems across the U.S. At the end of 2017, the Foundation was supporting 76 indigenous students pursuing advanced degrees in STEM fields, and 153 others have received advanced degrees since the program launched in 2003. Taken together, the Minority PhD and SIGP programs make the Foundation one of the most significant private funders of minority graduate education in the country.

Digital Information Technology

The Foundation's programs in technology focus on using the enormous power unleashed by the digital revolution to make scholarly computation and communication more effective and efficient. The Foundation nurtures the development of innovative software and computational platforms that respond directly to the expressed needs of researchers, while incentivizing good research practices regarding documentation, transparency, archiving, and reproducibility. Sloan grants continue to be critical to the development of a series of cutting-edge and widely deployed technologies and programming languages, including Julia, R, and Python as well as technology infrastructure like Dat, Dataverse, and the Jupyter computational notebook.

Digital technology is as important to the dissemination of research as it is to its production, and both activities are critical to the progress of a field. In a series of grants starting in 2013, the Foundation has supported the Association of Research Libraries in the development of SHARE, a research output management platform designed to help track the release of data, papers, presentations and other scholarly outputs related to a scientific research project. The SHARE platform has become so successful that in 2017, the Center for Open Science adopted it as the driving engine for its new preprint archive service,

OSF Preprints. Launched in 2017 and powered by SHARE, OSF Preprints has seen robust growth across a variety of diverse scientific disciplines and boasts more than two million uploaded papers.

Launched with Foundation support, Hypothesis is an annotation platform that allows users to add and share in-line annotations of documents on the web. Hypothesis is seeing remarkable growth in its user base, and in February of 2017 hit one million user-created annotations. By October, the number was two million. The explosion in use is due, in part, to productive partnerships with a growing number of influential scientific institutions such as AGU, bioRxiv, and the MIT Press.

The Foundation is also a founding supporter of the Digital Public Library of America (DPLA), the nation's first nationwide digital library. In 2017 DPLA launched the DPLA Exchange, which allows member libraries to acquire eBooks and serve them to their patrons, vastly expanding their eBook capacity and enhancing the literary offerings available to thousands of readers nationwide while making libraries more independent of publishing platforms.

Public Understanding of Science, Technology & Economics

2017 was an exciting year for the Foundation's program in the Public Understanding of Science, Technology & Economics. That program seeks, across a wide variety of media, to foster a culture that embraces science and integrates it with the arts and humanities, values scholarly training and expertise, and celebrates the fruits of scientific discovery within a humanistic framework. Doing so requires an honest accounting of how science sometimes fails to live up to its ideals. That means telling previously untold stories in the history of science, tales of those who have been forgotten, unheralded, excluded, or ignored. We present these stories both to give credit where credit is due, and to remind ourselves that the most worthwhile scientific narratives are usually not just about discovery. They are often about equity and justice.

That lesson was gloriously illustrated in 2017 by the runaway success of the Sloan-supported book by Margot Lee Shetterly turned into a Sloan-winning hit film *Hidden Figures*. Directed by Theodore Melfi, *Hidden Figures* tells the true story of four brilliant black women mathematicians and engineers—Katherine Johnson, Dorothy Vaughan, Mary Jackson, and Christine Darden—who played a pivotal but unsung role in many of NASA's greatest space race successes. The book was a national bestseller while the movie thrilled audiences and critics alike, garnering three Academy Award nominations and grossing more than $200 million at the box office worldwide. *Hidden Figures* continues to have a wide-ranging cultural impact, spawning minority scholarships, university courses, named buildings and streets, and Congressional salutes.

Telling stories by and about women and minorities in science is one of the Foundation's longest and most significant commitments. The 2017 Tribeca Film Festival hosted the worldwide premiere of *Bombshell: The Hedy Lamarr Story*, a documentary about the silver screen siren who was also a brilliant inventor and whose seminal work is fundamental to modern cellphone technology. Over the years, more than 50 women playwrights have received commissions through the Foundation's theater program, and more than 200 female screenwriters, producers, and directors have received grants through the Foundation's film program. Minority and women scientists whose stories the Foundation has helped tell include chemists Percy Julian and Rosalind Franklin, physicists Lise Meitner and Marie Curie, neurobiologist Rita Levi-Montalcini and marine biologist Rachel Carson, computer scientist Grace Hopper, mathematicians Ada Lovelace and Emilie du Chatelet, astronomers Hypatia and Vera Rubin, and breast cancer researcher Marie Claire-King.

In Conclusion

At any given time, the Foundation has about fifteen hundred active grants, most of which have been made not to individuals but to laboratories, teams, and collaborations. In 2017, thousands of researchers, scholars, technologists, authors, artists, students, and educators worked on Sloan-supported projects. Every single one deserves an essay of his or her own, and although we could mention only a few grantees in this brief summary, we can thank them all in the aggregate: for their imagination and creativity, for their perseverance and hard work, for the high standards they hold themselves to, and for the way they exemplify, in their scholarship and in their values, the very best science has to offer. Thank you.

2017 Grants by Program

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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

Established in 1955 by Alfred P. Sloan Jr., these $60,000 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 $421 million (2017$) has been awarded to more than 5,700 fellows, many of whom have gone on to highly esteemed careers: 45 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.

2017 Fellows

Arizona State University
Alexander A. Green, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

Baylor College of Medicine
Nuo Li, *NEUROSCIENCE*

Boston University
Andrew Liam Fitzpatrick, *PHYSICS*

Brandeis University
Amy Lee, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

University of British Columbia
Russ Algar, *CHEMISTRY*
Mark Schmidt, *COMPUTER SCIENCE*

Brown University
Tim Kraska, *COMPUTER SCIENCE*

California Institute of Technology
Xie Chen, *PHYSICS*
Manuel Endres, *PHYSICS*

In 2017, Kip Thorne, Feynman Professor of Theoretical Physics at CalTech, was awarded the Nobel Prize in Physics for his decisive contributions to the LIGO detector and the observation of gravitational waves. Thorne received a Sloan Research Fellowship in Physics in 1966. He is the 45th former fellow to win the Nobel Prize. **(PHOTO COURTESY OF FLICKR USER KONSTANTIN MALANCHEV. CC BY 2.0)**

University of California, Berkeley
- Ren Ng, *COMPUTER SCIENCE*
- Pierre Simon, *MATHEMATICS*
- Reed Walker, *ECONOMICS*
- Daniel Weisz, *PHYSICS*
- Michael Yartsev, *NEUROSCIENCE*

University of California, Davis
- Fereydoun Hormozdiari, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

University of California, Irvine
- Shane Ardo, *CHEMISTRY*
- Katherine Mackey, *OCEAN SCIENCES*

University of California, Los Angeles
- Pablo Fajgelbaum, *ECONOMICS*
- Weizhe Hong, *NEUROSCIENCE*
- Sriram Sankararaman, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
- Alexander Spokoyny, *CHEMISTRY*

University of California, Riverside
- Ming Lee Tang, *CHEMISTRY*

University of California, San Diego
- Kamil Godula, *CHEMISTRY*
- Tarun Grover, *PHYSICS*
- Daniel Kane, *COMPUTER SCIENCE*
- Sergey Kryazhimskiy, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
- Siavash Mirarab, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
- Jérémie Palacci, *PHYSICS*

University of California, Santa Barbara
- Stefano Tessaro, *COMPUTER SCIENCE*
- Andrea Young, *PHYSICS*

University of California, Santa Cruz
- Russell Corbett-Detig, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*

The University of Chicago
- Bryan Dickinson, *CHEMISTRY*
- Suriyanarayanan Vaikuntanathan, *CHEMISTRY*
- Joseph Vavra, *ECONOMICS*
- Abigail Vieregg, *PHYSICS*
- Alessandra Voena, *ECONOMICS*

University of Colorado, Denver
Joel Zylberberg, *NEUROSCIENCE*

Colorado State University
Jamie Neilson, *CHEMISTRY*

University of Colorado, Boulder
Garret Miyake, *CHEMISTRY*
Rahul Nandkishore, *PHYSICS*

Columbia University
Sebastian Will, *PHYSICS*

Cornell University
Ilana Brito, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Guillaume Lambert, *PHYSICS*
Kyle Lancaster, *CHEMISTRY*
Nilay Yapici, *NEUROSCIENCE*

Dartmouth College
Xia Zhou, *COMPUTER SCIENCE*

University of Delaware
Catherine Grimes, *CHEMISTRY*

Duke University
Yiyang Gong, *NEUROSCIENCE*

George Mason University
Natalie Burls, *OCEAN SCIENCES*

Georgia Institute of Technology
Mark Davenport, *MATHEMATICS*

Harvard Medical School
Andrew Kruse, *NEUROSCIENCE*

Harvard University
Jelani Nelson, *COMPUTER SCIENCE*
Amanda Pallais, *ECONOMICS*

University of Illinois at Chicago
Andrew Suk, *MATHEMATICS*

University of Illinois, Urbana-Champaign
Jefferson Chan, *CHEMISTRY*
David Sarlah, *CHEMISTRY*
Joaquin Vieira, *PHYSICS*
Josh Vura-Weis, *CHEMISTRY*

Indiana University
Yan Yu, *CHEMISTRY*

Johns Hopkins University
Rebekka Klausen, *CHEMISTRY*

Louisiana State University
Morgan Kelly, *OCEAN SCIENCES*

University of Maryland, College Park
Jon Froehlich, *COMPUTER SCIENCE*
Tom Goldstein, *MATHEMATICS*

Massachusetts Institute of Technology
Mohammad Alizadeh, *COMPUTER SCIENCE*
Semyon Dyatlov, *MATHEMATICS*
Nikta Fakhri, *PHYSICS*
Kerstin Perez, *PHYSICS*
Aaron Pixton, *MATHEMATICS*
Caroline Uhler, *MATHEMATICS*
Alexander Wolitzky, *ECONOMICS*

McGill University
Maksym Radziwill, *MATHEMATICS*

University of Michigan
Monica Dus, *NEUROSCIENCE*
Wei Ho, *MATHEMATICS*
Kerri Pratt, *CHEMISTRY*
Corinna Schindler, *CHEMISTRY*
Randy Stockbridge, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Ambuj Tewari, *COMPUTER SCIENCE*
Qiong Yang, *PHYSICS*

University of Minnesota
Vlad Pribiag, *PHYSICS*
Ian Tonks, *CHEMISTRY*

New York University
Jayeeta Basu, *NEUROSCIENCE*
Johannes Stroebel, *ECONOMICS*
Nicolas Tritsch, *NEUROSCIENCE*
Daniel Turner, *CHEMISTRY*

Northwestern University
Gang Liu, *MATHEMATICS*
Yifeng Liu, *MATHEMATICS*
Michael Rubenstein, *COMPUTER SCIENCE*
Tiffany Schmidt, *NEUROSCIENCE*

University of Notre Dame
Cody Smith, *NEUROSCIENCE*

The Pennsylvania State University
Michael DeGiorgio, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Kin Fai Mak, *PHYSICS*
Kohta Murase, *PHYSICS*

University of Pennsylvania
Amish Patel, *CHEMISTRY*

Princeton University
Amir Ali Ahmadi, *COMPUTER SCIENCE*
Nathalie de Leon, *PHYSICS*
Matthew Kunz, *PHYSICS*
Han Liu, *MATHEMATICS*
Silviu Pufu, *PHYSICS*
Nicholas Sheridan, *MATHEMATICS*

Purdue University
Chi Li, *MATHEMATICS*

University of Rhode Island
Austin Becker, *OCEAN SCIENCES*

San Diego State University
Nicholas Shikuma, *OCEAN SCIENCES*

University of South Carolina
Natalia Shustova, *CHEMISTRY*

University of South Florida
Bradford J Gemmell, *OCEAN SCIENCES*

University of Southern California
Ilias Diakonikolas, *COMPUTER SCIENCE*

Stanford University
Gabriel Carroll, *ECONOMICS*
John Duchi, *MATHEMATICS*
Polly Fordyce, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Jonathan Luk, *MATHEMATICS*
Lei Qi, *COMPUTATIONAL & EVOLUTIONARY MOLECULAR BIOLOGY*
Erik Sperling, *OCEAN SCIENCES*
Virginia Williams, *COMPUTER SCIENCE*

Temple University
Chelsea Walton, *MATHEMATICS*

University of Texas, Austin
Thibaud Taillefumier, *NEUROSCIENCE*

University of Toronto
Benjamin Rossman, *MATHEMATICS*
Angela Schoellig, *COMPUTER SCIENCE*

Vanderbilt University
Jennifer Trueblood, *NEUROSCIENCE*

University of Virginia
Thomas Koberda, *MATHEMATICS*

University of Washington
Ali Farhadi, *COMPUTER SCIENCE*
Emily Levesque, *PHYSICS*
John Tuthill, *NEUROSCIENCE*

University of Wisconsin, Madison
Darcie Moore, *NEUROSCIENCE*
Steven Sam, *MATHEMATICS*

Yale University
Pincelli Hull, *OCEAN SCIENCES*
Timothy Newhouse, *CHEMISTRY*

University of Nevada, Las Vegas
Zhaohuan Zhu, *PHYSICS*

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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, Irvine

IRVINE, CALIFORNIA

$1,000,000 over 24 months to develop an indoor chemistry modeling consortium.

Project Director: Manabu Shiraiwa, Assistant Professor

Funds from this grant support efforts by Manabu Shiraiwa, assistant professor of chemistry at the University of California, Irvine, in collaboration with Nicola Carslaw at the University of York, to develop and lead an indoor chemistry modeling consortium. This two-year project will bring together experts from several different fields to begin to develop a model that realistically represents how buildings influence indoor chemical processes. The team will begin to find ways to link six different modeling techniques that deal with different aspects of indoor chemistry on scales ranging from micro- to macroscale and from very short (less than 1 second) to much longer lifetimes.

The modeling consortium plans to address the following research questions:

1. Can we understand indoor chemistry well enough to predict it quantitatively with computer models of chemical and physical processes?
2. What are the major uncertainties that currently exist in these models?
3. What experiments/field measurements do we need to improve our models?
4. What experiments/field measurements do we need to evaluate our models?

Models will be developed within the framework of exploring two relevant and highly topical research themes for indoor air chemistry:

1. reactions between indoor oxidants and human skin, and
2. cleaning-related emissions of volatile organic compounds (VOCs).

The research team will also conduct three workshops—at the beginning, middle, and end of the project—to foster collaboration and communication as well as to provide in-person opportunities to review work plans and progress. Six early-career researchers will be trained. The new knowledge and modeling tools will be shared in peer-reviewed publications as well as through presentations at conferences, such as Indoor Air 2018 and the American Association for Aerosol Research (AAAR) meeting.

University of California, San Diego

LA JOLLA, CALIFORNIA

$749,760 over 36 months to investigate the fundamental chemistry of indoor surfaces.

Project Director: Vicki H. Grassian, Distinguished Professor

This grant supports efforts by Vicki Grassian, Distinguished Professor of Physical Chemistry at the University of California, San Diego, to monitor the chemistry that occurs on indoor surfaces. Grassian and her team will compare surface adsorption and surface reactions (kinetics, extent of reaction) over a range of different types of material surfaces found in homes, offices, and public spaces, including glass (windows), titanium dioxide (paints and self-cleaning surfaces), concrete, and drywall. She will conduct these experiments on model systems to better understand the chemistry of these materials, as well as on surfaces coated with thin films to determine if they behave differently. Gases of interest include ozone, nicotine, cyclomethylsiloxanes (components of personal care products), ammonia, and co-mixtures of these.

In addition, Grassian will conduct a series of controlled experiments that vary the relative humidity, temperature, and light surfaces are exposed to, and measure how chemical reaction mechanisms and reaction kinetics vary across cases. An important aspect of this research is to understand how these factors drive the chemistry of indoor surfaces with gases present in indoor environments. They plan to probe the molecular processes that occur on these indoor surfaces using molecular-based probes such as X-ray photoelectron spectroscopy, vibrational spectroscopy, and scanning probe techniques such as atomic force microscopy.

This project will characterize many of the physical and chemical transformations taking place on indoor surfaces and generate new data for indoor chemistry models. This proposal will provide a molecular-level understanding of chemistry on indoor surfaces as affected by important factors such as organic coatings, light, and relative humidity. The results will be shared through peer-reviewed publications and presentations at conferences and meetings. At least two students and one postdoc will be trained.

University of Colorado, Boulder

BOULDER, COLORADO

$1,251,611 over 24 months to initiate the development of community building and data infrastructure for the CIE program through HOMEChem, an interdisciplinary collaborative field experiment.

Project Director: Marina E. Vance, Assistant Professor

This grant funds a project led by Assistant Professor Marina Vance of the University of Colorado, Boulder, in collaboration with Associate Professor Delphine Farmer of Colorado State University to initiate the development of a data infrastructure for the field of indoor chemistry through an interdisciplinary collaborative field experiment named "House Observations of Microbial and Environmental Chemistry" (HOMEChem). The HOMEChem experiment will take place at a test house at the University of Texas at Austin in the summer of 2018, where researchers from 9 universities will aim to identify the most important factors controlling chemistry in indoor environments. Teams from each of these nine universities will make a wide range of measurements of the test house, including building and ventilation metrics; environmental parameters; spectral radiance and photolysis rates; aerosol concentrations and size distributions; aerosol composition; and the presence or absence of elemental and oxidized carbon, gas and particle phase organics, nitrogen oxides, ozone, nitrous acid, carbon monoxide, carbon dioxide, and methane. Many of these factors will be the subject of multiple measurements by more than one instrument, allowing comparison of instruments and collection methodologies. In addition, Vance and Farmer will conduct controlled experiments regarding cooking and cleaning, so see how these common household activities affect the chemistry that takes place inside the house.

The HOMEChem experiment promises not only to result in new knowledge about indoor chemistry, but to surface important issues regarding shared data and metadata needs among indoor chemists and to build community as the various research teams work together to execute the experiment and interpret their joint findings. Research results will be shared through at least eight publications and twenty presentations at high-profile sessions and plenaries at national and international meetings.

University of North Carolina, Chapel Hill

CHAPEL HILL, NORTH CAROLINA

$750,000 over 36 months to examine the roles of dampness, water soluble organic gases, and surface chemistry on indoor air composition.

Project Director: Barbara J. Turpin, Professor & Chair

This grant, to Barbara Turpin, professor and chair of the Department of Environmental Sciences and Engineering at the University of North Carolina, Chapel Hill, will fund a three-year effort to examine the roles of dampness, water-soluble organic gases (WSOGs), and surface chemistry on indoor air composition. The project is designed to improve characterization of indoor WSOGs, their chemistry and fate indoors, and to provide key information needed to predict the degree to which water in damp homes may alter indoor air composition.

The research will address the following questions by conducting controlled experiments with real indoor surfaces at high vs. low relative humidity: What is the uptake rate and equilibrium partitioning of WSOGs on typical indoor surfaces? How much liquid water absorbs on these surfaces and how does liquid water mediate uptake? The research will also provide insights into surface chemistry and product formation in damp homes by measuring real-time chemical changes on indoor surfaces after the introduction of key gases (ozone, water vapor, and WSOGs) using sophisticated state-of-the-art spectroscopic techniques. Finally, the UNC team will pilot real-time molecular-level characterization of WSOGs in one to three homes using high-resolution time-of-flight chemical ionization mass spectrometry (HR-ToF-CIMS) over 15 days.

The project will create new knowledge about the roles of dampness, water-soluble organic gases, and surface chemistry on indoor air composition. The research findings will be shared through peer-reviewed publications and presentations at national and international conferences.

IndoorChem.org is a website devoted to connecting the community of scientists working to explore the chemistry of indoor environments. The site provides researchers with a place to learn about conferences and workshops, share ideas and research tools, and shape a common agenda to move the discipline forward.

University of Toronto

TORONTO, CANADA

$736,035 over 36 months to investigate the role of photochemistry indoors.

Project Director: D. James Donaldson, Professor of Chemistry

This grant funds a research project by atmospheric photochemist D. James Donaldson, professor at the University of Toronto, and Christian George, a senior scientist at France's National Center for Scientific Research (CNRS) in Lyon, France, to investigate the role of photochemistry indoors. The team plans to establish whether heterogeneous (gas/surface) photochemical reactions occur indoors, producing gas phase oxidants and their precursors, as well as particles.

The team plans to address three main questions: (1) Are indoor surfaces of occupied spaces photochemically active in the formation of gas phase oxidants? (2) If so, how do local variables (temperature, relative humidity, specifics of illumination) affect the formation of gas phase oxidants? (3) Is heterogeneous photochemistry a source of indoor particulate matter? These questions will be addressed through a series of laboratory and chamber experiments in both laboratories in Toronto, Canada, and Lyon, France.

To facilitate the long-distance collaboration, the team will conduct a series of two-way student exchanges, as well as annual meetings between the principal investigators in Toronto and Lyon. This exchange of students will encourage and support strong international scientific ties at all levels, allowing students to experience different societies and laboratory structures, and better preparing them for transnational activities in the future.

This project promises to provide new knowledge about indoor photochemistry. The results will be shared through peer-reviewed publications and presentations at conferences and meetings. At least three undergraduate students, three graduate students, and two postdoctoral fellows will be trained.

Grants Made Against Prior Authorizations

In March 2016, the Trustees authorized the expenditure of up to $350,000 for small grants to facilitate the development of the Chemistry of Indoor Environment program. The following grants were made against this previously authorized fund.

Drexel University

PHILADELPHIA, PENNSYLVANIA

$84,797 over 11 months to disseminate key results from the Chemistry of Indoor Environments program and Microbiology of the Built Environment program at Indoor Air 2018.

Project Director: Michael J. Waring, Associate Professor

Gordon Research Conferences

WEST KINGSTON, RHODE ISLAND

$20,000 over 5 months to provide partial support for the 2017 Atmospheric Chemistry Gordon Research Conference.

Project Director: Kimberly A. Prather, Distinguished Chair in Atmospheric Chemistry

Memorial University of Newfoundland

ST. JOHN'S, CANADA

$49,800 over 23 months to share the key results from the Chemistry of Indoor Environments program and the Microbiology of the Built Environment program.

Project Director: Cora J. Young, Assistant 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 California, Los Angeles

LOS ANGELES, CALIFORNIA

$1,250,000 over 24 months to complete and synthesize the work of the Deep Energy community of the Deep Carbon Observatory.

Project Director: Edward D. Young, Professor

The grant provides two years of support to the Deep Energy (DE) community of the Deep Carbon Observatory. Representing 176 researchers in 32 nations, the group is about half from the United States and half from the rest of the world, the Deep Energy Community is the branch of the DCO that examines the abundance, distribution, and origins of deep Earth abiotic hydrocarbons and the reactions between energy and rock that produce energy. Grant funds will provide research support to the community as it completes a set of eight initiatives on reduced carbon formation, the fate of reduced carbon, confined hydrogen behavior, isotopic bond ordering of methane, ocean floor serpentinization, Precambrian cratons, analysis of sediment cores taken from a drilling site in Oman, and monitoring of subsurface microbial activity rates. The last project, joint with the Deep Carbon Observatory's Deep Life community, aims to determine how rapidly changes in subsurface metabolic activity occur in response to seismic events. (In plain words, earthquakes might cause deep microbial blooms.)

Along with completing these studies, the DE community would carry out a range of activities to synthesize and integrate the component activities, including through the DCO's collective effort to create a system of models of deep Earth carbon.

University of California, Los Angeles

LOS ANGELES, CALIFORNIA

$1,250,000 over 26 months to lead and synthesize the activities of the Extreme Physics and Chemistry community of the Deep Carbon Observatory.

Project Director: Craig E. Manning, Principle Investigator

Funds from this grant provide two years of operational and research support to the Extreme Physics and Chemistry Community of the Deep Carbon Observatory (DCO). The Extreme Physics and Chemistry community is a global network of researchers working together to better our understanding of the physical and chemical properties of carbon in the high temperature, high pressure environments characteristic of the deep Earth. Led by geophysicist Wendy Mao of Stanford and geologist Craig Manning of UCLA, the community is concerned with the 90% of Earth's carbon that resides in the interior as solids, magmas and melts, and low density fluids. It addresses the transformations that occur both as carbon rises from the core to the mantle to the crust and also as surface carbon is subducted beneath the crust and subjected to extraordinary temperatures and pressures.

Standing at ~7-centimeters tall, this 404.2-carat rough diamond was recovered from the Lulo mine, Angola, in February 2016. Evidence from the interior of such large gem diamonds suggests that these diamonds grow from an iron-nickel metallic liquid in Earth's deep convecting mantle. The presence of metal in regions of the deep mantle has broad implications for Earth's geologic evolution.

Grant funds will support research and administrative costs of the Extreme Chemistry community as it moves towards the planned conclusion of the DCO in 2019, with the majority of funds supporting a network of postdoctoral research associates at 20 participating institutions. Other funds support workshops, "hackathons," and computational simulation and modeling work associated with integrating insights from the community with discoveries by the larger DCO.

Carnegie Institution of Washington

WASHINGTON, DISTRICT OF COLUMBIA

$1,250,000 over 24 months to synthesize the work of the Reservoirs and Fluxes Community of the Deep Carbon Observatory.

Project Director: Erik H. Hauri, Staff Scientist

This grant continues support for two years for research conducted by the Reservoirs and Fluxes community of the Deep Carbon Observatory. Led by Marie Edmonds of Cambridge University and Erik Hauri of the Carnegie Institution for Science and comprising some 120 core members across the globe, the Reservoirs and Fluxes community is engaged in a coordinated research program to advance our understanding of the volume, distribution, and movement of Earth's carbon. Major research goals include improving our knowledge of the global budget of fluxes of gases from volcanoes; learning about carbon in the mantle and its changes through time by studying diamonds that were formed very deep; improving estimates of the global circulation of carbon in Earth's interior and fluid dynamics of carbon; and improving knowledge of the chemical forms, mineral hosts, and reactions of carbon moving between reservoirs. The third and fourth activities are key for the DCO's program-wide initiative to build a system of models simulating the origins and movements of deep carbon through Earth's history, the paramount synthetic effort of the DCO, which could also be its greatest scientific legacy. The majority of grant funds provide partial support for each of about ten post-docs at six different institutions.

Marine Biological Laboratory

WOODS HOLE, MASSACHUSETTS

$1,250,000 over 26 months to integrate and synthesize the activities of the Deep Life community of the Deep Carbon Observatory.

Project Director: Mitchell L. Sogin, Distinguished Scientist

Funds from this grant provide two years of operational and research support to the Deep Life Community of the Deep Carbon Observatory. Led by US microbiologist Mitch Sogin and German biogeochemist Kai Hinrichs, the Deep Life Community is a global collaborative network of some 250 researchers working together to enhance our understanding of the nature, distribution, abundance, and limits of the deep biosphere. Funds from this grant will allow the Deep Life Community to conclude its research as the Deep Carbon Observatory approaches its planned conclusion in 2019, as well as begin integrative work to synthesize the community's findings with the work of the larger DCO. Grant funds will support the completion of three major sampling studies: one in mainland Oman, one in the Atlantis Massif on the north Atlantic seafloor, and one in the Nankai Trough off the coast of Japan. Other funded research includes the completion of a "Census of Deep Life" that draws on deep life surveys of more than 90 locations worldwide. In addition, the Deep Life community continues laboratory studies of "extreme biophysics" that probe how biological molecules behave at high temperatures and pressures. Finally, the Deep Life Community will contribute several chapters to the technical volume that will summarize the entire body of DCO work and will contribute to the Deep Earth Carbon modeling initiative that provides integrative frameworks for the many faces of the DCO. The modeling has the exciting, maximal aim to predict the distribution of all deep life on Earth in space and time.

Officer Grants

Bigelow Laboratory for Ocean Sciences

WEST BOOTHBAY HARBOR, MAINE

$86,128 over 23 months to lead the creation and editing of the principle summary scientific volume of the initial decade of the Deep Carbon Observatory.

Project Director: Beth N. Orcutt, Senior Research Scientist

University of California, Los Angeles

LOS ANGELES, CALIFORNIA

$45,000 over 16 months to support the inaugural Gordon Research Conference on deep carbon science as a legacy of the Deep Carbon Observatory.

Project Director: Craig E. Manning, Principle Investigator

Carnegie Institution of Washington

WASHINGTON, DISTRICT OF COLUMBIA

$115,000 over 14 months to provide partial support for the 4-D workshop on deep-time, data-driven discovery and the evolution of earth.

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

George Washington University

WASHINGTON, DISTRICT OF COLUMBIA

$74,962 over 12 months to explore research areas in extreme biophysics, creation of new carbon-based materials, and implications for astrophysics and more extreme conditions not currently explored in the DCO.

Project Director: Russell J. Hemley, Research Professor

University of Sydney

SYDNEY, AUSTRALIA

$100,000 over 21 months to modify models of the movement of Earth's tectonic plates over the past billion years to incorporate visual knowledge of deep carbon cycle.

Project Director: Sabin Zahirovic, Postdoctoral Research Associate

University College London

LONDON, UNITED KINGDOM

$70,000 over 17 months to conduct a workshop and publish a special journal issue on catastrophic perturbations to Earth's deep carbon.

Project Director: Adrian Jones, Professor

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.

Major grantmaking is this program is scheduled to conclude in 2019.

Trustee Grants

University of California, Davis

DAVIS, CALIFORNIA

$784,007 over 24 months to provide final renewed support for the Microbiology of the Built Environment Network (microBEnet).

Project Director: Jonathan Eisen, Professor

This grant provides two years of operational support for the operation and enhancement of microbe.net, a website that provides services to the diverse community of researchers working at the intersection of microbiology and the built environment. Over the next two years, a team led by Jonathan Eisen at the University of California, Davis, plans to sustain the role of microBEnet as a critical hub for the field; develop and disseminate education, training, and outreach materials that will help sustain the MoBE field; build partnerships around key reference data sets in order to attract new methods, investigators, and collaborations in the field; develop synergistic interactions with other MoBE projects; and move microBEnet toward independent, long-term sustainability.

The work plan includes further expansion of the network of site contributors and users. Eisen also plans to develop MoBE course materials; collect and post MoBE research protocols, conference reports, and unpublished white papers; support the addition of a MoBE component to existing Citizen Science projects; and encourage community members to curate Wikipedia pages on MoBE topics. In addition, Eisen plans to continue sequencing efforts to leverage reference datasets (genomes, metagenomics, and 16S rRNA surveys) to draw in new people to the field.

University of California, San Diego

LA JOLLA, CALIFORNIA

$750,000 over 24 months to develop and disseminate techniques for 3D mapping of the microbiology and metabolism of built environments.

Project Director: Robin D. Knight, Professor

This grant to professor Rob Knight and Pieter Dorrenstein at the University of California San Diego funds efforts to develop and disseminate techniques for 3D mapping of the microbiology and metabolism of built environments. Knight and Dorrenstein will use commodity scanning and motion capture systems to build 3D models of built environments, track microbial movement through a room, and identify hundreds of swab locations in 3D space automatically. They also plan to upgrade QIITA (https://qiita.ucsd.edu/), the open source microbial study management platform, to include "living data" concepts from the Global Natural Products Social Network (GNPS), allowing re-annotation of MoBE datasets and connection of 3D maps with microbes and molecules from thousands of other studies. They will also produce scans of at least eight visually and scientifically compelling built environments.

Knight and Dorrenstein will share their research, tools, and findings through website, blogs, conference presentations, and peer-reviewed publications. At least 30 graduate students, postdoctoral fellows, and faculty and/or research staff will be trained during the project.

University of Oregon

EUGENE, OREGON

$1,000,000 over 24 months to provide final renewed support for the Biology and the Built Environment (BioBE) Center.

Project Director: Kevin Van Den Wymelenberg, Associate Professor/Co-Director

This grant provides research and operating support for the Biology of the Built Environment (BioBE) Center at the University of Oregon. Founded in 2010 with Sloan support, the BioBE Center conducts research on the indoor microbiome and provides education about the microbiology of built environments. This grant provides continuing support for the Center's ongoing outreach, research, and training activities and promotes Center efforts to implement a sustainable financing model that integrates their work with industry practice.

BioBE's central research question is: how does the design and operation of the built environment impact the built environment microbiome? The BioBE team has planned a series of experiments organized around three primary architectural decision realms that each have implications for health, energy-efficiency, and microbiome composition and function: (1) design for air (moving air for contaminant removal and thermal tempering), (2) light (illumination for visual tasks and definition of form), and (3) material selection (finish, substrates, and structure).

Other funded work under this grant includes plans to expand and strengthen the nascent Health and Energy Industry Consortium, a group of 75 compa-

Microbiologist Jessica Green speaks at a National Academies symposium on future research and applications of the study of the microbiology of built environments. Green directs the University of Oregon's Biology and the Built Envioronment (BioBE) Center. **(PUBLIC DOMAIN. PHOTO BY LYNN SCHRIML)**

nies, professional firms, academics, and associations, and plans to educate undergraduate, graduate, and doctoral students in architecture/biology about how design impacts the microbiome of built environments. The Center will also increase interdisciplinary course offerings that create new methodological approaches to education at the architecture-biology interface.

Grants Made Against Prior Authorizations

In June 2015, the Trustees authorized the expenditure of up to $280,000 to support two postdoctoral fellows studying the effects of space on the microbiome. The fellows were supported as part of a collaboration with the National Aeronautics and Space Administration. The following grants were made against this previously authorized fund.

Arizona State University

TEMPE, ARIZONA

$140,000 over 24 months to develope predictive model systems of polymicrobial biofilm formation and susceptibility to chemical disinfectant: A longitudinal study with implications for spaceflight systems integrity and health risks.

Project Director: Cheryl Nickerson, Professor

Colorado School of Mines

GOLDEN, COLORADO

$140,000 over 24 months to examine Biodeterioration and Biocorrosion in Spaceflight Ecosystems: Implications for Material/ Microbiome Interactions on the International Space Station.

Project Director: John R. Spear, Professor

In March 2015, the Trustees authorized the expenditure of up to $720,000 to provide postdoctoral fellowships to outstanding early-career scientists and engineers studying the microbiology of built environments. The following grant was made against this previously authorized fund.

University of Hawaii

HONOLULU, HAWAII

$120,000 over 24 months to characterize the fungal communities captured by the air filters at the Mauna Loa Observatory in Hawaii, one of the most remote locations on earth.

Project Director: Laura Tipton, Postdoctoral Scholar

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

University of California, Berkeley

BERKELEY, CALIFORNIA

$30,000 over 8 months to extend comparative data analysis for studies of water damaged homes in NY and CA.

Project Director: John W. Taylor, Professor

Gordon Research Conferences

WEST KINGSTON, RHODE ISLAND

$74,750 over 10 months to provide partial support for the inaugural Microbiology of the Built Environment Gordon Research Conference.

Project Director: Jordan Peccia, Associate Professor

Harvard University

CAMBRIDGE, MASSACHUSETTS

$30,000 over 12 months to provide partial support for the Microbiology of the Built Environment exhibit at the Harvard Museum of Natural History.

Project Director: Roberto Kolter, Professor

Officer Grants

University of Oregon

EUGENE, OREGON

$125,000 over 12 months to work with Wellspring Consulting, LLC, to develop a business plan to sustain the activities of the BioBE Center at the University of Oregon.

Project Director: Kevin Van Den Wymelenberg, Associate Professor/Co-Director

Sloan Digital Sky Survey

PROGRAM DIRECTOR: EVAN S. MICHELSON

The Sloan Digital Sky Survey (SDSS) is one of the most productive, detailed, and highly cited telescopic surveys in the history of astronomy, pioneering an innovative model of scientific collaboration that has broadly influenced how institutions work together, how instruments are built, how data are shared, how scientists are trained, and how the public can be engaged in astronomical discovery. Every SDSS phase aims to answer fundamental questions in astronomy, astrophysics, and cosmology by expanding our understanding of the large-scale evolution and structure of the universe, the formation of stars and galaxies, and the history of the Milky Way. SDSS remains the Sloan Foundation's longest-running basic science research program and is one of the flagship research enterprises for which the Foundation is known throughout the scientific community.

In cooperation with the Astrophysical Research Consortium, the Foundation has helped build and operate the Sloan Foundation 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. The 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.

The forthcoming fifth phase of SDSS (SDSS-V) will further expand the collaboration between these two observatories to create one of the most extensive spectroscopic observation programs in operation through the middle of the next decade. SDSS-V will study the forces shaping the origin, structure, and future of galaxies; the nature

of supermassive black holes; and the role interstellar and intergalactic regions play in celestial evolution. The data collected will be prodigious: infrared spectra of over six million stars in the Milky Way, optical spectra of over four hundred thousand black holes, and over twenty-five million optical spectra of interstellar gas. Both SDSS-V telescopes will be equipped with rapidly reconfigurable fiber positioning technologies that will dramatically reduce the time it takes to observe the spectra of an observed object, allowing SDSS to complement and augment many other astronomical research programs that are examining stars, galaxies, exoplanets, and black holes.

All SDSS data continues to be released to the public under open principles. More than 8,200 peer-reviewed papers have been written using SDSS data, and those papers have in turn been cited over 700,000 times in the literature. The collaboration is also working to influence the culture of astronomy by including programmatic activities to engage underrepresented minorities through its Faculty and Student Team (FAST) initiative that aims to increase the number of underrepresented minority scholars pursuing doctoral degrees in astronomy and astrophysics.

Trustee Grants

Astrophysical Research Consortium

SEATTLE, WASHINGTON

$16,000,000 over 60 months to undertake the Sloan Digital Sky Survey V (SDSS-V), which will utilize all-sky spectroscopic observations to explain the genesis of the Milky Way and its neighbors, comprehensively test stellar astrophysics and star-planet relations, probe supermassive black hole physics, and map, on unprecedented scales, the Milky Way's interstellar gas and that of nearby galaxies.

Project Director: Juna Kollmeier, Director

This grant provides partial support for the planning and implementation of the fifth research phase of the Sloan Digital Sky Survey (SDSS-V). The five-year project aims to use two telescopes (one in New Mexico and one in Chile) fitted with state of the art spectroscopic instruments to answer fundamental questions in astronomy, astrophysics, and cosmology about the forces shaping the origin, structure, and future of galaxies; the nature of supermassive black holes; and how regions between stars and galaxies, known as the interstellar medium, impact how these celestial objects form and grow.

SDSS-V will be the most extensive spectroscopic observatory program in operation through the middle of the next decade. Over the course of five years, it will collect infrared spectra of over six million stars in the Milky Way (an order of magnitude more than have ever been observed), optical spectra of over 400,000 black holes, and over 25 million optical spectra of interstellar gas. As with previous phases, all data collected by SDSS-V will be released to both the scientific community and the general public under open principles, allowing non-affiliated scientists and stargazers alike to partake in SDSS discoveries.

Planned technological improvements to the SDSS telescopes will make it one of the only observation programs capable of enhancing, complementing, and

Astronomers and astrophysicists gather for the official kick-off-meeting of phase five of the Sloan Digital Sky Survey. Led by astrophysicist Juna Kollmeier, SDSS-V comprises three sub-surveys: a mapping of the Milky Way, an inventory of black holes, and a study of the spaces between stars and galaxies. (Photo courtesy of Jeff Crane, Carnegie Institution for Science and the SDSS Collaborative.)

making the best use of data from other large astronomical surveys. Both SDSS-V telescopes will be equipped with rapidly reconfigurable fiber positioning technologies that will reduce the time it takes to collect object spectra from hours down to minutes. This will allow the SDSS to rapidly shift its focus and observe interstellar phenomena identified by the Large Synoptic Survey Telescope, the Kepler and TESS space missions, the Gaia space mission, and the eROSITA satellite.

This grant provides approximately 25 percent of the total SDSS-V project budget and includes funds for project infrastructure and planning, research, instrumentation and technology development, and outreach and education. The remainder of funds will be raised from within the scientific community.

Astrophysical Research Consortium

SEATTLE, WASHINGTON

$731,000 over 24 months to maximize the sustainability of the Sloan Digital Sky Survey (SDSS) data archive.

Project Director: Michael Blanton, SDSS-IV Director

The SDSS data management structure, software, and interface has been on the frontier of astronomy since it was developed in the early 2000s. Many leading astronomical data centers use, integrate, and rely heavily on SDSS data, and these data are routinely accessed by amateur astronomers, students, and the public.

This grant provides support to upgrade two back-end components of the SDSS data archive. The first is the Science Archive Server (SAS), housed at the University of Utah. SAS includes SDSS's raw and calibrated images, and the SDSS spectrum files, all of which are primarily used by professional astronomers. The second is the Catalog Archive Server (CAS), hosted at Johns Hopkins University. CAS contains the primary catalog data and all metadata extracted from the raw images and spectra. CAS helps to facilitate research from astronomers both within and outside of the collaboration, as it serves as the primary link between SDSS data and other data sets in astronomy. In addition to modernizing and expanding the core functioning of these two systems, the upgrades will help improve the integration of SDSS data with broader outreach and public education efforts, including better connections with SDSS Voyages, the newly developed web portal devoted to public engagement.

Higher Education

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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 Ph.D. 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 nine **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. Three recent grants have been made to universities to fund post-baccalaureate research experiences for underrepresented minority students who plan to apply for doctoral programs in economics. A grant to the National Academy of Sciences will produce a consensus study and online resource guide on effective mentoring programs and practices that will incorporate studies of mentoring on diverse individuals, research teams, and leadership.

Undergraduates Jeremy James and Nizhoni Tallas (center, center right) receive a Sloan-supported award from the American Indian Science and Engineering Society for excellent oral presentations of scientific research.
(PHOTO COURTESY OF BEVERLY HARTLINE.)

Trustee Grants

University of Maryland, Baltimore County

BALTIMORE, MARYLAND

$1,304,560 over 60 months to develop an effective pipeline for underrepresented minority students to gain admission to and complete highly competitive doctoral programs in economics by providing student support, high-value summer research experiences, and postbaccalaureate programs.

Project Director: David Mitch, Chair & Professor

This grant funds a pilot project at the University of Maryland, Baltimore County (UMBC) that will leverage the insights and infrastructure of the university's successful Meyerhoff Scholars program to identify talented minority undergraduates with an interest in pursuing advanced degrees in economics and provide them with high quality mentoring and training that will help prepare them for success in top flight graduate programs. Funded activities include:

- Hosting of several workshops per year to inform students early in their college years about career opportunities available to economics PhDs;
- Creation of faculty working groups in economics, math, and other STEM fields to examine how undergraduate course pathways influence the potential for doctoral work in economics;
- Provision of advising, mentoring, group support, and financial support for interested students;
- Offering of summer research experiences to 15 undergraduates over five years at either UMBC or at one of several other approved research universities or institutes; and
- The award of five stipends to UMBC graduates for two-year research assistantships in Sloan-approved economics-focused post-baccalaureate programs.

Mathematical Sciences Research Institute

BERKELEY, CALIFORNIA

$449,500 over 41 months to increase the number of students from underrepresented groups in mathematics graduate programs.

Project Director: Helene Barcelo, Deputy Director

This grant provides 40 months of continued funding for the MSRI Undergraduate Program (MSRI-UP) at the Mathematical Sciences Research Institute. The MSRI-UP program includes (1) an annual six-week summer research experience for 18 undergraduate mathematics students from underrepresented groups working in research teams of three, (2) colloquia and professional development workshops, (3) presentations at national math conferences following the summer program, (4) an introduction to a wide community of peers and mentors, and (5) long-term follow-up and mentorship. The research efforts of participants will result in technical reports posted on MSRI's website, oral presentations at a culminating symposium, and presentations at various national conferences.

Of former MSRI-UP participants with bachelor's degrees, 82% have continued into graduate programs, including 70% in doctoral programs. Though the program was only started in 2007, 45 alumni have gone on to earn MS degrees and 20 have completed PhDs. These achievements are especially noteworthy given the program's focus on recruiting underserved students who are not clearly headed for a graduate program in mathematics and who are not high GPA students from elite high schools.

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$400,000 over 24 months to heighten quality, vigor, and innovation in the U.S. STEMM enterprise by increasing the diversity of individuals, research teams, and leadership through a consensus study and online resource guide on effective mentoring programs and practices.

Project Director: Thomas Rudin, Director

This grant provides partial support for a two-year initiative by the National Academies' Board on Higher Education and Workforce to produce a thoroughly-researched consensus study on effective mentoring practices and the role these practices play in improving student persistence and expanding diversity and inclusion. Examining both undergraduate and graduate mentoring programs, the study aims to identify areas for future empirical research and to evaluate the impact of varied mentoring programs in STEMM (STEM+Medicine). A parallel effort will develop an online, interactive resource guide so that institutions, departments, individual faculty, and student development professionals will be able to access fully-vetted materials and resources on mentoring and customize them for their own use.

Plans are to convene a study committee of 8-12 members; hold two-to-four in-person committee meetings and four-to-five virtual committee meetings; complete a critical review of the literature; organize workshops and stakeholder engagement activities; publish the committee report; develop, test, and launch the interactive online resource; and assess the project's uptake and impact.

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$2,000,000 over 60 months to provide scholarship support for the Sloan Indigenous Graduate Partnership (SIGP) enabling consortium members to recruit, support, and graduate Indigenous students earning graduate degrees in STEM disciplines.

Project Director: Christopher Smith, Vice President

Funds from this grant provide scholarships to three years of cohorts of M.S. and Ph.D. students participating in the Sloan Indigenous Graduate Partnership. Supported students are American Indian or Alaska Native scholars enrolled in graduate degree programs in STEM fields at one of the SIGP's four participating campus systems: Purdue University, the University of Alaska (Anchorage and Fairbanks), the University of Arizona, and the Montana University System (University of Montana, Montana State University, and Montana Tech).

Recruitment targets for the next three period include 20 new Native American Ph.D. students and 59 Native American master's students, of whom 47 will be funded through Sloan funds and 12 will supported by matching funds from SIGP schools.

Additional funds support administrative and financial management services provided by NACME, including processing of scholarship applications, EFT forms, and scholarship payments to three new cohorts of SIGP students; tracking scholars' progression to graduation and recording first employment; participating in select AISES conferences where SIGP program meetings take place; maintaining working relationships with SIGP students, program directors, and program staff at all participating campuses; and reporting twice annually to Sloan on recruitment, retention, and graduation data.

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$704,328 over 36 months to manage effectively and efficiently the Foundation's portfolio of graduate scholarship programs.

Project Director: Christopher Smith, Vice President

Since 2001, the National Action Council for Minorities in Engineering (NACME) has served as the sole administrative manager for the Foundation's graduate scholarship programs for underrepresented minorities, the Minority Ph.D. program (MPHD) and the Sloan Indigenous Graduate Partnership (SIGP). NACME verifies student eligibility, disburses scholarship funds, and tracks student progress. This grant continues support for these and other activities for another three years.

In addition to these activities, over the next three years NACME Vice President Christopher Smith and Program Manager Denise Ellis plan to launch several new initiatives related to Sloan fellowship programs, including community building among campuses participating in the MPHD and SIGP, financial analysis of scholarship funds, and reporting on the academic progress of scholarship recipients. In addition, they will begin to administer surveys to supported students both as they join the program and at graduation.

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$700,000 over 44 months to support a new Alfred P. Sloan Minority Ph.D. (MPHD) University Center of Exemplary Mentoring (UCEM) program at Duke University (combining $700,000 in new funding with $300,000 in unspent NACME funds).

Project Director: Christopher Smith, Vice President

This award provides for the establishment of a new University Center of Exemplary Mentoring (UCEM) to be hosted at Duke University. The heart of the Foundation's longstanding Minority PhD program, UCEMs are campus-based initiatives that provide scholarships, faculty and peer mentoring, professional development activities, and seminars and other resources aimed at promoting underrepresented minority students' (URMs') successful completion of graduate study. The Duke University UCEM will encompass nine science and engineering departments: chemistry, computer science, mathematics,

physics, statistical science, biomedical engineering, civil and environmental engineering, electrical and computer engineering, and mechanical engineering and materials science. Over the three-year grant period, 30 minority graduate students will be supported with $40,000 awards over and above their standard graduate student support packages, half from Sloan grant funds and half from Duke matching funds. In addition, UCEM faculty and administrators will enhance and expand their minority outreach, aiming for a 20% increase in URM applications and at least a 10% increase in URM matriculants to the UCEM-participating programs over the life of the grant. Other funded activities include a coordinated set of professional development and support activities for supported students, including mentorship, seminars, and networking opportunities.

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$630,000 over 60 months to support scholarships and program expenses for a three-year renewal of a University Center of Exemplary Mentoring (UCEM) at the University of South Florida.

Project Director: Christopher Smith, Vice President

This grant continues three years of funding for the University Center of Exemplary Mentoring (UCEM) at the University of South Florida (USF). UCEMs provide scholarships and support services to STEM Ph.D. students who identify as African American/black, Hispanic/Latinx, or American Indian/Alaska Native and who are U.S. citizens. Supported students, known as Sloan Scholars, receive a $40,000 stipend, a standard doctoral student support package, and are eligible to participate in a host of professional development and mentoring opportunities designed to maximize the chances of succeeding in graduate study. For each supported student, UCEMs provide a full doctoral support package to a second minority student through an institutional matching program. In addition to scholarships, grants funds will support the continuation, expansion, and improvement of a host of recruitment, retention, and student support activities, including production of an operational manual of recruitment and retention processes and activities, further development of USF's multidimensional mentoring model, and programs to help coordinate activities between Sloan Scholars in USF's Engineering School with those in its College of Marine Sciences.

New York University

NEW YORK, NEW YORK

$727,511 over 48 months to further develop the Ph.D. Excellence Initiative to change the face of U.S. economics departments by preparing a select cadre of high-achieving post-baccalaureate students of color for the rigors of Ph.D. study in the field.

Project Director: Peter Blair Henry, William R. Berkley Prof. of Economics & Dean

Led by Peter Henry at New York University's Stern School of Business, the Ph.D. Excellence Initiative (PHDEI) seeks out promising students of color who recently graduated with a baccalaureate degree in economics and offers them high quality coursework, training, and research experience designed to make them very competitive candidates for admission to top economics graduate programs. Incoming PHDEI students take two courses per semester (tuition is covered by NYU), and receive mentoring and research experience through Henry and participating economics faculty at NYU and other institutions. Grant funds support the administration of the program for four years, along with associated outreach, communications, and evaluation activities. Additional funds support an annual summer conference at which current and former research assistants and PHDEI fellows, joined by supportive faculty mentors, will present their research.

Purdue University

WEST LAFAYETTE, INDIANA

$383,754 over 36 months to recruit, support, and graduate Indigenous students earning graduate degrees in STEM disciplines through the consortial efforts of the Sloan Indigenous Graduate Partnership (SIGP).

Project Director: Kevin D. Gibson, Associate Professor

Funds from this grant support efforts to coordinate activities between the four campus systems of the Sloan Indigenous Graduate Partnership (SIGP): the University of Arizona, Purdue University, the University of Alaska (Anchorage and Fairbanks), and the Montana University System (University of Montana, Montana State University, and Montana Tech). Goals for the SIGP over the three year grant period include recruitment of 20 new Native American Ph.D. students and 59 Native American M.S. students, an increase in the visibility of SIGP as a national resource for institutions seeking to improve Native American graduate student success in

STEM fields; growth in the number of faculty (Native and non-Native) who are knowledgeable about the best practices for mentoring Native students, maintenance of high retention and graduation rates for students in the program, and improved engagement and presence of the SIGP on social media.

Grant funds support administrative and programmatic expenses associated with these goals. Funds for student scholarships over this period are provided through a separate grant to the National Action Council for Minorities in Engineering (NACME).

Grants Made Against Prior Authorizations

In October 2016, the Trustees authorized the expenditure of up to $250,000 to provide support for conferences and workshops aiming to increase diversity in STEM higher education. The following grants were made against this previously authorized fund.

American Indian Science and Engineering Society

ALBUQUERQUE, NEW MEXICO

$20,000 over 18 months to provide partial support for the Undergraduate Research Competition at the 2017 and 2018 AISES National Conferences to highlight the research efforts of Native youth and establish connections with SIGP institutions.

Project Director: Kathy DeerInWater, Director

University of Minnesota

MINNEAPOLIS, MINNESOTA

$42,500 over 18 months to support three panels and associated papers at the National Conference on the 50th Anniversary of the Kerner Commission Report that explore the consequences of the 1968 civil disorders with a special focus on the production of minority economists.

Project Director: Samuel L. Myers, Professor

Officer Grants

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$50,000 over 7 months to support up to four undergraduate students planning for PhD programs from the University of Puerto Rico system for a semester (Spring 2018) of study at the Massachusetts Institute of Technology.

Project Director: Alan Grossman, Praecis Professor of Biology/Dept. Head

National Action Council for Minorities in Engineering, Inc.

WHITE PLAINS, NEW YORK

$120,750 over 12 months to provide emergency funding for up to 35 continuing Sloan Scholars at the University of Puerto Rico at the Mayaguez and Rio Piedras campuses to enable progress toward their doctoral degrees following Hurricane Maria.

Project Director: Christopher Smith, Vice President

Social Science Research Council

NEW YORK, NEW YORK

$125,000 over 15 months to pilot a small grants program establishing the Sloan Scholars Mentoring Network (SSMN) as a grant-making organization to incentivize Sloan Scholar participation, to support early academic-career Sloan graduates, and to create opportunities for informal mentoring.

Project Director: Mary Byrne McDonnell, Executive Director

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.

Grants Made Against Prior Authorizations

In October 2016, the Trustees authorized the expenditure of up to $250,000 to provide support for conferences and workshops aiming to increase diversity in STEM higher education. The following grant was made against this previously authorized fund.

American Society for Engineering Education

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 12 months to connect current doctoral engineering and computer science students, postdoctoral fellows, and recent faculty to sources of federal research support and private vendors of research tools through an interactive research showcase.

Project Director: Norman Fortenberry, Executive Director

Officer Grants

Association of American Universities

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 6 months to undertake planning activities in preparation for a major new initiative on PhD education in collaboration with AAU member universities.

Project Director: Tobin Smith, Vice President for Policy

University of Wisconsin System

MADISON, WISCONSIN

$125,000 over 12 months to build a new user interface and database for the Small World Initiative (SWI) and train graduate students to teach with the big data sets gathered through SWI course-sourcing on antibiotics produced by newly isolated soil bacteria.

Project Director: Jo Handelsman, Director

Public Understanding of Science, Technology, & Economics

Books	**32**
Film	**35**
Radio	**40**
Television	**42**
Theater	**45**
New Media	**47**

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 Margot Lee Shetterly's *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*, 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 David Baron's *American Eclipse: A Nation's Epic Race to Catch the Shadow of the Moon and Win the Glory of the World*, which was a finalist for the PEN/E.O. Wilson Prize for Literary Science Writing; Seth Stephens-Davidowitz *New York Times* bestseller *Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are,* Kevin Davis's *The Brain Defense: Murder in Manhattan and the Dawn of Neuroscience in America's Courtrooms*, and Joel Shurkin's *True Genius: The Life and Work of Richard Garwin*.

Grants Made Against Prior Authorizations

In October 2015, the Trustees approved the expenditure of up to $400,000 to support promising new books on science, technology, engineering, or mathematics. In June 2016, the Trustees authorized the expenditure of an additional $500,000 for the same purpose. The following grants were made against these previously authorized funds.

Cornell University

ITHACA, NEW YORK

$45,065 over 12 months to support research for and writing of Data Driven: Truckers and the New Workplace Surveillance *(Princeton University Press 2018), a book about digital surveillance of long-haul truckers and digital surveillance in the workplace.*

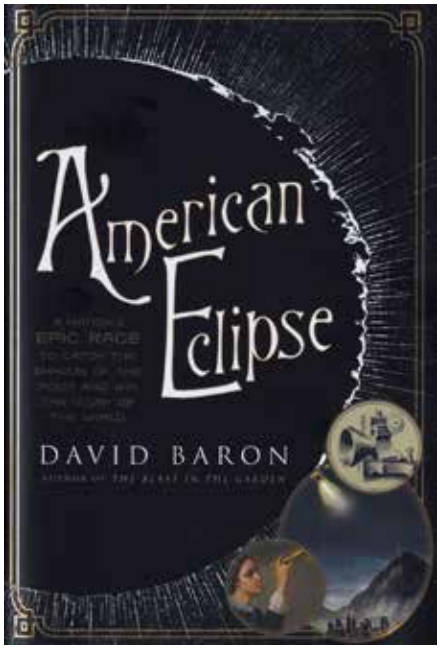
Project Director: Karen Levy, Assistant Professor

Jared Farmer

NEW YORK, NEW YORK

$50,000 over 38 months to support the research and writing of a book on the human relationship with trees and what it says about our larger relationship with nature, Ancient Trees in Modern Times: A Natural History of Long-term Relationships.

Project Director: Jared Farmer, Author



David Baron's *American Eclipse* was a finalist for the PEN/E.O. Wilson Prize for Literary Science Writing.

Jonathan Waldman

BOULDER, COLORADO

$50,000 over 12 months to support the research and writing of a general-interest nonfiction book about a small company's efforts to build the world's first commercially-viable bricklaying robot, called SAM.

Project Director: Jonathan Waldman, Author

University of Maryland, College Park

COLLEGE PARK, MARYLAND

$46,500 over 6 months to support Jason Farman's Waiting for Word: How Message Delays Have Shaped History, Love, Technology, and Everything We Know, *a book about technologies of communication, to be published by Yale University Press in late 2018/early 2019.*

Project Director: Jason Farman, Associate Professor

University of Maryland, College Park

COLLEGE PARK, MARYLAND

$43,000 over 12 months to support the research and writing of a graphic non-fiction book on space-time, relativity, and gravity to be published by Princeton University Press.

Project Director: Jeffrey Bub, Distinguished University Professor

Montana State University, Bozman

BOZEMAN, MONTANA

$48,417 over 12 months to support a book on the evolutionary and ecological science underlying agriculture, Eternal Harvest: An Extraordinary Biography of Wheat*, to be published by University of Chicago Press.*

Project Director: Catherine Zabinski, Professor

Maura R. O'Connor

BROOKLYN, NEW YORK

$32,100 over 9 months to support Wayfinding: The Mystery and Science of Human Navigation in the Age of GPS*, a nonfiction trade book on human navigation to be published by St. Martin's Press in 2018.*

Project Director: Maura R. O'Connor, Author

Yale University Press

NEW HAVEN, CONNECTICUT

$30,250 over 10 months to support Urban Chromatic, *a book that uses satellite imagery to increase public understanding of remote sensing and contemporary global urbanization.*

Project Director: Karen Seto, Associate Dean of Research

Carl Zimmer

GUILFORD, CONNECTICUT

$50,000 over 11 months to support the research and writing of a popular book on the nature of heredity, from its early history to the latest scientific findings and their implications for society.

Project Director: Carl Zimmer, Author

Stephen E. Olson

SEATTLE, WASHINGTON

$50,000 over 12 months to support a book on the discovery, manufacture, and use of plutonium in the bomb dropped on Nagasaki, to be published by W.W. Norton in the spring of 2020.

Project Director: Stephen E. Olson, Author

Jon Gertner

MAPLEWOOD, NEW JERSEY

$42,000 over 12 months to support the research and writing of a book, The Ice at the End of the World, *on the scientific and technological history of Greenland with a special focus on climate change.*

Project Director: Jon Gertner, Author

John M. Johnson Jr.

OJAI, CALIFORNIA

$38,517 over 8 months to support a book about the astrophysicist Fritz Zwicky and the search for dark matter.

Project Director: John M. Johnson, Author

Ainissa Ramirez

NEW HAVEN, CONNECTICUT

$27,500 over 12 months to support research for and writing of The Alchemy of Us: How Matter and Humans Transformed One Another *(MIT Press 2018), a book about how human engineering and the invention of 8 key material devices changed our lives.*

Project Director: Ainissa Ramirez, Scientist & Author

Seth Fletcher

CROTON-ON-HUDSON, NEW YORK

$25,000 over 12 months to support research for and writing of Einstein's Shadow: A Black Hole, A Band of Astronomers, and the Quest to See the Unseeable *(Ecco Press 2018), a book about the Event Horizon Telescope and the quest to capture the first direct image of a black hole.*

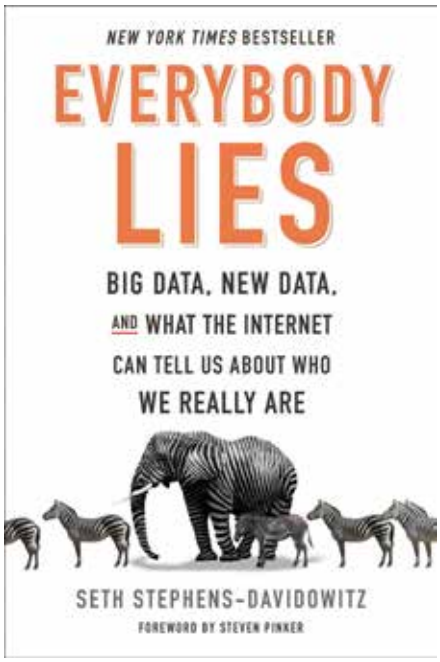
Project Director: Seth Fletcher, Author

Susan Hand Shetterly

SURRY, MAINE

$22,500 over 9 months to support a book on seaweeds and their interactions with humans and their habitats, to be published by Algonquin Press.

Project Director: Susan Hand Shetterly, Author



Seth Stephens-Davidowitz's *Everybody Lies* was a *New York Times* Bestseller.

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 600 film projects from some of the nation's most innovative filmmakers, and has created a film development pipeline consisting 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 premiered at film festivals in 2017: *Bombshell: The Hedy Lamarr* Story, which had its world-premiere at a Sloan-hosted screening during the Tribeca Film Festival, and *The House of Tomorrow*, which premiered at a Sloan-hosted screening during the San Francisco International Film Festival.

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 Theatre's *Science on Screen* effort into a nationwide program that has awarded 164 grants to 72 independent cinemas, each of which shows at least one Sloan-supported film a year.

Trustee Grants

Coolidge Corner Theatre Foundation

BROOKLINE, MASSACHUSETTS

$761,440 over 24 months to sustain and expand the national Science on Screen program, with a focus on enhanced web and social media promotion.

Project Director: Katherine Tallman, Executive Director

This grant provides two years of continued support for the Coolidge Corner Theatre Science on Screen series, a grant program that helps independent theaters across the country pair current, classic, cult, and documentary film screenings with thoughtful introductions by notable figures from the fields of science, technology, and medicine. Grant funds will allow Coolidge to make 56 grants to independent theaters over the next two years, bringing to 70 the number of participating cinemas across the country. Each theater in the Science on Screen series receives a grant of between $4,000-$8,500 to facilitate three screenings a year with expert STEM speakers, at least one of which is a film developed or awarded a prize through the Sloan Foundation's Film program. Additional grant funds support a National Evening of Science on Screen in which all the participating theaters hold coordinated screenings, as well as funds for marketing and promotion of the program, website improvement, SEO optimization, and social media outreach.

Film Independent, Inc.

LOS ANGELES, CALIFORNIA

$699,236 over 36 months to provide direct support to develop and distribute science and technology scripts, teleplays, and films.

Project Director: Jennifer Kushner, Director

This grant continues a Sloan Foundation partnership with Film Independent (FIND), producer of the Independent Spirit Awards and the Los Angeles Film Festival, to support filmmakers and television writers who explore scientific or technical themes in their work or create films that feature scientists, engineers, technologists, or mathematicians as major characters. The FIND program includes a host of interrelated and mutually supportive activities that promote this goal. FIND selects one producer per year to develop a science-themed script in FIND's Producing Lab, which includes a $30,000 producer's grant and a reception and promotion around this project; awards one producer or producing team per year a Sloan Fast Track Fellowship with a $20,000 grant and invitation to the Fast Track film financing market; selects one outstanding episodic television writer per year and awards him or her with a $10,000 grant to develop a science-themed series in FIND's new Episodic Lab; and awards two distribution grants of $50,000 each to an exceptional science-themed film to incentivize buyers to acquire it for distribution. Grant funds will support these awards and associated administration and outreach costs for the next three years.

Film Independent, Inc.

LOS ANGELES, CALIFORNIA

$398,668 over 5 months to support the triennial Sloan Film Summit: a three-day event of screenings, panels, staged readings, project updates, networking opportunities, and community building for Sloan film grantees.

Project Director: Maria Bozzi, Senior Director

This grant provides funds to Film Independent (FIND) to organize and host the 2017 Sloan Film Summit, the major convening of all Sloan film grantees held every three years. The summit offers a rare opportunity for interaction and networking between students, faculty, and administrators from the Foundation's six film schools; filmmakers and staff from the five screenplay development and film festival partners; and Sloan grantees at Museum of the Moving Image (MoMI), Coolidge Corner Theatre, and the Science and Entertainment Exchange. 150 Sloan grantees are expected to attend.

The three-day summit will open with a Friday night film screening on the theme of women and science, followed by an opening dinner. Saturday morning will feature Sloan award recipient updates as well as case studies with filmmakers and scientist collaborators. In the afternoon, there will be a networking lunch that connects filmmakers with scientists, followed by an industry connect program allowing filmmakers to meet with agents, casting directors, distributors, and other industry representatives. During this time, representatives from all of Sloan's film partners will meet with Sloan program staff to share experiences and discuss best practices. Later, breakout sessions involving the latest in virtual reality will be followed by a special evening event. Sunday will open with a science and storytelling keynote from a prominent member of the film or television industry. After the keynote, there will be staged readings of excerpts from Sloan-winning screenplays for an industry audience. The summit will conclude with a showcase of Sloan-supported feature films, including one completed feature and sneak previews of upcoming features.

Grant funds support administrative costs associated with hosting the event, along with associated publicity and outreach in print and social media.

Panelists at the world premiere of *Bombshell: The Hedy Lamarr Story* at the 2017 Tribeca film festival. Pictured (from left) *Bloomberg*'s Rebecca Greenfield, director Alex Dean, Oscar-winning actress and executive producer Susan Sarandon, award-winning actress and producer Diane Kruger, UCLA professor and electrical engineer Danijela Cabric, and patent attorney Patricia Rogowski. Pictured with Sloan Vice President, Programs and Program Director Doron Weber (PHOTO CREDIT: KATHI LITTWIN)

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$500,000 over 36 months to sustain the Science and Entertainment Exchange and the role of science and science consultants in Hollywood and to provide science advisors for the Sloan Film Program.

Project Director: Ann Merchant, Deputy Executive Director

The Science and Entertainment Exchange was launched by the National Academy of Sciences in 2008 to pair members of the science community with the entertainment industry. The Exchange works to ensure accuracy when science is used in film, tries to seed new ideas within the film and television industry by exposing them to new content, and acts as a resource of professional science advice, including to Sloan's myriad film partners. This grant funds a series of activities by the Exchange to bolster scientific representation in Hollywood films and television, increase the diversity of its science consultants, and strengthen ties with the Sloan Film program.

Grant funds will support the Exchange as it provides science consultants to the film and television community and to Sloan filmmakers on some 300 television and film projects per year. Additional funds will support efforts to increase the number of women and underrepresented minorities in the Exchange's scientist database and an initiative to include Sloan-supported filmmakers in Exchange events and outreach.

San Francisco Film Society

SAN FRANCISCO, CALIFORNIA

$467,500 over 24 months to nurture, develop, and champion films that explore scientific or technological themes and characters.

Project Director: Noah Cowan, Executive Director

This grant supports a series of activities by the San Francisco Film Society (SFFS) to nurture, develop, and champion films that explore scientific or technological themes and characters. SFFS will award two $35,000 fellowships per year to promising screenwriters who are exploring scientific or technological themes in their work. In addition, SFFS will give an annual award, the Sloan Science in Cinema Prize, to the best science-themed feature film submitted to the the San Francisco Film Festival and will promote the winning film at the festival with a ceremony, screening, post-screening panel, and reception. The Festival will also host a yearly Since in Cinema Project Summit, which will bring together scientists and screenwriters to identify and publicize an annual "top ten" list of new scientific stories that would lend themselves to narrative screenplays. Lastly, SFFS will partner with the Blacklist to identify promising science-themed scripts and bring them to the attention of developers, producers, and other film industry executives. Grant funds support these activities and associated operational costs for the next two years.

Sundance Institute

BEVERLY HILLS, CALIFORNIA

$500,000 over 24 months to support a science and technology film program at the nation's pre-eminent independent film center that includes screenwriting fellowships, feature film prizes, science and film panels, and associated outreach.

Project Director: Michelle Satter, Founding Director

This grant continues a Sloan partnership with the Sundance Film Institute for a series of initiatives that promote the development, production, and distribution of science-themed films. Annual initiatives include

- The Sloan Commissioning Grant, which is awarded to a screenwriter or producer with an early-stage science-themed project to support its development. The award includes a cash grant; a stipend for a science advisor and research; mentorship; and year-round staff support from Sundance.
- The Sloan Lab Fellowship in the Sundance Institute Feature Film Program, which supports the participation of a filmmaker and his or her science-themed script in the Screenwriters Lab, Screenwriters Intensive, or Creative Producing Summit. Winners participate in the Feature Film Fellows Track at the Sundance Film Festival and are eligible for additional Feature Film Program Labs. The fellowship also includes a grant to support the development of the project, including funds for science research and advice.
- The Sloan Lab Fellowship in the Sundance Institute Episodic Program, which supports a writer with an early-stage episodic project to support its development for television or online platforms. It includes a cash grant to support the development of the project, a stipend for a science advisor, and mentorship and other support from Sundance staff.
- The Alfred P. Sloan Feature Film Prize, which is selected by a jury of film and science professionals. This award and accompanying cash prize is presented at the Sundance Film Festival to the writer and director of an outstanding feature film focusing on science or technology as a theme, or depicting a scientist, engineer, or mathematician as a major character.
- The Science-in-Film Forum at the Sundance Film Festival, which is a moderated panel discussion featuring independent filmmakers and leading scientists and technology experts.

Grant funds support these initiatives and additional outreach, publicity, and administrative costs for a period of two years.

Tribeca Film Institute

NEW YORK, NEW YORK

$830,000 over 24 months to build on the TFI Sloan Filmmaker Fund's success in developing new science films to production and to raise the profile of Sloan screenings, readings, and panels at the Tribeca Film Festival.

Project Director: Molly O'Keefe, Senior Director

Funds from this grant continue a partnership with the Tribeca Film Institute (TFI) to promote the development and release of science-themed films and support filmmakers who explore scientific or technological themes in their work.

Each year, the TFI Sloan Filmmaker Fund issues an open call for new and established filmmakers to submit science-themed film treatments, finished screenplays, or works-in-progress. After a rigorous independent review process, 2-6 projects are selected each year for support. Winning projects receive between $10,000 and $75,000 to help usher the project toward completion. In addition, winners receive year-round support from TFI, including mentorship, workshops, readings, inclusion in the annual TFI Network market, and arranged industry meetings. TFI also hosts a highly publicized and well-attended screening and panel discussion of a science-themed film at the Tribeca Film Festival each year along with an associated reception. Lastly TFI is launching a new Alumni Discretionary Fund that will provide microgrants to previously supported projects, providing a critical intervention that helps ensure supported projects are continuing to move toward production and release.

This grant provides support for these and related activities for a period of two years.

Officer Grants

International Documentary Association

LOS ANGELES, CALIFORNIA

$50,000 over 6 months to support a documentary on artificial intelligence and the development of a CameraBot device that will function autonomously as the director and cameraman.

Project Director: Amy Halpin, Director

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; Ira Flatow's perennially popular *Science Friday*; 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 reporting unit, which produces the podcast *Only Human* and deep-dive reporting series on the economics of healthcare in the New York region. In 2017, the Institute for the Future launched its ten-episode, Sloan-funded *For Future Reference* podcast. 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

National Public Radio, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$600,000 over 24 months to deepen and expand Planet Money's *coverage of economics via podcast episodes, on-air radio stories, and participatory journalism.*

Project Director: Christopher Turpin, Vice President

Funds from this grant continue support for the production of *Planet Money*, National Public Radio's award-winning, signature foray into exploring the changing American economy via in-depth stories that examine key economic issues for a general audience in an accurate, accessible, and engaging way. Grant funds support production of the twice-weekly *Planet Money* podcast, shorter segments that air on NPR's popular *Morning Edition* and *All Things Considered*, multipart series to explore complex subjects at greater depth, and experiments in "participatory journalism" like "*Planet Money* Bought Some Oil," where *Planet Money* journalists directly participate in specific industries to help illuminate their processes. Planned activities over the two-year grant period include a 10-part series on the history of the U.S. economy over the past 200 years that will examine subjects such as central banking, national debt, and the modern, multinational corporation; and new participatory journalism projects such as exploring the business of commercial space satellites.

PRX Incorporated

CAMBRIDGE, MASSACHUSETTS

$510,744 over 21 months to support PRX in developing a new generation of science shows and expanding science-themed audio content for radio broadcast and podcast.

Project Director: Kerri Hoffman, CEO

Funds from this grant support efforts by PRX Incorporated to develop, distribute, and promote podcasts featuring high-quality scientific content or that explore scientific themes. Over the next two years, PRX plans to produce

- 10 episodes of the *Orbital Path* podcast, a new monthly program hosted by astronomer Michelle Thaller which covers astronomy, space science, and cosmology;
- 12 episodes of *The Outside*, an outdoor-focused podcast about survival science and the science of adventure;
- 1 science-themed episode of *The Moth* podcast
- 2 science-themed episodes of the *99% Invisible* podcast
- 1 science-themed episode of the *Theory of Everything* podcast
- 12 episodes of *Go Flight*, a podcast developed in partnership with the Smithsonian Air and Space Museum
- 12 episodes of *Sidedoor*, a new podcast developed with the Smithsonian that tells stories about science, art, history, humanity and their surprising interconnections.

In addition, PRX will continue to develop and promote *Transistor*, a broad science channel that showcases audio pieces from the open-call STEM Story Project and tests new ideas and formats from independent producers. PRX intends to use this platform to develop a new signature podcast that will launch with 18 new episodes.

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*; *American Experience*'s "Rachel Carson" and "The Race Underground"; and *Africa's Great Civilizations*, a six-part series hosted by Henry Louis Gates Jr. *Bombshell: The Hedy Lamarr Story*, premiered at Tribeca Film Festival in 2017 and will air on *American Masters* in 2018. *NOVA*'s "Black Hole Apocalypse," the first-ever *NOVA* documentary to be hosted by a female scientist, Janna Levin, will air in January 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 topics it has sponsored in other media.

Trustee Grants

City Lore, Inc.

NEW YORK, NEW YORK

$500,000 over 14 months to support the theatrical release, festival run, and PBS broadcast of Oliver Sacks: The Life of the Mind*, a documentary about the renowned neurologist, clinician, and writer.*

Project Director: Steve Zeitlin, Executive Director

The grant provides production support to filmmaker Ric Burns for a new documentary about Oliver Sacks, the celebrated neurologist, clinician, and bestselling writer who died in 2015. Upon receiving his fatal diagnosis, Sacks invited Burns to film his final days and this production will draw on some 80 hours of unique footage from the end of Sacks' life, as well as other footage covering the full arc of Sacks' remarkable career.

Foundation funding includes support for the addition of three science advisors to the project, to ensure the accuracy of the film's portrayal of Sacks' work

The finished film will have a theatrical release, a US and international film festival run, and will be broadcast on American Masters on PBS.

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, and mobile platforms with related content.

Project Director: Lee Koromvokis, Producer, Business & Economics

This grant continues support for the PBS NewsHour's regular weekly broadcast of Making Sen$e with Paul Solman, a series that explains business and economic issues clearly and engagingly to a general audience both on air and online.

Grant funds support the production of 52 Making Sen$e broadcast video reports each year on major issues facing the American and global economy. Additional funds support the production of hundreds of original pieces of web content, including long-form think pieces written by economists or based on Paul Solman's interviews with economists. The NewsHour also has a formalized partnership with NBER to feature its economists, and the reach of its segments is magnified by dissemination on Extra, the NewsHour's educational website, on PBS Teachers, and on partner sites such as the Council for Economic Education's econedlink.org.

Planned segments over the grant period include many topics that address the economic concerns of everyday Americans. Questions to be investigated include, among others: What's going to happen if Obamacare is repealed? What rate of economic growth is plausible? Why has there been a reversal of mortality for middle-aged white men? Can jobs in the coal industry come back?

Open Mind Legacy Project

NEW YORK, NEW YORK

$200,000 over 24 months to support eight to ten interviews with Sloan-supported authors and Sloan-related thinkers each year on The Open Mind.

Project Director: Alexander Heffner, Host

This grant provides two years of support for continued production and broadcast of *Open Mind*. Hosted by Alexander Heffner and broadcast on 214 PBS stations, *Open Mind* is a 30-minute, one-on-one interview show that dives deeply into a rich variety of topics pertinent to the public discourse. Grant funds will allow Heffner and the *Open Mind* team to interview five Foundation-supported science and technology authors per year, allowing them to discuss their books and the ideas behind them in a thoughtful and engaging public forum. An additional 3-5 interviews per year will focus on topics of Sloan Foundation interest such as the Digital Public Library of America, the Sloan Digital Sky Survey, or the economics of the aging workforce. Additional grant funds support efforts to improve the reach of the program, including expanded outreach on social media and enhanced promotion of the *Open Mind* podcast.

WGBH Educational Foundation

BOSTON, MASSACHUSETTS

$2,000,000 over 28 months to support the production of four prime time American Experience *documentary films about the role of science and technology in history.*

Project Director: Mark Samels, Executive Producer

Rachel Carson: conservationist, marine biologist, and author of *Silent Spring.* Carson's work, life, and influence was explored in the twenty-ninth season of the Sloan-supported history series, *American Experience*. **(PHOTO FROM *AMERICAN EXPERIENCE: RACHEL CARSON*, COURTESY OF MARTHA FREEMAN)**

This grant provides funds to the popular television history series *American Experience* for the production of four new shows for a total of eight hours of new, prime time science programming over the next two years. Supported shows include one two-hour series on the history of the eugenics movement ("Eugenics on Trial") and one four-hour series about the decade-long U.S. effort to reach the moon ("Chasing the Moon"). The other two shows include a one-hour documentary about Alfred Loomis and the team of scientists who helped develop radar and the atomic bomb during World War II ("Tuxedo Park"), and a one-hour special about advances in the science of deep sea exploration and rescue ("SeaLab").

WNET

NEW YORK, NEW YORK

$750,000 over 25 months to support a two-hour public television broadcast of a multimedia live stage play about Albert Einstein's journey to the general theory of relativity.

Project Director: David Horn, Executive Producer

This grant funds a project by WNET, working with physicist Brian Greene, the World Science Foundation, 59 Productions and CounterPunch Studios, to adapt the live stage piece "Light Falls: Space, Time, and an Obsession of Einstein" for broadcast on public television. The piece, which debuted at Lincoln Center during the 2016 World Science Festival and is narrated by Greene, traces Einstein's journey to the discovery of the general theory of relativity. The piece walks the audience through the stages in Einstein's journey—from his boyhood fascination with a compass to his desperate efforts to understand gravity to his fear that mathematician David Hilbert would beat him to the general theory. In addition to providing historical information about Einstein himself, the production will explain, explore, and make compelling key scientific ideas related to the general theory such as Lorentz contraction, time dilation, the equivalence principle, Riemannian geometry, and curved spacetime. The producers, working with the award-winning CounterPunch Studios, will also explore deploying a pioneering holographic rig that can generate a digital, life-like, three-dimensional rendering of Einstein so that Greene can interact and converse with a realistic looking historical figure.

The completed production will be broadcast on the one hundredth anniversary of the 1919 solar eclipse measurements that confirmed Einstein's theory and made him the most famous scientist in the world.

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 twenty 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 pilot grants 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, Frank Basloe's *Please Continue*, Nell Benjamin's *The Explorer's Club,* and Anna Ziegler's *Boy* and *Photograph 51*, which had an award-winning 2015 production starring Nicole Kidman in London's West End. In 2017, Leigh Fondakowski's Sloan-supported *Spill*, about the BP oil disaster in the Gulf of Mexico, was the Ensemble Studio Theatre/Sloan mainstage production. *Mosquitoes*, a new play by Lucy Kirkwood commissioned by the Foundation and Manhattan Theatre Club in 2008, had a sold-out run at the National Theatre in London from July through September of 2017. 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.

Trustee Grants

L.A. Theatre Works

VENICE, CALIFORNIA

$500,000 over 24 months to record four new Sloan plays for public radio broadcast and online streaming, and to develop a new 12-play podcast while disseminating 20 science plays to millions of people and thousands of libraries and schools.

Project Director: Susan Albert Loewenberg, Producing Director

This grant continues support for for the Relativity Series, a Foundation partnership with LA Theatre Works (LATW) to produce, broadcast, and disseminate audio versions of science- or technology-themed plays. Relativity now totals 32 science plays, of which 20 have been commissioned, developed, and/or produced by the Sloan Theater program. Productions are high-quality and feature leading actors, giving recorded plays a life well after their theatrical runs. They are broadcast on over 50 public radio stations in the U.S., on Radio Beijing in China, and on radio in many English-speaking nations. Productions are also distributed via streaming and downloading on the Internet, through educational outreach to over 3,000 teachers and 13,000 community libraries, and through distribution partners such as iTunes, Audible, Amazon, and Overdrive. Grant funds will enable L.A. Theatre Works to produce and distribute audio version of four new science-themed plays over the next two years. Additional funds support a variety of initiatives to expand the reach and impact of the Relativity catalog, including a podcast series; a new website; an educational app; and print, online, and social media outreach.

Olivia Colman and Yoli Fuller in Lucy Kirkwood's *Mosquitoes* at the Dorfman Theatre, National Theatre in London. (PHOTO BY BRINKHOFF/MÖGENBURG)

Leigh Fondakowsi's *Spill,* staged at Ensemble Studio Theatre. (PHOTO COURTESY OF ENSEMBLE STUDIO THEATRE. PHOTOGRAPHER: GERRY GOODSTEIN)

Officer Grants

American Associates of the National Theatre

NEW YORK, NEW YORK

$10,820 over 6 months to commission a play about Hungarian physician Ignaz Semmelweis and his breakthrough discovery on the importance of antiseptic practices in medicine, to be written by playwright Stephen Brown and potentially produced by the National Theatre.

Project Director: Emily Anstead, Head of Trusts

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 of science. 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 a catalogue and traveling exhibition featuring the seminal drawings of Santiago Ramón y Cajal, the father of modern neuroscience; 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. In 2017, the Foundation partnered with a leading Virtual Reality (VR) company, WITHIN, to produce a 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. The documentary generated over 100,000 views on the app, 500,000 views on Facebook, 5,000 reactions on social media, and press coverage. The Foundation also supported the American Academy of Arts & Sciences "Public Face of Science" research initiative, a National Academy of Science conference on the "Science of Science Communication," and a showcase of science-themed new media works produced in the U.S. at the 25th Annual World Congress of Science and Factual Producers in San Francisco.

Trustee Grants

Arizona State University

TEMPE, ARIZONA

$248,648 over 29 months to create a free, open source, interactive, digital edition of Frankenstein: Annotated for Scientists, Engineers and Creators of All Kinds *that bridges the sciences and humanities and seeks to foster an engaged community of readers.*

Project Director: Ed Finn, Director, Assistant Professor

This grant provides support for an initiative by the Center for Science and Imagination at Arizona State University, partnering with MIT Press, MIT Media Lab, and Plympton Literary Studio, to create an open-access digital edition of Mary Shelley's landmark novel Frankenstein. The digital "Living Frankenstein" edition—titled Frankenstein: Annotated for Scientists, Engineers and Creators of All Kinds—will present an innovative reading experience and compelling new digital content to the 21st century reader, including a podcast series, videos, and graphical interactives. It is also constructed on the software platform PubPub, developed by MIT to facilitate large-scale collaborative authorship and peer review, which will allow readers to explore multiple layers of content while annotating, commenting, and curating material that they can share with a wide community.

The project tackles the novel's age-old themes of creation and responsibility—and its contemporary relevance to artificial intelligence, robotics, genetic engineering, and more—to foster an engaged community of readers and a new interactive reading experience timed to the novel's 200th anniversary in 2018. The digital edition will offer a unique encounter between a great literary text and contemporary issues of science and technology refracted through an interactive digital medium that seeks to transform the reading experience and advance public understanding and community engagement with science and technology.

A 2.5 mile-long interferometer used to detect gravitational waves, featured in WITHIN's "Listening to the Universe," a short Sloan-funded virtual reality documentary about LIGO, from *The Possible* series. **(IMAGE COURTESY OF WITHIN.)**

Officer Grants

Academy Foundation

BEVERLY HILLS, CALIFORNIA

$20,000 over 2 months to support the Academy of Motions Pictures Art and Sciences and its Sci-Tech Council in a screening and panel discussion of Hidden Figures, presented in collaboration with NASA.

Project Director: Andrew Maltz, Managing Director

Mathematical Sciences Research Institute

BERKELEY, CALIFORNIA

$100,000 over 3 months to support a Sloan Film Room and related math and arts programming at the National Math Festival.

Project Director: David Eisenbud, Director

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 6 months to support the third in a series of Sackler Colloquia on the Science of Science Communication, to be held November 16 and 17, 2017.

Project Director: Barbara Kline Pope, Executive Director

Women Make Movies, Inc.

NEW YORK, NEW YORK

$50,000 over 2 months to showcase 10 high-profile new media science projects from the U.S. at the 2017 World Congress of Science and Factual Producers.

Project Director: Barbara Ghammashi, Director

Washington Monthly Corporation

WASHINGTON, DISTRICT OF COLUMBIA

$50,000 over 12 months to support the re-launch of Invention & Technology Magazine with a special issue on the achievements of women and minorities in STEM and to redesign the website.

Project Director: Diane Straus, Publisher

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. Note: This subprogram has an evolving emphasis on behavioral macroeconomics, and will combine with similar topics under the new heading "Behavioral Economics Applications and Foundations."
- **Behavioral and Regulatory Effects on Decision-making** Projects in this sub-program study households and individuals, specifically the role "choice architecture" plays in 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. Note: Relabeled as "Behavioral Economics Applications and

Foundations," this subprogram is expanding to include research on behavioral macroeconomics as well.

- **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: the productivity of the scientific enterprise; labor markets for scientists and engineers; patterns of scientific publication, collaboration, and intellectual property protection; markets for scientific equipment and instrumentation; the economics of digitization; new developments in U.S. productivity dynamics and measurement; the economics of artificial intelligence, robots, and other autonomous technology; 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: causal inference; persistent identifiers; data citation standards; identification and tracking systems for scholars; federal statistics; smart disclosure platforms for obfuscated markets; data and metadata management protocols; the mathematics of privacy; access to social science datasets containing sensitive information; the replicability of empirical research; and the economics of knowledge contribution and distribution.

Trustee Grants

American Association for the Advancement of Science

WASHINGTON, DISTRICT OF COLUMBIA

$500,251 over 24 months to pilot a Center for Scientific Evidence in Public Issues whose reports on policy-relevant scientific findings will be impartial, respected, timely, and informed by expertise in the social and behavioral sciences.

Project Director: Rush Holt, Chief Executive Officer

The new Center for Scientific Evidence in Public Issues (the "Scientific EPI Center") being launched by the American Association for the Advancement of Science aims to help bring scientific evidence to bear on public policy issues. The need for such a center has been discussed in Washington for decades, beginning when Congress closed its own Office of Technology Assessment in 1995. As impartial scientific expertise in government and think tanks has dwindled, policymakers increasingly turn to lobbyists or other self-interested parties. What is needed, instead, is a source of impartial experts who can bring our best scientific understandings to bear on policy

issues as diverse as climate change, cybersecurity, AI, and renewable energy.

This grant provides funds to the new Scientific EPI Center for the hiring of a full-time economist or other empirical social scientist. The addition of such a full-time staffer will allow the Center to benefit from the rigorous frameworks and models developed within economics for the analysis of incentives and behavior, provide a guide to the voluminous economic literature that bears on policy issues, and ensure that Center reports and recommendations are informed by economic insights about trade-offs, opportunity costs, nudges, and elasticities. Qualifications for this position include a Ph.D. as well as years of scholarly achievement, policy experience, and management practice.

Brookings Institution

WASHINGTON, DISTRICT OF COLUMBIA

$632,355 over 24 months to promote independent, unbiased, and nonpartisan economic research on regulatory economics.

Project Director: Adam Looney, Director

Effective government regulations can improve citizens' health, safety, and financial well-being and reduce market imperfections. On the other hand, regulations that are poorly designed or implemented can impair markets, impose burdens, and impede innovation. There are potential benefits from regulatory interventions that mitigate imperfections but also potential costs from necessarily imperfect regulation. The challenge is to find an appropriate balance.

This grant provides support for an initiative at the Brookings Institution to found a new, evidence-based, non-ideological Center on Regulation and Markets. In recent years, the trend has been for academics interested in regulation to specialize in environmental, health, labor, or other specific regulatory contexts. While this approach has many merits, such specialization deprives the field of the insights and wisdom that come from the wider study of regulation as such. The new Brookings Center will aim to recapture those insights and revitalize regulatory economics by incorporating recent behavioral, technological, societal, and legal perspectives.

The new Center will initially concentrate on three work streams: Regulatory Processes and Perspectives, Market and Government Failures, and the Regulation of Financial Markets. Specific topics range from autonomous vehicles and the sharing economy to bankruptcy law and cost/benefit estimation methods. Outputs will include peer-reviewed papers, policy briefs, roundtables, and conferences.

Brookings Institution

WASHINGTON, DISTRICT OF COLUMBIA

$500,000 over 36 months to continue supporting the production and dissemination of accessible, reliable, and influential research through the Brookings Papers on Economic Activity.

Project Director: Janice C. Eberly, Co-Editor

The conferences and journal volumes produced by the Brookings Papers on Economic Activity (BPEA) are premier outlets for policy-relevant research on economics. Biannual meetings feature invited speakers as well as a wide spectrum of policymakers, researchers, and other participants. Only commissioned papers that are carefully edited, presented, critiqued, and revised eventually appear in the journal, where they are published together with discussants' written comments.

Many of the most distinguished and active economists on the national scene regularly turn to this platform as a way of conveying timely ideas in a relatively nontechnical but highly visible format. All kinds of policymakers and media from across the political spectrum end up citing BPEA papers quite frequently. Brookings and the BPEA remain among the few institutions in Washington where respectful, impartial, nonpartisan, and evidence-based debate about economic issues still thrives. This grant provides three years of support for the continued publication of the BPEA.

The University of Chicago

CHICAGO, ILLINOIS

$700,000 over 36 months to compile accurate and comprehensive microdata about household income by developing new methods for combining survey results with administrative data.

Project Director: Bruce D. Meyer, McCormick Foundation Professor

Funds from this grant support a project by economist Bruce Meyer of the University of Chicago to create a rich new dataset for the measurement of U.S. household income. Partnering with the Census Bureau, Meyer plans to link and reconcile data from a host of important, but currently separate govern-

ment surveys and data sources, including the Current Population Survey, the Consumer Expenditure Survey, the American Community Survey, the Survey of Income and Program Participation, tax return data from the IRS, and information from important government programs like SNAP and TANF. The resulting dataset, to be called the Comprehensive Income Dataset, would significantly expand the analytic power of these datasets taken separately and would also ease several well-known obstacles to the measurement of U.S. household income.

Grant funds will support the initial construction of the dataset, which will then be made available for use by scholars through Federal Statistical Data Research Centers.

Columbia University

NEW YORK, NEW YORK

$490,298 over 36 months to integrate behavioral insights into the foundations of standard macroeconomic models by re-examining the role of the Euler equation.

Project Director: Emi Nakamura, Assistant Professor

How do people decide between consuming more today and saving more for the future? Mainstream macroeconomists have one answer: the Euler Equation. Simply put, it says that an optimizing agent will consume today up to the point where adding one more unit now would provide the same utility that could be expected if consuming that extra unit were deferred until tomorrow instead.

In principle, the attitude expressed by the Euler Equation seems reasonable enough. Surely if you knew that having a second dessert right now, for example, would not be as enjoyable as having that dessert tomorrow, you would do well to wait. Yet as a practical matter, such calculations are difficult or impossible for individuals to make. And we all know from experience that hardly anyone ever tries. Real people rely on heuristics at best, and are sometimes not only inconsistent but also self-defeating. The Euler Equation also has theoretical implications that limit its applicability to the real world. For instance, to a population governed by the Euler Equation, the timing of consumption does not depend on when income arrives. So Euler populations will not alter their behavior in response income events like tax cuts. But clearly people in the real world do so alter their behavior.

This grant funds the research of Emi Nakamura and Jon Steinsson of Columbia University to test alternatives to the Euler Equation against a uniquely comprehensive dataset of the consumer behavior of the residents of Iceland, which has usefully kept records of nearly every financial transaction in the country. The goal is to devise a replacement for the Euler Equation and to create new macroeconomic models that are both less naïve and more useful in predicting consumer behavior in the real world.

The Conversation

BOSTON, MASSACHUSETTS

$500,000 over 25 months to enhance The Conversation's production of publicly accessible articles by academics about their research in economics.

Project Director: Bruce Wilson, Executive Director & Co-CEO

The Conversation U.S. (TCUS) is an independent and nonprofit news outlet that produces popular articles by academics about their research. Articles on the site are written and titled by researchers themselves, edited in cooperation with skilled journalists, and then published under a Creative Commons CC-BY license, allowing other publications like *The Atlantic*, *Washington Post*, and *New York Times* to republish them to their own readers. Since its founding in 2014, some 3,400 scholars from 525 universities have written for TCUS. Including republished articles, the number of "reads" has grown to more than six million per month.

Funds from this grant provide two years of support to the Business and Economics desk at TCUS, allowing the continued publication of articles on timely topics in economics and finance. In addition to defraying operational costs, grant funds will support the hiring of a researcher responsible for identifying top professors whose academic work is timely and compelling enough for TCUS to turn into popular, authoritative, and important news.

Haverford College

HAVERFORD, PENNSYLVANIA

$302,246 over 36 months to teach more undergraduate social scientists about integrity, transparency, and reproducibility in empirical research.

Project Director: Richard J. Ball, Associate Professor

Improving the reliability of empirical research will require many strategies over many years. One "theory of change" is to start at the beginning by targeting undergraduates during their first experiences with

collecting, processing, and interpreting data. If inculcated in college, good habits and rigorous expectations can last a lifetime. The benefits will be seen not only among those who go on to become academics, but also among those who become doctors, lawyers, leaders, and informed citizens generally.

With this motivation, economist Richard Ball has developed the Teaching Integrity in Empirical Research (TIER) Protocol, which guides novice researchers on how to work with data. Starting with liberal arts colleges, over 120 faculty have participated in extended workshops on how to teach this protocol. It is being used in 25 courses and has been featured in webinars run by the American Statistical Association. Funds from this grant provide support to Ball to continue expanding valuable partnerships, training programs, and curricular development projects for the TIER protocol, with particular emphasis on improving its footprint at research universities.

Innovations for Poverty Action

NEW HAVEN, CONNECTICUT

$660,365 over 36 months to study the behavioral welfare economics of potential interventions in four kinds of critical consumer decisions.

Project Director: Hunt Allcott, Associate Professor

This grant funds a project by Hunt Allcott, Dmitry Taubinsky, and Jonathan Zinman to model four common kinds of consumer decisions and then use those models to analyze the welfare implications of potential policy interventions aimed at altering these decisions.

They plan to examine supposed "mistakes" people make making decisions about sugar-sweetened beverages, credit card borrowing, checking account overdrafts, and college enrollment. In each context, the research team will start by formulating a theoretical model that can accommodate a range of consumer behaviors. Next, they will perform empirical analyses using experimental, quasi-experimental, and survey designs to identify biases and test predictions. Then they will analyze the empirical welfare implications of various regulatory or other interventions aimed at altering consumer choices in these areas.

In addition to covering data collection costs, grant funds will support a research assistants and a single project manager for all four studies.

Participants in the 2017 Sloan-NOMIS conference on the Attentional and Perceptual Foundations of Economic Behavior. The event brought together economists, psychologists, and neuroscientists to discuss how certain "irrational" human behaviors and decision mechanisms might come about due to constraints imposed by scarce perceptual and attentional resources. (PHOTO COURTESY OF ANDREW CAPLIN AND NEW YORK UNIVERSITY)

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$502,129 over 36 months to explore the effects of robots on employment, wages, and productivity.

Project Director: Daron Acemoglu, Elizabeth & James Killian Professor

This grant funds work by economists Daron Acemoglu of MIT and Pascual Restrepo of Boston University, who are investigating the economics of robotics and automation. These two researchers have begun developing a conceptual framework to understand how robotics is affecting the economy. The effects of new automation technologies, they maintain, can best be understood by explicitly examining how fast and how thoroughly they replace human labor in the performance of specific tasks. One virtue of such a framework is that it helps distinguish between the "displacement effect" of automation—the way it can reduce demand for certain kinds of labor—and the "productivity effect" of automation—the way it can increase the value of certain sorts of labor by making laborers more productive.

Using this framework, Acemoglu and Restrepo estimate that an increase of one new robot per thousand workers in the U.S. economy reduces the ratio of employment to population by 0.5 percentage points and reduces average wages by 1 percent in a local labor market with the average U.S. exposure to robots relative to a local labor market with no exposure to robots. Grant funds will support the extension and refinement of Acemoglu and Restrepo's work, including plans to disaggregate effects across various labor markets by studying long-term and fine-grain data at the firm level.

The project promises to generate at least six academic papers based on this work.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$434,269 over 36 months to conduct research on the private and social returns to innovation.

Project Director: Heidi L. Williams, Career Development Associate Professor

This grant funds a suite of three research projects by Heidi Williams of MIT to estimate the returns on R&D investments. All three projects deal with how private and public interests diverge and to what extent that divergence is mitigated or created by the patent system.

The first study asks how much "stealing" from previous innovations may increase private returns without necessarily increasing social returns. Working with Daron Acemoglu (MIT), Williams will measure "citations stolen" from patents that served as "prior art" for a given innovation. Because advances do not always come about due to new knowledge per se, but rather due to marginal or technical improvements on existing technologies, "follow-on innovations" can earn more private returns than warranted by the new social value they create. Williams will compare citation data between successful and unsuccessful patent applications to help quantify the extent to which progress depends on substituting new ideas for old ones, rather than the generation of completely new or disruptive capabilities.

For the second study, Williams and co-authors Pat Kline (University of California, Berkeley), Nevianna Petkova (U.S. Office of Tax Analysis), and Owen Zidar (University of Chicago Booth School of Business) will merge data on U.S. patent applications with IRS tax records to investigate which firms and which workers profit from a patent. By carrying out event studies, the team will specifically trace how spillovers accrue to private parties other than the original inventors.

The third study, with Eric Budish (Chicago Booth) and Ben Roin (MIT Sloan School of Management), seeks evidence to support the common but unproven assumption that patents increase innovation. What happens, for example, when the patent for a basic ingredient expires, but a "new use" is found during the unprotected period? Preliminary findings indicate a drop-off in for-profit (but not publicly funded) research on a drug once a generic competitor can enter the market. Williams and her collaborators will estimate the social value of "missing" research investments that private interests are not undertaking now, but would if incentive systems were different.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$390,487 over 36 months to study R&D investment levels and returns in the context of current U.S. productivity and innovation trends.

Project Director: John Van Reenen, Professor

While advances in information technology may be changing our lives, they are not necessarily translating into greater productivity or prosperity for the economy as a whole. Having peaked in the 1950s, productivity growth fell dramatically in the U.S. from 2004 to 2008. The last five years have seen some of the lowest levels since the U.S. began collecting such statistics.

This grant funds a project by John Van Reenen of MIT and Nicholas Bloom of Stanford to study how R&D investment in the U.S. affects the productivity growth rate. In previous work, Van Reenen and Bloom have identified how organizational innovations affect worker productivity. This grant funds an extension of that work as the team tries to isolate the role research and development plays in productivity by studying what they call "Ideas-TFP." From a macroeconomic view, the team will examine trends in Ideas-TFP across countries and regions. At the meso level, they will concentrate on a few key sectors, such as medical and agricultural innovation. Focusing further on individual firms, they will compile private and public data about R&D spending as well as patenting and new product introductions. Of particular concern to the team will be constructing measures of market "dynamism" that reflect the rates at which jobs and firms are created or destroyed.

The datasets compiled and shared by this project will also help other recent grantees, since estimating the returns on R&D is one of the animating and abiding goals for the Sloan Foundation's subprogram on the Economic Analysis of Science and Technology.

University of Michigan

ANN ARBOR, MICHIGAN

$738,000 over 36 months to support research on the economics of science that uses new data from universities about academic funding, spending, and training.

Project Director: Jason Owen-Smith, Research Professor

The Institute for Research on Innovation and Science (IRIS) provides data and data management services in support of fundamental research on the results of public and private investments in discovery, innovation, and education. Partnering with dozens of research universities, IRIS collects and processes administrative data, links those files with restricted federal microdata, and make the fully documented results available to researchers. Data compiled by IRIS bear on a host of interesting issues about the practice of modern science in a university setting, including return on investment, the productivity of scientific teams, and whether university science labs have spillover effects on local economies. Funds from this grant provide three years of support to IRIS to expand its operations and facilitate use of IRIS data by researchers.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$724,000 over 36 months to organize and support innovative research on the economics of digitization.

Project Director: Shane Greenstein, Kellogg Prof. of Information Technology

Digitization changes everything. The rapid decline in marginal costs for information storage, processing, and networking, for example, challenges many basic assumptions of textbook economics. Traditional concepts and analytical tools provide limited help understanding recent phenomena such as on-demand labor markets, zero-cost reproduction of copyrighted material, or exclusively ad-supported consumption goods.

This grant provides three years of continued support to the Economics of Digitization Working Group at the National Bureau of Economic Research. Under the leadership of Professors Shane Greenstein and Josh Lerner from Harvard and Scott Stern from MIT, the working group brings together top scholars to address issues such as digital markets for books, music, and the news; online privacy and piracy; government regulation of the internet; the economic implications of artificial intelligence; and the economics of two-sided markets. Grant funds will support two meetings of the working group per year, an annual student tutorial, a small grant program to support new work on the economics of digitization, and outreach and support to the growing community of researchers interested in working on these and related issues.

New Jersey Institute of Technology

NEWARK, NEW JERSEY

$509,038 over 19 months to develop and test privacy-protection techniques that enable researchers to collect and analyze sensitive data.

Project Director: Kurt Rohloff, Associate Professor

Fully Homomorphic Encryption (FHE) allows researchers to analyze encrypted data accurately without decrypting those data. It is an intriguing method for providing access to sensitive datasets while respecting both privacy concerns and licensing agreements and may eventually have significant use in privacy-protecting research protocols.

This grant funds a project to demonstrate the usefulness of FHE algorithms in academic research. The project is a partnership between computer scientists Kurt Rohloff from New Jersey Institute of Technology (NJIT) Shafi Goldwasser from MIT, and researchers from the University of Michigan's Institute for Research on Innovation and Science (IRIS). IRIS collects sensitive data from universities on grant spending and staffing. Rohloff and Goldwater will develop an FHE computing environment and associated algorithms designed to analyze this sensitive data while observing necessary privacy-protecting protocols. Grant funds will support graduate students, postdoctoral fellows, and programmers working on the project, a social scientist to consult closely with the team about the needs and practices of empirical researchers, and outreach to potential users through workshops, publications, and presentations at professional conferences.

New York University

NEW YORK, NEW YORK

$491,605 over 36 months to study how attention and perception affect microeconomic behaviors and macroeconomic outcomes.

Project Director: Andrew Caplin, Silver Professor of Economics

Over the past 30 years, behavioral research has succeeded in generating many examples of how people routinely violate traditional economic assumptions

that human actors are rational optimizers of their preferences. So far, however, behavioral economists have not succeeded in generating a coherent set of principles that could replace these assumptions. The grant funds a project led by Mike Woodford of Columbia, Andrew Caplin from NYU, and Ernst Fehr from the University of Zurich, to take up this challenge. The team hypothesizes that much of what we have observed in behavioral economics can be systematized and explained through the lens of attentional constraints. Nonoptimal decisions like those observed by behavioral economists can be best explained, they theorize, by thinking of them as the result of the allocation of limited attentional or decision-making resources.

Grant funds will support the team as they work on developing and testing this theory. Additional funds support a series of summer schools and workshops to further engage the larger community of scholars on these issues.

NumFOCUS

AUSTIN, TEXAS

$684,185 over 36 months to develop a programming toolkit for the construction, execution, and evaluation of macroeconomic simulations where heterogeneous agents interact behaviorally.

Project Director: Christopher D. Carroll, Professor

Though it has been ten years since the Great Recession, the comprehensive macroeconomic models in use at central banks, government agencies, and other large financial institutions are not noticeably improved from a decade ago. Conversations with leaders of those institutions point to two fundamental flaws in traditional models, namely, the assumptions about representative agents and about rational expectations. These imply not only that the economy evolves as if there is only one consumer and only one firm but also that the consumer and the firm make optimal decisions based on predictions that are realized.

Why are macroeconomists so reluctant to give up these stultifying assumptions? Because as hard as it is to run models with those assumptions, it is nearly impossible to compute much without them. Chris Carroll of Johns Hopkins University wants to fix this situation. While serving as chief economist at the Consumer Financial Protection Bureau (CFPB), he started constructing an open source computational tool kit for macroeconomists that can specifically handle non-rational heterogeneous agents.

The platform, the Heterogeneous Agents Resources Kit (HARK), is capable of modeling how microeconomic interactions among heterogeneous agents can lead to macroeconomic outcomes different from those predicted by traditional techniques. It is also possible to assign less-than-rational behaviors—such as hyperbolic discounting, anchoring, or herding—to parts of the population. Running simulations under those circumstances can reveal phenomena that traditional models can neither explain nor even generate.

This grant provides three years of support to Carroll as he further expands and develops HARK and creates tools to facilitate its use.

Private Capital Research Institute

BOSTON, MASSACHUSETTS

$500,000 over 36 months to set up an Administrative Data Research Facility that makes data about the private capital industry accessible to researchers.

Project Director: Josh Lerner, Director

Representing roughly $4 trillion globally, private capital plays an outsize role in productivity trends since its investments traditionally promote innovation and reorganization. Since private equity is private, however, there is very little available data on how venture capital or private equity firms invest in companies. What few studies we do have comes from proprietary data that cannot be shared and thus cannot be subjected to normal scientific attempts to replicate or check findings and results. Josh Lerner, a distinguished scholar at the Harvard Business School, is so keen on making data about this sector more available to academic researchers that he established a nonprofit, the Private Capital Research Institute (PCRI), explicitly for that purpose.

This grant funds a project by Lerner and his team at PCRI to compile a large dataset of Certificates of Incorporation (COIs). COI filings record significant details about the provision of private capital, including information on the capital structure and key terms of venture capital deals along with important information about valuation. Though supposedly public, COIs are in practice quite difficult to obtain or study other than one at a time. Lerner and the PCRI staff will use grant funds to acquire approximately 6,000 COIs and begin compiling a database that tracks 20-30 variables contained in COIs. The database will then be made available to academic researchers for research.

Stanford University

STANFORD, CALIFORNIA

$480,854 over 36 months to develop, test, and post new algorithms for estimating heterogeneous causal effects from large-scale observational studies and field experiments.

Project Director: Susan Athey, Economics of Technology Professor

This work funds methodological work by economist Susan Athey, who is aiming to develop rigorous new statistical algorithms that will allow machine learning programs to isolate causal relationships in large, complex datasets. Athey is building special new tools to handle methodological tasks that economists care about but often find challenging. These include novel techniques for taking heterogeneity into account while estimating treatment effects, calculating optimal policies, and testing hypotheses in very large and varied populations. Athey's focus will be on computing algorithms that are particularly useful for evaluating policy interventions and that enable one to isolate how policy changes differentially affect the behavior of heterogeneous populations. As a result of her work, she expects to publish several pieces in peer reviewed statistical and econometric journals and all the algorithms, code, documentation, and nonproprietary data Athey and her team generates will be made freely available to other researchers.

University of Toronto

TORONTO, CANADA

$474,606 over 36 months to study the behavioral welfare economics of how nudges affect financial decision making.

Project Director: Sandro Ambuehl, Assistant Professor

Suppose you observe people making economic decisions that do not appear to be in their own best interest. Say they are not saving enough for retirement. Policymakers may decide to "nudge" those people into saving more, following the precepts put forth by Sunstein and Thaler in their popular book about behavioral economics. But is this, on balance, a good idea? Perhaps some people have good reasons to "undersave" (e.g., perhaps the person has a wealthy spouse). Evaluating a policy "nudge" like programs to increase saving would involve asking if the net benefit to those targeted outweighs the cost of the intervention. Determining when this is the case is a problem in "Behavioral Welfare Economics" and involves important questions about when choices represent mistakes on the part of the chooser, when they do not, and how much choosers value the opportunity to correct mistakes they make.

This grant supports work by Sandro Ambuehl from the University of Toronto and Doug Bernheim from Stanford to study how to measure welfare losses incurred due to irrational mistakes. The team will field several experiments that give subjects two financial choices that look different but are actually the same and then measure both the subjects' willingness to pay for one option over the other and their willingness to pay to have the choice between options simplified. The results promise to shed new light on how the choosers value the ability to make good decisions and how that value is related to the likely costs of a poor choice.

Urban Institute

WASHINGTON, DISTRICT OF COLUMBIA

$616,926 over 24 months to demonstrate new statistical and visualization capabilities by migrating massive microsimulation models to the cloud.

Project Director: Robert McClelland, Senior Fellow

Evaluating the impact of proposed changes to the law requires predicting how people's behavior will change in response to this or that policy change. These predications are made using microsimulations. Researchers compile data from a representative sample of the population, run models that estimate what those individuals will do in response to changes in, say, the tax code, and then aggregate the results. This is a traditional tool not just for economists but also for the study of traffic, finance, epidemiology, and crowds. The problem with microsimulations, however, is that they are computationally unwieldy. Running a sophisticated model requires lots of time and computing power.

Funds from this grant support efforts by Robert McClelland at the Urban Institute's Tax Policy Center (TPC) to take the next big step in microsimulation by harnessing the power of cloud-based computing. McClelland will move the TPC's existing tax policy evaluation microsimulation models to the cloud, allowing the models to both be run faster and to allow multiple simulations to be run at once. This will make it routinely practical, for example, to see how robust results are to changes in parameter choices, to evaluate many different policy options and see which works best, and to handle nonlinearities due

to thresholds in the tax code where different rules kick in or out. Basic statistical tasks—like obtaining variances, building confidence intervals, or testing hypotheses—should run in a matter of hours rather than months. These new capabilities will greatly enhance how useful TPC's models are for rapidly understanding proposed changes in the tax code. The TPC team will then test these new capabilities by investigating three specific research questions: How does uncertainty in growth rates and recession timing affect projected tax revenues? How does sampling variation affect model behavior? And how can tax policies improve distributional outcomes without reducing revenue? Lastly, TPC will also launch an interactive website where the public can explore and visualize tax plans of their own design in real time.

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.

University of Michigan

ANN ARBOR, MICHIGAN

$20,000 over 12 months to support a symposium for researchers, policymakers, and financial experts that will highlight interactions between behavioral economics and macroeconomics.

Project Director: Michael Barr, Faculty Director

Stony Brook Foundation

STONY BROOK, NEW YORK

$15,000 over 6 months to support diverse participation by graduate students in a summer workshop on macro, behavioral, and experimental economics.

Project Director: Yair Tauman, Director

University College London

LONDON, UNITED KINGDOM

$20,000 over 12 months to expand the content and outreach of Microeconomic Insights, an online source for accessible summaries of high-quality microeconomic research.

Project Director: Ariel Pakes, Thomas Professor

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

Harvard University

CAMBRIDGE, MASSACHUSETTS

$18,803 over 6 months to support the Third Annual Conference on Big Data at the Harvard Center for Mathematical Sciences and Applications.

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

Tufts University

MEDFORD, MASSACHUSETTS

$20,000 over 6 months to support a mathematical workshop on the Geometry of Redistricting.

Project Director: Moon Duchin, Associate Professor

Moon Duchin, Associate Professor of Mathematics at Tufts University, gives a talk at the Geometry of Redistricting workshop at the Somerville Theater on August 7, 2017. The workshop was the first of a national series organized by the Metric Geometry and Gerrymandering Group (MGGG), a small Boston-based team of mathematicians who study applications of geometry and computing to U.S. redistricting in the interest of promoting and preserving democracy." (ALONSO NICHOLS/TUFTS UNIVERSITY)

Officer Grants

Columbia University

NEW YORK, NEW YORK

$125,000 over 12 months to study the general equilibrium effects on labor markets due to robots.

Project Director: Edmund Phelps, Director

University of Florida

GAINESVILLE, FLORIDA

$124,999 over 16 months to establish an Administrative Data Research Facility that provides open access to precinct-level election data and visualization tools.

Project Director: Michael P. McDonald, Associate Professor

Harvard University

CAMBRIDGE, MASSACHUSETTS

$80,000 over 14 months to organize interdisciplinary studies of the scientific research enterprise, including how inputs produce the outputs.

Project Director: Karim Lakhani, Professor

Haverford College

HAVERFORD, PENNSYLVANIA

$63,112 over 12 months to study causes and consequences of occupational exit by scientists and engineers.

Project Director: Anne Preston, Professor

Industrial Organizational Society, Inc.

BOSTON, MASSACHUSETTS

$20,000 over 24 months to support graduate student presentations at the International Industrial Organization Conference.

Project Director: Julie Mortimer, Associate Professor

University of Michigan

ANN ARBOR, MICHIGAN

$10,000 over 12 months to organize a meeting of experts on the development of tools for teaching Quantitative Empirical Reasoning.

Project Director: Margaret Levenstein, Director

Miller-McCune Center for Research Media and Public Policy

SANTA BARBARA, CALIFORNIA

$50,000 over 6 months to support academic and nonprofit participation in a workshop that will also bring together industry and policy leaders to discuss computational social science.

Project Director: Geane DeLima, President

New Venture Fund

WASHINGTON, DISTRICT OF COLUMBIA

$50,000 over 25 months to support the Open Research Funders Group, a partnership committed to the open sharing of research outputs.

Project Director: Heather Joseph, Executive Director

Working Longer

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.

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

Brandeis University

WALTHAM, MASSACHUSETTS

$413,385 over 37 months to create the first comprehensive database, with ages and genders, of approximately two million inventors who received a U.S. patent between 1976 and 2012 and to measure how inventive creativity varies over the life course of inventors.

Project Director: Margie Lachman, Professor

Research shows a shifting balance of gains and losses in cognitive abilities throughout adulthood, with increases in experience-based knowledge and decreases in the ability to process new information quickly and efficiently. However, as is the case with much psychological research, little is known about how these ability changes manifest in daily life, including in the workplace.

This grant supports a project by psychologist Margie Lachman and economist Adam Jaffe to study creative output over the life course by augmenting and analyzing a large dataset of more than two million patent holders. Lachman and Jaffe will use the dataset to examine such questions as the extent to which individuals are able to maintain or increase the quality and quantity of their innovative work, whether this varies by sector or gender, and whether teams that bring older and younger workers together are less or more creative than teams that are less age-diverse.

This research will result in new knowledge and important insights for economists, psychologists, and other social scientists who are interested in how aging-related cognitive changes can affect innovation across life trajectories and across different types of teams. The creation of the new database will also facilitate further research.

Harvard University

CAMBRIDGE, MASSACHUSETTS

$657,748 over 31 months to support research that addresses how work conditions shape observed employment transitions of older workers and how age and employment status affect preferences for working conditions.

Project Director: Nicole Maestas, Associate Professor of Health Economics

This grant funds follow-up research by Harvard's Nicole Maestas in the aftermath of the 2015 American Working Conditions Survey (AWCS). The AWCS is alone among major workplace surveys in its attention to cataloging both the pecuniary and the nonpecuniary characteristics of jobs, which allows researchers to analyze how these characteristics shape older Americans' decisions regarding working into later ages. In tandem with the AWCS, Maestas fielded a stated preference experiment designed to assess how much older workers value different job characteristics. Funds from this grant will allow Maestas to reconnect with survey participants three years after the original ACWS survey, allowing the collection of new data and enabling a clearer look into both how workplace characteristics shape retirement decisions and the dynamics of how worker preferences about the desirability of various workplace characteristics change over time.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$971,750 over 40 months to examine the link between the receding retirement age of older workers and the shifts in demand for these workers associated with the expansion of artificial intelligence and robotic substitutes.

Project Director: Richard B. Freeman, Ascherman Professor of Economics

Funds from this grant support research by Harvard economist Richard Freeman that will link and then analyze 16 different data sets in order to examine the relationship between the increased employment/postponement of retirement by older workers and shifts in the demand for these workers associated with the changing composition of industries and the expansion of artificial intelligence (AI) and robotic automation. Freeman will examine differences in employment and earnings of these workers by gender, education, health status, and income, and by industry, occupation, and firm and will study the impacts of these technologies on earnings, as well as employment. Overall, this project seeks to identify new patterns of work and retirement, determine their effect on worker well-being, and project whether these patterns are likely to continue among younger cohorts as they age.

In addition to his own analysis, Freeman will commission 10 additional papers from leading economists using this new linked dataset, which will then be made available for public access through application to the

Census Bureau research centers. All papers will be published as NBER Working Papers and submitted for publication in leading peer-reviewed journals.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$437,161 over 29 months to compare the retirement paths of public and private employees, assessing differences in working conditions, retirement benefits, and government regulations and impacts on the age of retirement from career jobs and the likelihood of post-retirement work.

Project Director: Robert L. Clark, Research Associate

Public sector and private sector employees experience what appear to be distinctly different routes from full-time employment to full-time retirement. This grant funds research by North Carolina State University's Robert Clark and Harvard's Joseph Newhouse that will compare the retirement paths of public and private workers and assess how working conditions, retirement benefits, and government regulations impact the age of retirement and the likelihood of working after retirement.

Clark and Newhouse will commission 16 research studies that will examine the impact of pensions, health policies, employment rules, and government programs and regulations on the timing of when older workers leave their jobs, their potential for working after retirement, and how these differ for public and private sector employees. The research will be carried out in two waves, with eight projects and a capstone research conference for each wave.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$375,475 over 48 months to renew support for a three-year postdoctoral program on the economics of the aging workforce.

Project Director: Nicole Maestas, Associate Professor of Health Economics

This grant provides four years of renewed support to a postdoctoral fellowship program run by the National Bureau of Economic Research which supports talented young researchers interested in working on the economics of an aging workforce. Fellows receive a one-year stipend to carry out research at NBER's office in Cambridge, Massachusetts, as well as limited funds for research-related purposes. In addition, fellows have the opportunity to participate in NBER's weekly lunch seminars, NBER's Summer Institute workshops on Aging and Labor Studies, relevant activities related to the larger NIA-NBER fellows program on Aging, and collaborative research and networking activities with a similar postdoctoral fellowship program at the Harvard Center for Population and Development Studies.

Selection of the three fellows per year will be made by a panel of experts who are members of both the Aging and Labor Studies NBER programs. Nicole Maestas of Harvard University will chair the selection committee, which will include leading scholars in the fields of labor economics and the economics of aging. The committee's decisions will be based on their evaluation of the fellows' potential to make an important contribution to the understanding of the behavior of older workers and the functioning of labor markets for these workers.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$281,750 over 24 months to provide partial support for the International Social Security (ISS) project in order to understand how labor force participation responds to Social Security reforms in 12 countries and to draw lessons for the United States.

Project Director: Courtney Coile, Professor of Economics

This grant supports an ongoing NBER project, the International Social Security (ISS) project, led by Courtney Coile and Axel Börsch-Supan, that will examine a variety of retirement and social safety net reforms that have been implemented in other countries, including Canada, Japan, and nine European countries. Teams of investigators from 12 countries (11 mentioned above and the U.S) will examine the precise financial incentives associated with those reforms and the effects of the changed financial incentives on work, retirement, and claiming behavior at older ages. The studies will use a common template, which will enable meaningful, if complicated, comparisons across countries. While the institutional and cultural contexts differ across countries to various degrees, the commonality of demographic pressures and the limited scope of options for restoring financial sustainability to retirement programs make the experiences of other countries directly relevant to Social Security reform discussions in the United States.

Darlene Howard (left), professor emerita of psychology at Georgetown University, talks with thee journalists at a National Press Foundation workshop about changing views on the aging mind and brain. **(PHOTO COURTESY OF THE NATIONAL PRESS FOUNDATION.)**

National Opinion Research Center

CHICAGO, ILLINOIS

$285,804 over 20 months to increase the amount and quality of news coverage of the economics of working longer, by training fellows in economics and data-driven journalism and by supporting the development of an original survey and enhanced coverage.

Project Director: Trevor Tompson, Vice President & Director

This grant provides twenty months of continued support for a partnership between National Opinion Research Center (NORC) and the Associated Press (AP) to marry NORC's research expertise with AP's media reach to create a vehicle for promoting public understanding of the barriers and facilitators, as well as the causes and patterns, to people working beyond conventional retirement age in the United States. Funds from this grant will provide twenty months of salary support to a NORC-AP journalism fellow, who is selected through a competitive application process. The fellow will cover the older work force beat, producing thoughtful, scientifically informed, high-quality articles on a variety of issues at the intersection of aging and work, including retirement, work and health, productivity, older workers and the gig economy, and the economic impact of an aging work force on businesses, pensions, and government programs like Social Security. In addition, NORC will field a high-quality, nationally representative survey of older adults about issues facing older workers with the results distributed nationwide through the AP. Survey reporting will be supplemented with reporting on new economic research on the older work force and survey data will be made freely available to researchers in a public-use dataset.

Princeton University

PRINCETON, NEW JERSEY

$383,891 over 18 months to improve the Contingent Worker Supplement (CWS) questions in order to increase validity, reduce measurement error, and include appropriate categories of alternative workers.

Project Director: Alan B. Krueger, Professor of Economics and Public Affairs

Our understanding of the size and characteristics of the alternative work force—freelance workers, contract workers, contingent workers, on-call workers, temporary workers, etc.—is severely limited by inadequate federal surveys. They are inadequate in several ways: lack of a clear and agreed upon taxonomy of work; questionable phrasing of questions; sporadic fielding of the surveys; and failure to take into account entirely new forms of work, often referred to as the gig economy, the platform economy, or the on-demand economy.

The U.S. Department of Labor's Bureau of Labor Statistics (BLS) is fielding its first Contingent Work Survey (CWS) in 10 years. This grant funds a project by Princeton economist Alan Krueger and Edward

Freeland, Director of the Princeton Survey Research Center, to identify and examine ways to improve the CWS questions in order to increase validity, reduce measurement error, and determine if new or additional categories of alternative work are needed.

Stanford University

STANFORD, CALIFORNIA

$599,839 over 36 months to support a conference series in order to foster more research and policy discussion about changing labor market institutions to accommodate increased longevity.

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

The annual Stanford Institute Economic Research (SIEPR) Working Longer Conferences allow researchers working at the intersection of aging and work to present their findings, compare approaches, imagine new projects, and get constructive feedback from fellow researchers. Over the past four years, more than 90 different scholars have presented high-quality research as authors, co-authors, or discussants, and each conference has averaged 60 to 70 attendees. The conferences also provide the opportunity for Sloan to identify new potential grantees and to introduce and welcome junior scholars to the community of working longer researchers. This grant provides funds to Stanford University to continue organizing, administering, and hosting the SIEPR Working Longer conferences for an additional three years.

Stanford University

STANFORD, CALIFORNIA

$234,987 over 24 months to enhance the understanding of the options faced by households whose previous retirement plans now appear unrealistic, perhaps due to slow growth, lower than projected wage growth, or poor past or projected asset returns.

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

Many economists predict that the global economy is entering a sustained period of historically low productivity and real wage growth. This grant funds work by economists John Shoven and Sita Slavov that will analyze the implications of working longer and strategies for saving for retirement in a such a low-growth, low-return, low real-wage-growth environment. How do optimal retirement and savings strategies change as the prospects of robust economic growth dim?

This research will include two projects related to the broader theme of retirement-focused behaviors in a slow growth economy. The first will focus on the measuring the benefits accruing to working longer in a low-return environment. Using data taken from the influential Health and Retirement Study (HRS), Shoven and Slavov they will compute the rate of return to working longer for HRS respondents between ages 50 and 62 using a life cycle model that assumes individuals face borrowing constraints and that incorporates the actuarial benefit adjustments they receive when they delay Social Security

The second project will explore in depth the impact of low wage growth and low asset returns in a slow growth economy. Shoven and Slavov will work through the theoretical implications of optimal savings and working decisions. Because savings depresses current standards of living in exchange for future benefits, the attractiveness of saving drops as asset returns slow. Likewise, the attractiveness of future work dips as wage growth slows. Shoven and Slavov will work out how these differing factors interact under standard economic modeling assumptions, paying special attention to the implications for working longer to raise or maintain living standards.

The two projects form an interesting and compelling research agenda that has real-life consequences for millions of Americans.

Urban Institute

WASHINGTON, DISTRICT OF COLUMBIA

$1,876,012 over 24 months to identify, simulate, and evaluate policy reform options that could reduce work disincentives at older ages, more equitably and efficiently provide retirement benefits to older adults, and ensure long-term solvency of U.S. retirement programs.

Project Director: Richard W. Johnson, Senior Fellow

To make sound decisions about potential changes to Social Security, Medicare, and other retirement programs, policymakers need reliable, objective predictions based on the best available data on how reforms would likely affect retiree income and benefits, labor market activities, taxpayer burdens, and program costs and solvency. The predictions are often provided by DYNASIM, the Urban Institute's well-respected microsimulation model. This grant funds a project by the Urban Institute to expand and improve the DYNASIM model.

DYNASIM is a more ambitious tool than nearly every policy evaluation model in use today. It attempts

to predict a wider range of outcomes than do most models developed by CBO or the analytical offices of Cabinet agencies. For example, a raise in the early and full retirement ages would almost certainly affect retirement ages, earnings, savings patterns, and the distribution of incomes of those 60 to 74 years in age. It may also influence marriage rates and living arrangements, and could indirectly affect the health status and health insurance coverage of some older Americans. Simple models often focus on just one or two of these outcomes. DYNASIM's predictions, however, attempt to capture all these indirect effects.

With this grant, the Urban Institute will develop further the predictive capabilities of DYNASIM so that the model can be used to produce credible and detailed predictions of the impact of government policy reforms that affect the nation's elderly. The programs of interest include Social Security, including its Disability Insurance (SSDI), Medicare, tax policies that affect retirement saving, and important components of Medicaid. The grant will examine how reforms in one or more of these programs will affect old-age labor supply, the prevalence of old-age poverty, the distribution of income in old age, out-of-pocket spending on health care in old age, and tax burdens of the elderly. The DYNASIM model will also produce predictions of the effects of these policy changes on both the elderly and the nonelderly.

In addition to providing for the needed improvements, the grant includes funds to maintain DYNASIM during the project period, such as by incorporating the latest economic and demographic assumptions used by Social Security and updating tax and other policy parameters. In addition, the Urban Institute team will use some funds to train additional DYNASIM analysts, to ensure the sustainability of the model, and to find ways to provide access to other researchers, so that it can continue to provide the research and policy community with the best information on the effects of retirement policy reforms after the grant period ends.

Grants Made Against Prior Authorizations

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

University of California, Berkeley

BERKELEY, CALIFORNIA

$20,000 over 12 months to support the first paper in a two-year, three-paper research agenda on "The Equilibrium and Spillover Effects of Working Longer: Evidence from Quasi-Experimental Variation in Early Retirement Incentives".

Project Director: Benjamin Schoefer, Assistant Professor

Officer Grants

Center for Economic and Policy Research

WASHINGTON, DISTRICT OF COLUMBIA

$15,000 over 11 months to analyze the Contingent Work Supplements (CWS) in order to better understand the incidence of nonstandard work arrangements among varying demographic groups and to assess changes found between 1995-2017.

Project Director: Eileen Appelbaum, Co-Director

National Press Foundation

WASHINGTON, DISTRICT OF COLUMBIA

$106,553 over 9 months to provide a four-day training in the public understanding of working longer to a set of 20 journalists.

Project Director: Sandy Johnson, President & COO

Stanford University

STANFORD, CALIFORNIA

$124,999 over 20 months to research and publish case studies of employer practices shaping the working lives of Americans 60 and older.

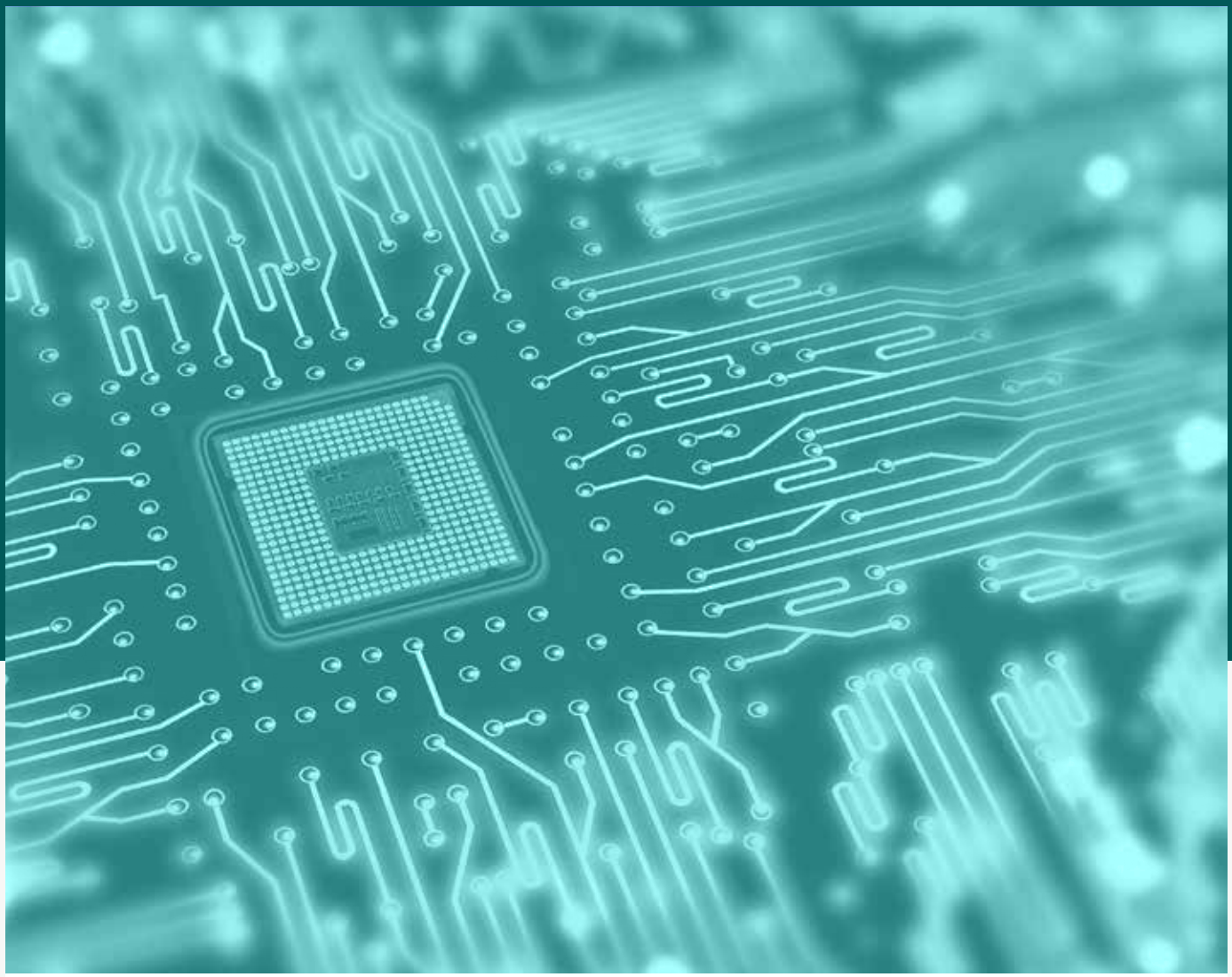
Project Director: Laura L. Carstensen, Professor

Center for State and Local Government Excellence

WASHINGTON, DISTRICT OF COLUMBIA

$109,450 over 12 months to collect, analyze and code data on U.S. state pension statues and related policies that impact a retiree's ability to continue working or return to work.

Project Director: Joshua Franzel, President & CEO



Digital Technology

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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

University of California, Berkeley

BERKELEY, CALIFORNIA

$659,359 over 24 months to support improvements to NumPy, an essential numerical computing utility for the Python programming language.

Project Director: Jonathan Dugan, Chief Research Officer

If you are working with data using the Python programming language, you probably rely on an open source software library called NumPy which provides tools to store large multidimensional arrays and matrices, algorithms for their analysis and manipulation, and means to move them from one software package to another. Without NumPy, scientific computing in Python would be slower, more cumbersome, and more error-prone.

Initially released in 2005, NumPy's core code has built up a substantial "technical debt," which not only constrains the future development of the platform but also creates a high barrier to entry into its open source developer community.

This grant supports an ambitious project led by NumPy core developer Nathaniel Smith to discharge this technical debt and set in place standards and architecture to encourage more sustainable development going forward. Using this funding, Smith and a team of developers will develop new modular systems for creating data types and arrays of data within NumPy; conduct a wholesale clean-up of the NumPy codebase; and launch a new community engagement process that includes face-to-face meetings, the onboarding of new contributors, and processes for proposing and evaluating larger architectural changes to the platform.

University of California, Riverside

RIVERSIDE, CALIFORNIA

$499,480 over 36 months to support continued development of a browser-based interactive platform for exploring -omic datasets.

Project Director: Holly Bik, Assistant Professor

Bioinformaticist Holly Bik was particularly interested in broadening the ability of metagenomics researchers to take advantage of data visualization in order to explore and understand population distributions. With Sloan support, Bik developed Phinch, a web-based visualization platform that easily integrates with common tools like QIIME.

This grant provides three years of funding to Bik to scale up Phinch and grow its user base into a sustainable community-supported software project. Her plan is to begin with a user workshop to refine already-collected requirements from existing users and metagenomics pipeline maintainers, then move back into active development. The technical goals laid out for the platform include the integration of statistical tools into visualization interfaces, an important step to help researchers move from exploration of data through visualization into more robust analysis.

The University of Chicago

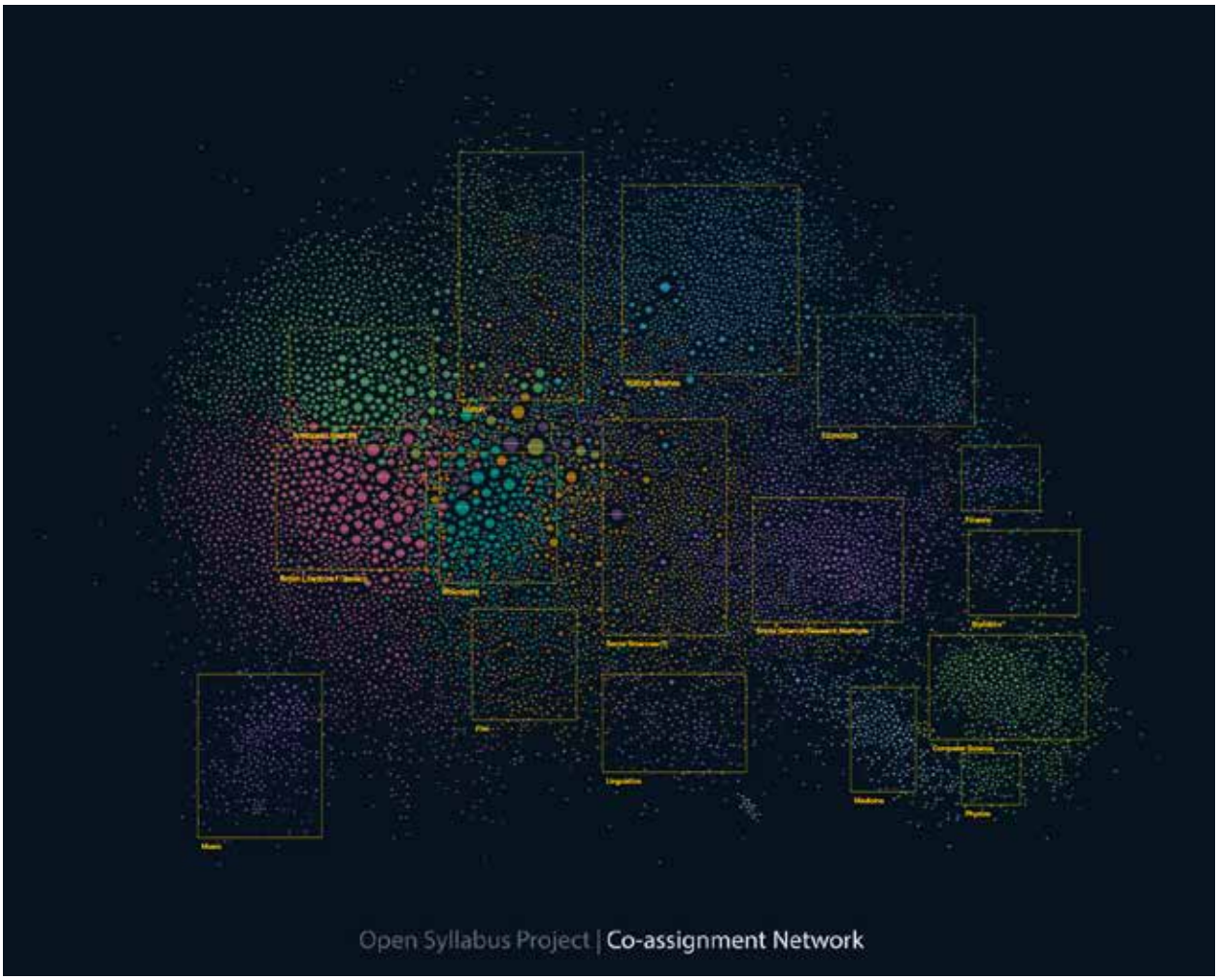
CHICAGO, ILLINOIS

$750,000 over 36 months to study how the choice of computational tools such as programming languages and data-analysis environments impacts their users.

Project Director: James A. Evans, Professor

In linguistics, the Sapir-Whorf hypothesis holds that the structure of a language affects its speakers' world view and modes of thought. University of Chicago computational sociologist James Evans and University of Wisconsin cognitive scientist Gary Lupyan hypothesize that a version of this hypothesis applies to programming languages. They propose to explore the "cognitive and social consequences of programming and data analysis environment" choices, specifically how the characteristics of programming languages might influence a developer's efficiency, creativity, and collaboration.

To evaluate this hypothesis, Evans and Lupyan will undertake exploratory studies of observational data on software development broadly then then look more closely at specific cases in scientific software development. They will use large-scale project data from GitHub to determine which specific features of programming languages (e.g., static vs. dynamic variable typing) might be best operationalized as independent variables that influence the ways in which developers think and work. They will then test the hypotheses that surface through that exploratory work using a series of comparative-language experiments to be run in constrained development environments, including the Jupyter Notebook platform. Grant funds provide three years of research support for the project.



The Sloan-supported Open Syllabus Project extracts individual items from over 1 million US university and college course syllabi offering a unique perspective on the use of scholarly work in the classroom. In addition to a search interface that allows users to see what else is most frequently assigned with a given text, the Open Syllabus Explorer (at http://explorer.opensyllabusproject.org/) offers a browseable graph of all assigned works. The proximity of, say, Social Science Research Methods, Statistics, and Computer Science in the lower right corner is a function of the frequent co-assignment of texts from those fields (as opposed to History or American Literature, represented in the upper left).

Code for Science and Society

PORTLAND, OREGON

$394,000 over 12 months to develop software for open, reproducible, version-controlled, and testable spreadsheets.

Project Director: Nokome Bentley, Project Director

A whole lot of science takes place in spreadsheets. Many researchers still bring their data into Excel as a convenient environment for exploration and analysis. Unfortunately, Excel has none of the attributes of a modern platform for reproducible computational research: it is not easily extensible to interoperate with data repositories; does not easily allow for version control; and cannot take advantage of substantial investments in open source scientific software packages.

Nokome Bentley, a New Zealand-based fisheries scientist and software developer, has been developing a project called Stencila Sheets, an authoring tool that offers users familiar Google Docs–style interfaces, but is something quite different under the hood. His vision is a spreadsheet where each cell can hold data or code written in R, Python, Julia, or several other computing languages, with the output of a given cell addressable by any other cell in the sheet. The proximate goal is not to develop a direct competitor to Excel, but rather to offer spreadsheet users an easy bridge into the open-source ecosystem of reproducible computational science. Funds from this grant will allow further development of the Stencila platform over the next year, including increased integration with the Jupyter computing ecosystem, the development of a standalone desktop client, and the addition of features like real-time collaboration and import/export from other platforms.

Columbia University

NEW YORK, NEW YORK

$313,241 over 24 months to enable greater use of machine learning techniques in scientific research through technical and user experience improvements to scikit-learn.

Project Director: Andreas Mueller, Lecturer

Written in Python, scikit-learn is an open source machine learning software package used widely across the natural and social sciences (the "software paper" that introduced scikit-learn in 2011 has been cited over 4,700 times). Its maintainers have identified a set of improvements that would make it substantially more efficient for scientific users and enable more reproducible research, but which would require more focused time than any contributor can currently offer. This grant provides funds to Columbia University's Andreas Müller, one of the current core maintainers of scikit-learn, to design and implement the identified improvements. These include more flexible data types, better integration with Jupyter notebooks for model exploration, and some technical fixes that will substantially improve platform stability and performance.

Council on Library and Information Resources

WASHINGTON, DISTRICT OF COLUMBIA

$925,362 over 36 months to support data and software curation postdoctoral fellowships, in order to develop emerging leaders in the field and build capacity within academic libraries.

Project Director: Charles Henry, President

This grant provides three years of support to an ongoing postdoctoral fellowship program administered by the Council on Library and Information Resources (CLIR) that aims both to grow data and software curation capacity within research libraries and to develop the next generation of data and software curators who will bring deep research experience into the organizational context of the university library. Fellows are PhD-level researchers who are selected, in part, for their potential to build collaborative relationships with natural and social scientists across the university. Since the launch of the program in 2012, fellows have been placed at a wide variety of universities, working with scientists and library staff on projects to improve the university's data and software curation services and responding to requests from researchers to build tools and resources that speak to their needs. Recent participating institutions include UC Berkeley, MIT, Yale, the California Digital Library, Vanderbilt, the Federal Reserve Bank of Kansas City and the U.S. Agency for International Development.

Funds from this grant will support the 2018-2020 class of CLIR fellows, which includes a cohort of four software curation fellows as well as four additional data curation fellows in the natural and social sciences. In addition to covering some salary, travel, and professional development support for fellows, grant funds cover operational costs associated with the administration of the program.

New York University

NEW YORK, NEW YORK

$550,000 over 18 months to support the development of and data exchange between Datavyu (a tool for video coding) and Databrary (a platform for archiving and controlled sharing of video data).

Project Director: Karen Adolph, Professor

In the behavioral sciences, fields like child development and behavioral ecology often rely on video as a primary source of research data. The major research repositories of behavioral video, however, do not have much more sophistication than YouTube, relying on keywords and transcripts for discovery and failing to leverage incredibly sophisticated coding data into analytic tools.

Karen Adolph at NYU and Rick Gilmore of Penn State are accomplished psychologists who are responsible for developing a leading video coding tool, the open source Datavyu, and an innovative platform for behavioral video archiving, Databrary. The former is notable for its flexibility and fine-grained resolution, and the latter for its ability to set precise access controls to comply with the myriad restrictions related to the use of human subjects of the projects whose data it hosts.

This grant supports an 18-month project by Adolph and Gilmore to use Datavyu and Databrary to model integration between coding tools and data repositories more generally. Since both platforms are open source and have active user communities, they are excellent candidates to prototype how standards-compliant coding data might be transferred into a data repository alongside its raw video, and how that repository might then leverage that coding data into new discovery and analytic interfaces. This work could generalize to a host of other coding tools, not to mention the handful of other social science data archives like ICPSR and Dataverse that are tentatively moving into hosting behavioral video data.

NumFOCUS

AUSTIN, TEXAS

$497,338 over 24 months to support the development of data and computational skills training curricula in image analysis, economics, and chemistry.

Project Director: Tracy Teal, Executive Director

Data Carpentry is community-driven organization that develops and teaches workshops on the fundamental data skills needed to conduct research. A sister effort to Software Carpentry, which provides researchers with hands-on training in the basic software engineering skills that are increasingly needed for the conduct of 21st century science but are unlikely to be taught in standard scientific PhD curricula, Data Carpentry workshops target researchers who think of themselves not as software developers, but who may write custom code for the management, preparation, and analysis of their research data. Because the size, shape, and format of data differ substantially across disciplines, the "Data Carpentry" curriculum is necessarily domain-specific in a way that Software Carpentry is not. After initial successes in ecology, genomics, geospatial data, and biology, the Data Carpentry leaders will use the funds from this grant to grow into new disciplines (image analysis, economics, and chemistry), in the process standardizing their curriculum development processes in order to make it easier to form new disciplinary communities. Over the next two years, Data Carpentry plans to assemble Advisory Committees for each area of focus, run curriculum-building hackathons, and then pilot each bootcamp several times before releasing to the broader community of Software/Data Carpentry members.

Rensselaer Polytechnic Institute

TROY, NEW YORK

$774,770 over 36 months to support the Research Data Alliance regional U.S. organization.

Project Director: Leslie Borrelli, Executive Director

The Research Data Alliance is an international grassroots organization that brings technologists, developers, and researchers together to jointly develop and adopt data-sharing infrastructure, tools, and practices. RDA working groups tackle some of the thorniest topics facing data science today, including reproducibility, data preservation, interoperability, data citation, and best practices for data repositories. RDA provides useful services to the data-driven research community, including to many grantees supported through the Foundation's Digital Information Technology program. Funds from this grant provide core operating support to the U.S. regional chapter of the RDA and support efforts to build out the organization's U.S. administrative infrastructure and grow its membership base. Funded activities over the next three years include the production of reports detailing RDA data sharing recommendations, member outreach, creation of adoption case studies for RDA products and services, trainings, annual stakeholder meetings, and the development of a long term business plan for independent sustainability.

Julia Computing

NEWTON, MASSACHUSETTS

$912,609 over 24 months to support the continued development of the Julia programming language.

Project Director: Viral Shah, CEO & Co-Founder

Developed by a small group of MIT computer science students, Julia was designed to be the "Goldilocks" of computer programming languages, combining the ease of use of high level languages like R or Python with the computing power of workhorse languages like C or Fortran. Julia has steadily grown in popularity since its 2012 release and has found particularly enthusiastic use in economics and finance. Further improving the language however, requires addressing several key pain points for research users. Funds from this grant support a project to update the Julia language and substantially improve usability for researchers by improving documentation and error messaging, building a substantially faster compiler, and developing a package manager to facilitate the discovery and use of third-party extensions.

In addition, this grant includes resources for a concerted push to diversify the currently overwhelmingly white and male Julia developer community. Testing the application of models that have been successful in other open source software projects, the team will devote substantial effort to engagement with women and underrepresented minority groups, and offer travel subsidies for participation in Julia events to diversify its community.

Hopewell Fund

WASHINGTON, DISTRICT OF COLUMBIA

$211,091 over 16 months to develop centralized coordination capacity within the Data Science Environment partnership for alumni networking, evaluation, and internal and external communications.

Project Director: Ali Ferguson, Coordinator

The Moore-Sloan Data Science Environments (DSEs) are a major collaboration between Sloan and the Gordon and Betty Moore Foundation to support three university-based data science centers devoted to empowering data-driven research through the creation of new tools, resources, infrastructure, and career paths that help university researchers make the most of the possibilities that data science opens for the 21st century scientist. Supported centers have been launched at the University of California, Berkeley; NYU; and the University of Washington.

This grant provides funds for the hire and support of a DSE coordinator who will take responsibility for internal communication between the DSEs, serve as a visible point of contact for inquiries and outward messaging for best practices coming out of the DSEs, and develop a network to connect and support "alumni" who have in one way or another left the DSE universities and are now building data science capacity at other universities.

This new coordinator position will be initially housed within the Hopewell Fund, an arm of the New Venture Fund.

Grants Made Against Prior Authorizations

In March 2017, the Trustees authorized the expenditure of up to $250,000 for small grants promoting the aims of the Data and Computational Research program. The following grants were made against this previously authorized fund.

University of California, Berkeley

BERKELEY, CALIFORNIA

$18,500 over 21 months to study private sector research and data sharing practices.

Project Director: Deirdre Mulligan, Associate Professor

University of California, Office of the President

OAKLAND, CALIFORNIA

$20,000 over 6 months to develop connections between open source scientific software developers, through a one-day meeting.

Project Director: Guenter Waibel, Executive Director

The University of Chicago

CHICAGO, ILLINOIS

$30,000 over 6 months to support a conference on Data Science for Social Good.

Project Director: Rayid Ghani, Director

Columbia University

NEW YORK, NEW YORK

$15,000 over 8 months to support a meeting on offline data transfer networks.

Project Director: Mark Hansen, Brown Professor Media Innovation

FORCE11

SAN DIEGO, CALIFORNIA

$20,000 over 6 months to partially support the 2017 Future of Research Communication and eScholarship meeting.

Project Director: Cameron Neylon, President

Georgetown University

WASHINGTON, DISTRICT OF COLUMBIA

$7,000 over 19 months to partially support a meeting on the capacity of organizations at the local, state, national and international levels to utilize data to advance science and solve social problems.

Project Director: Michael Bailey, Interim Dean

NumFOCUS

AUSTIN, TEXAS

$20,000 over 6 months to support travel by students and junior faculty to a workshop focused on the development of scientific software using the R statistical computing language.

Project Director: Karthik Ram, Project Lead

Open Source Hardware Association

BOULDER, COLORADO

$58,920 over 12 months to support the development of a dynamic, web-based platform to facilitate the adoption, licensing, and improvement of open source hardware.

Project Director: Alicia Gibb, Executive Director

Aspiration

SAN FRANCISCO, CALIFORNIA

$20,000 over 6 months to support participation in a summit on the sustainability of open source software projects.

Project Director: Allen Gunn, Executive Director

Officer Grants

University of California, Davis

DAVIS, CALIFORNIA

$50,000 over 22 months to further develop tools for the distributed transcription and classification of data from historic sources.

Project Director: Peter Brantley, Director of Online Strategy

Carnegie Mellon University

PITTSBURGH, PENNSYLVANIA

$9,561 over 6 months to support a workshop on community code engagements in scientific software.

Project Director: James D. Herbsleb, Professor

Public Lab

CAMBRIDGE, MASSACHUSETTS

$124,849 over 17 months to support a workshop and associated roadmapping activities on open science hardware.

Project Director: Shannon Dosemagen, Executive Director

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

The American Assembly

NEW YORK, NEW YORK

$749,399 over 24 months to support the growth and sustainability of a large-scale online database of university course syllabi.

Project Director: Joseph Karaganis, Vice President

In 2013, the Sloan Foundation approved a two-year grant to Joe Karaganis at the American Assembly to prototype a system to aggregate and make available data about what materials are assigned on course syllabi. The resulting Open Syllabus Project team publicly launched the first version of their Syllabus Explorer in early 2016. Within two months, the site logged over 250,000 visits, and was written up in the Chronicle of Higher Education as well as the New York Times, the Washington Post, and Time magazine. Funds from this grant provide continuing support to the effort, allowing the project to increase both the scale and richness of the syllabus data available for analysis. Funded activities include development of algorithms to allow the database to better recognize articles in STEM fields, expansion of the platform to enable the incorporation of datasets, software, and other items that might be published with a Document Object Identifier, and a pilot partnership with the Digital Public Library of America to mobilize the syllabus data in the service of public libraries.

Association of Research Libraries

WASHINGTON, DISTRICT OF COLUMBIA

$315,100 over 24 months to develop and disseminate a Code of Best Practices in Fair Use for Software Preservation.

Project Director: Krista Cox, Director of Public Policy Initiatives

This grant funds an initiative by the Association of Research Libraries to document and clarify copyright and intellectual property law issues related to the archiving of software. Led by intellectual property lawyer, Peter Jaszi, the initiative has three parts. First, Jaszi and a team of collaborators will undertake a broad literature review and conduct some 40 long-form interviews with legal experts, librarians, museum curators, software developers, and other stakeholders to produce "a report on problems that arise in software preservation regarding issues of copyright and fair use." The report will then become the basis for a set of small workshops to generate, after legal review, a code of reasonable best practices used by archivists to resolve those problems. Finally, a substantial outreach push will build community consensus in support of those best practices. The work will be stewarded by the Association of Research Libraries, whose membership has a strong interest in this area, but will also draw heavily on the museum community, as well as major professional organizations in computer science, and other computationally intensive disciplines.

The effort will document the legal state-of-play surrounding several thorny intellectual property issues related to software archiving, promote better archival practices across the country and further the cause of reproducibility in research, which depends on the continued availability of software used to generate scientific results.

University of California, Office of the President

OAKLAND, CALIFORNIA

$747,258 over 24 months to develop and deploy infrastructure necessary to elevate data to a first-class research output.

Project Director: Guenter Waibel, Executive Director

One obstacle to developing effective data citation practices is that data does not behave like a published article. It can be far more complex, can exist in many successive versions (none of which are canonical), and only a part of a given dataset might be used by a given study. An effective data citation regime must reflect the multitude of ways data can be used in research.

These issues were taken up by the California Digital Library (CDL) in a 2014 National Science Foundation planning study to explore the idea of "data level metrics" and determine which metrics would be of most value to researchers. The grant funds an expansion of this work, as the CDL assembles a coalition to implement their findings. Over the next two years, CDL will bring together the organization that mints DOIs for datasets (DataCite) and the organization that manages the standard for article download and access data (COUNTER) with a collection of data repositories (DataONE) in order to implement best data citation practices using extensions to the popular Lagotto article usage tracking software. Beyond their own implementation, this collaboration will work with

the Research Data Alliance to build consensus for and recruit additional repositories to adopt their best practices and technical solutions.

Rochester Institute of Technology

ROCHESTER, NEW YORK

$470,458 over 36 months to develop a mathematically-aware search engine for popular use by both students and experts.

Project Director: Richard Zanibbi, Associate Professor

A "math aware" search engine is exactly what it sounds like, a search engine that speaks and understands the language of mathematics. It would be able to locate not only words on pages, but to identify and recognize mathematical symbols, expressions, equations, formulas, and theorems. This is harder than it sounds, since common mathematical symbols can take on special meanings depending on the context in which they appear.

This grant funds work by computer scientists Richard Zanibbi and Lee Giles to create an easy to use, fully math aware search engine. Zanibbi and Giles plan to develop state-of-the-art methods for extracting, indexing and retrieving math in documents; develop algorithms for the recognition of handwritten math and math captured in images; and implement these in a user-friendly interface with helpful features like autocompletion of common queries. The new engine will then be tested on Wikipedia and on CiteSeerX, an open-source repository of academic papers.

The completed search engine, if successful, would vastly expand the possibilities of discovery for amateur and professional mathematicians alike, with numerous applications in both research and education.

Yale University

NEW HAVEN, CONNECTICUT

$1,000,000 over 30 months to expand emulation and software preservation infrastructure in order to ensure that software and software-dependent digital content is accessible by future generations.

Project Director: Euan Cochrane, Digital Preservation Manager

Yale University Library digital archivist Euan Cochrane leads one of the most ambitious software archiving programs in United States research libraries. Currently accessible to Yale faculty and students, the Yale software collection relies on open source software called bwFLA that enables the creation, management, and distribution of "virtual machines" which can simulate the hardware of an older computer on a newer computer and then run older software on the simulated machine. In practice this means that if you have the right credentials, you can go to the Yale Library website, click a link, and suddenly be running Windows 3.1, the original MacOS, or any other operating system and software, right in your browser.

This grant supports efforts by Cochrane and his team at Yale to further develop this infrastructure and, working with the Software Preservation Network, to cultivate this capability at other institutions. The grant will support focused work on four use cases: scientific software, CD-ROM archiving, restricted-access reading rooms, and a "Universal Virtual Interactor" that would automatically launch the correct software and version to open any given digital file. Other supported activities include technical refinements to the bwFLA platform and the archiving of the National Software Reference Library currently held by the National Institutes of Standards and Technology.

Grants Made Against Prior Authorizations

In March 2017, the Trustees authorized the expenditure of up to $250,000 for small grants promoting the aims of the Scholarly Communication program. The following grants were made against this previously authorized fund.

University of Bologna

BOLOGNA, ITALY

$124,993 over 19 months to establish an open scholarly citation database that freely and legally makes available accurate citation data in easily reused standard machine-readable formats.

Project Director: Silvio Peroni, Doctor

NumFOCUS

AUSTIN, TEXAS

$34,700 over 12 months to improve the publication and citation of scientific software through improvements to the technical infrastructure for the Journal of Open Source Software.

Project Director: Arfon Smith, Project Lead

ORCID

BETHESDA, MARYLAND

$19,900 over 12 months to support participant travel to a meeting that will inform the next ORCID strategic plan.

Project Director: Laurel L. Haak, Executive Director

University of Oxford

OXFORD, UNITED KINGDOM

$65,000 over 12 months to streamline the publication workflow for data papers.

Project Director: Neil Jefferies, Head of Innovation

Wikimedia Foundation

SAN FRANCISCO, CALIFORNIA

$20,000 over 12 months to help support a workshop on the citation of academic research across Wikimedia projects.

Project Director: Dario Taraborelli, Head of Research

Officer Grants

Ithaka Harbors Inc.

NEW YORK, NEW YORK

$20,000 over 6 months to support the pilot convening of the William G. Bowen Colloquium.

Project Director: Catharine Bond Hill, Managing Director

National Science Communication Institute

SEATTLE, WASHINGTON

$20,000 over 6 months to partially support the 2017 meeting of the Open Scholarship Initiative.

Project Director: Glenn Hampson, Executive Director

Earth Science Information Partners

BOULDER, COLORADO

$89,015 over 31 months to support a workshop to develop design patterns for scholarly commons.

Project Director: Bruce Caron, Community Architect

Universal Access to Knowledge

PROGRAM DIRECTOR: DORON WEBER

The program in Universal Access to Knowledge seeks to facilitate the openness and accessibility of all knowledge in the digital age for the widest public benefit under fair and secure conditions. Focusing on the largest bounded networks and storehouses of knowledge—libraries, archives, museums, encyclopedias—the program has sought to build open, collaborative knowledge-sharing ventures such as Wikipedia and the Digital Public Library of America (DPLA) and to support these entities and encourage like-minded ventures and networks. The goal is to use digital information technology for expanding scientific and cultural knowledge and for ensuring the free exchange of ideas and information under the highest standards of quality, nonpartisanship and independence.

Current grant-making focuses on supporting broadly collaborative efforts such as 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 the 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 2017, the DPLA launched the DPLA Exchange, America's first library-owned eBook marketplace with thousands of popular ebooks and e-audiobooks as well as free public domain eBooks. The organization also launched a new hub membership network that marks an important step in creating a strong, self-sustaining network.

Since 2008, the Foundation has been the lead funder and trusted advisor to Wikipedia, which is now the largest encyclopedia in hu-

man history and the fifth largest website in the world, available in 298 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 repository of freely licensed educational media, with 34 million files of photos, videos and audio, and growing by 5 million files a year.

In October 2017, Annual Reviews, a non-profit publisher of a prestigious series of multi-author reviews in 50 discipline-specific fields in science and social science, launched *Knowable,* a digital magazine with major support from Sloan and the Moore Foundation that unlocks scientific research to inform the public discourse in multiple subjects with compelling, timely, and impartial knowledge.

Trustee Grants

Paris School of Economics

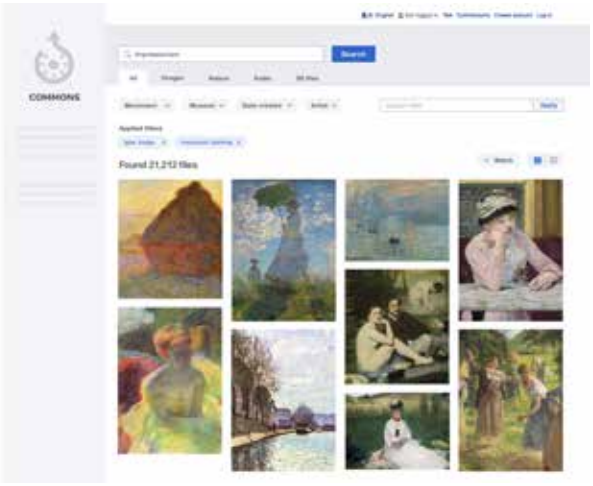
PARIS, FRANCE

$900,000 over 36 months to improve the quality, quantity, and accessibility of data in the World Wealth and Income Database (WID.world) for researchers of all backgrounds and for the general public.

Project Director: Thomas Piketty, Co-Director

The World Wealth and Income Database (WID.world), co-directed by Facundo Alvaredo, Lucas Chancel and Thomas Piketty at the Paris School of Economics and Emanuel Saez and Gabriel Zucman at the University of California at Berkeley, provides high quality, fully public access to comprehensive and reliable data on income and wealth inequality. Surprisingly easy to use, the website allows researchers, journalists, and the public to access raw data, read the methodology of how those data were collected and processed, and improve them through their own contributions. WID.world datasets combine fiscal, survey, and national account data in a novel, systematic way that produces reliable income time series and minimizes well known problems related to self-reporting and "under-reporting at the top."

Funds from this grant support the continued expansion and improvement of WID.world. Plans include expanding the number of countries covered to include China, India, Brazil, and several African states; improving data on the full income distribution; using collected income data to study issues such as tax fraud; improving the site's statistical tools; and adding new data variables like gender and environmental inequality. In addition, the research team will hold several workshops to facilitate use of the site and improve coordination with other researchers and large organizations such as the World Bank and IMF.



A mock-up of the new Wikimedia Commons image search functionality that the three-year, $3-million Sloan-funded structured data on Commons project will enable for more than half-a-billion Wikipedia users. **(IMAGE COURTESY OF NIRZAR PANGARKAR/WIKIMEDIA FOUNDATION, CC BY-SA 3.0)**

Energy & Environment

Energy & Environment

PROGRAM DIRECTOR: EVAN S. MICHELSON

Launched in early 2015, this 10-year 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. Since its launch, the program has become a paradigmatic example of how the Foundation can achieve its mission by influencing a field, shaping the research questions that scholars study, supporting research across the natural and social sciences, and partnering with other funders. The program has made substantial progress in each of five established 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.
- **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 investigates previously underexplored and targeted research questions in select areas. Regarding energy sources (supply), the program supports investigation and systemic analyses of the energy system and energy technology innovation. Regarding midstream infrastructure, the program examines multidisciplinary research on transmission and distribution systems along with studying the siting of energy infrastructure. Regarding energy use (demand), the program explores empirical analyses of energy efficiency interventions and social science research in the area of transportation. The program includes support for additional cross-cutting opportunities, such as energy data analytics, information dissemination, and strategically organized convenings.

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

Arizona State University

TEMPE, ARIZONA

$299,574 over 18 months to examine alternative governance approaches and institutions associated with geoengineering research, focusing on solar radiation management field experiments, using participatory deliberation methodologies.

Project Director: Daniel Sarewitz, Professor

There is a growing debate in the energy and environment community about the role to be played by geoengineering as a response to climate change. Solar radiation management (SRM) technologies, which involve injecting aerosol particles into the atmosphere to cool the Earth by reflecting sunlight, are increasingly central to these discussions. SRM technologies may be developed quickly, have the potential to be relatively inexpensive, and could be easily scaled. However, SRM research and its associated deployment raises many underexplored concerns related to moral hazard, technological uncertainty, unintended externalities, and potential irreversibility. In particular, little is known about the public's understanding of SRM technologies, their potential concerns, and what procedural and governance safeguards might be put in place to allay them.

A multidisciplinary team of scholars at Arizona State University (ASU) proposes to conduct a series of public dialogues with the aim to better understand public views on the development, and deployment of SRM technologies. First, the ASU team will conduct an initial framing and design workshop with subject matter experts to develop rubrics for discussing SRM technologies with the public. Next, they will hold two forums, one in Arizona and the other in Boston, each involving over a hundred members of the lay public. Trained social scientists will lead structured focus groups that will inform participants about SRM technologies and solicit their views and perspectives. Multiple forms of qualitative and quantitative data will be collected throughout the process, including pre- and post- event surveys and interviews. A final expert workshop will then integrate and assess collected data and present findings to policymakers and the research community.

Boston University

BOSTON, MASSACHUSETTS

$424,360 over 24 months to develop, evaluate, and transfer to practice a robust framework of distribution locational marginal prices that can improve efficiencies in electricity distribution.

Project Director: Michael Caramanis, Professor

This grant funds work by power systems expert Michael Caramanis to develop a sophisticated, granular framework for pricing electricity at different points on the electricity distribution grid, especially for those systems that feature increased levels of load varying distributed energy resources like consumer solar panels. Decades ago, the introduction of locational marginal prices (LMPs) helped to match generation and consumption in the bulk power system. Caramanis plans to extend this framework and take on the more technically complex challenge of developing distribution network locational marginal prices (DLMP) for different nodes in the electricity distribution grid. After developing algorithms to model DLMP for electricity distribution, Caramais will work in close collaboration with at least two utilities to test his model on actual distribution system networks. The proposed work will help address a critical gap in the academic literature and could lead to improved regulatory policies regarding distribution network pricing.

University of California, Davis

DAVIS, CALIFORNIA

$412,564 over 36 months to quantify existing and pending distribution system impacts of high levels of penetration of distributed energy resources and loads.

Project Director: James Bushnell, Professor

This grant funds a collaboration between University of California, Davis energy economists James Bushnell and David Rapson and distribution systems engineer, Duncan Callaway of the University of California at Berkeley. The group plans to study how the rise of distributed energy resources (DERs) like rooftop solar panels and electric vehicles impact power quality and distribution system performance in California.

Working with utilities (such as Southern California Edison and Pacific Gas & Electric Company) and state government regulators (including the California Public Utilities Commission and the California Air Resources Board), Bushnell and his colleagues will collect and combine data on solar photovoltaic installations and electric vehicle registrations and then map them to individual circuits in the California electricity distribution grid. This will allow the team to analyze in fine-grained detail how increases in solar photovoltaic installations and electric vehicles are likely to strain elements of the California electricity distribution system. The team will then investigate how the performance of distribution systems maps to various socioeconomic and demographic characteristics of California residents.

University of California, San Diego

LA JOLLA, CALIFORNIA

$271,207 over 24 months to assess the economic, policy, institutional, and technological barriers and opportunities associated with the development and deployment of carbon capture, utilization, and sequestration technologies.

Project Director: David Victor, Professor

Many analyses examining the transition to a low-carbon energy system in the United States identify carbon capture, utilization, and sequestration (CCUS) technologies as critical in order to make progress toward deep decarbonization. These technologies have proven difficult to develop and scale, however, and much uncertainty remains about the durability and longevity of policies and incentive structures designed to demonstrate their feasibility.

Funds from this grant support work by David Victor and his team at the University of California, San Diego to examine the economic, political, institutional, and technological barriers that are impeding the development of CCUS technologies. First, the team will survey the literature and develop a typology of canonical CCUS technology features being used in different CCUS demonstration facilities, such as the adopted method of carbon dioxide sequestration or the planned industrial use of the carbon dioxide byproduct. They will then select a set of demonstration plants that represent a broad array of different CCUS features to study, conducting semi-structured interviews with a wide range of industry leaders, government representatives, scientists, engineers, and non-governmental actors involved in these projects. Their analysis will focus on the regulatory, institutional, and technological barriers and opportunities that have shaped the development of CCUS technologies to date with the aim of extracting relevant lessons that can be learned as this suite of technologies moves ahead.

At the end of the project, the UCSD team will organize a structured workshop to review the research results and share findings with the broader community of researchers and practitioners.

University of Colorado, Denver

DENVER, COLORADO

$218,239 over 24 months to support a pilot study that will analyze case examples of policy conflict and concord among key stakeholders related to the siting of energy infrastructure, including solar and wind energy production projects, pipelines, and transmission lines.

Project Director: Christopher Weible, Professor

Researchers Tanya Heikkila and Chris Weible from the University of Colorado, Denver plan to undertake a research project that will examine the role played by different stakeholders and policy actors in contributing to the degree of conflict and concord surrounding the siting of energy infrastructure projects.

Heikkila and Weible will examine stakeholder coalitions formed during the planning, permitting, and approval stages of various energy infrastructure projects, including renewable energy projects (wind farms and large-scale solar installations), transmission lines, and pipeline build-outs. They will first identify a variety of recently proposed large-scale energy infrastructure siting projects. They will then focus on a select set of each project type, representing a diverse array of stakeholder coalition characteristics, for more detailed study. Projects under study will include not only successful siting projects but also those that were terminated or abandoned due to stakeholder opposition. Heikkila and Weible will then interview key stakeholders and policy actors involved in the siting of each project and conduct detailed textual analyses of media coverage and public records related to permitting decisions.

Colorado School of Mines

GOLDEN, COLORADO

$277,334 over 18 months to provide early-career economists and other social scientists with training and an understanding of technological dimensions of electricity distribution systems.

Project Director: Ian Lange,
Director, Mineral & Energy Economics

To properly understand and model the changing US electricity distribution grid, economists and other social scientists need in-depth training on the technological and engineering complexities of the electricity distribution system. This grant provides funding to the Colorado School of Mines (CSM) to organize and host a week-long summer school for early-career economists and other social scientists designed to provide such training.

Each week-long summer school, to be held twice each summer over the course of two summers, would include tailored classroom training; engagement and lectures by senior utility, government, and nongovernmental experts; and an experiential component through tutorials held at NREL's Energy Systems Integration Facility. Participating expert instructors include those in distribution systems planning (Doug Arent and Michael Coddington), grid integration (Barbara O'Neill), and power systems engineering (Benjamin Kroposki).

Summer school participants—which include advanced graduate students, postdoctoral fellows, and junior faculty—will be broadly recruited from professional societies, such as the Association of Environmental and Resource Economics and the United States Association of Energy Economics, and from universities that have doctoral programs with a strong focus in energy economics.

The Sloan-supported Women in Energy program at Columbia's Center on Global Energy Policy seeks to help grow the presence and leadership of women in the energy sector. Here, program participants visit Columbia University's Central Chiller and Boiler Plants. (PHOTO COURTESY OF COLUMBIA CENTER ON GLOBAL ENERGY POLICY)

Columbia University

NEW YORK, NEW YORK

$299,989 over 24 months to support the Columbia Energy Exchange podcast series to disseminate information and deepen dialogue around energy and environment issues.

Project Director: Jason Bordoff, Founding Director

This grant provides two years of support for the continued production and improvement of the Columbia Energy Exchange podcast series, produced by Columbia University's Center on Global Energy Policy (CGEP). Launched in 2015 and hosted by veteran energy journalist Bill Loveless, the 30-minute, weekly podcast features in-depth, one-on-one discussions with top thought leaders in the energy sector. The podcast series has featured an impressive network of leaders from across the energy system, including former government agency heads from the United States and abroad, CEOs of energy companies involved in a wide range of industries (oil, gas, electricity, nuclear, and renewables), and top analysts from energy think tanks, consultancies, and NGOs. Past guests include former Secretary of Energy Ernest Moniz, Canada's Minister of Environment Catherine McKenna, Chevron CEO John Watson, and the World Bank's Head of Energy Riccardo Puliti. The podcast series also features research results from CGEP-affiliated scholars and its weekly release schedule enables CGEP to address topical and relevant energy issues as they rise in the public discourse.

Sloan grant support will provide funds for the production of 50 episodes of the series over each of the next two years, allow CGEP to produce transcripts of each episode, and enable necessary technical improvements to upgrade the podcast's audio quality.

Columbia University

NEW YORK, NEW YORK

$254,994 over 24 months to continue support for the Women in Energy program at the Center on Global Energy Policy to improve the engagement of women in energy policy, security, and technology communities.

Project Director: Jason Bordoff, Founding Director

The Women in Energy (WIE) program is an initiative developed by the Center on Global Energy Policy at Columbia University to provide professional development and networking opportunities to female students interested in a range of energy issues. Launched in 2015 with Sloan Foundation support, the program hosts seminars and networking events, provides mentoring, and gives summer internship stipends for students at universities both in the greater New York City region and, increasingly, the larger northeastern area of the United States. The program also connects current female students with female leaders in the energy sector from government, industry, and nonprofits. This grant provide two years of renewed support for the program.

Council on Library and Information Resources

WASHINGTON, DISTRICT OF COLUMBIA

$521,200 over 36 months to improve data management practices in energy economics and policy analysis research through a Postdoctoral Fellowship Program in Data Curation for Energy Economics.

Project Director: Charles Henry, President

This grant to the Council on Library and Information Resources funds a fellowship program for four, two-year postdocs interested in working at the intersection of energy economics and data science.

As large, complex datasets on energy production, transportation, and use become increasingly available, demand has emerged for a new type of scholar with one foot firmly in energy economics—the data it uses, the questions it asks, the methodologies it deploys—and one foot in data science. These fellowships aim to fill some of that need by creating postdoctoral positions that provide such training. Supported fellows will work on a diverse array of projects such as energy data visualization, integrating multiple datasets, and establishing university-wide energy data storage and access platforms.

Fellows will be placed at four energy research centers that are existing grantees in the Foundation's Energy and Environment program: University of California Berkeley's Energy Institute at Haas, the Energy Institute at the University of Texas at Austin, Duke University's Energy Data Analytics Lab, and the Energy Policy Institute at the University of Chicago. Fellows will be selected in close cooperation with researchers at each institute, ensuring that candidates have both the skills and research interests each institute needs. As a signal of demand for the fellows, participating Centers have agreed to cover 50% of each fellow's stipend and benefits costs.

The fellowship program will be administered by the Council on Library and Information Resources, which has experience running several successful fellowship programs and has well-established recruitment, selection, mentoring, and professional development processes, including annual network-building workshops and the provision of micro-grants to selected fellows for collaborative projects.

Duke University

DURHAM, NORTH CAROLINA

$225,000 over 32 months to support an Energy Data Analytics predoctoral fellows program to advance multidisciplinary training and collaboration among early career researchers in energy data analytics.

Project Director: Brian Murray, Interim Director

This proposed grant will provide partial funding for four Ph.D. students per year for two years (eight total) to conduct research on energy data analytics at Duke University's Energy Data Analytics Lab (EDAL). Candidates will be drawn from a range of natural and social science disciplines—economics, engineering, environmental science, computer science, statistics, mathematics—and will be required to have faculty supervisors drawn from both energy-related domains and data-science relevant disciplines.

Each pre-doctoral fellow will be expected to produce at least one paper that emerges from their fellowship research. All datasets produced will be made available through the EDAL repository. Fellows will has access to EDAL's high performance computing environments and have the opportunity to lead an undergraduate energy data science team over a summer term. An Energy Data Analytics Symposium will be held at the end of the grant period to feature student work and that of invited internal and external senior scholars.

Environmental Defense Fund Inc.

NEW YORK, NEW YORK

$589,260 over 24 months to understand the economic and environmental impacts of cost-reflective electricity pricing schemes related to distributed energy resources deployment.

Project Director: Beia Spiller, Senior Economist

Funds from this grant support a multi-institutional and multidisciplinary research project led by two economists at the Environmental Defense Fund (EDF) (Beia Spiller and Kristina Mohlin) working in collaboration with power systems engineers at MIT (Karen Tapia-Ahumada and Ashwini Bharatkumar) and regulatory analysts at New York University (Burcin Unel) to understand how alternative electricity rate designs might impact the reliability of electricity distribution grids.

Many households face a fixed, per kilowatt hour rate from their utility for their electricity use—whether it is midnight in the winter (when overall demand for electricity is low) or whether it is late afternoon on a hot, sunny summer day (when demand is high). Some utilities, however, are experimenting with a host of demand-varying pricing schemes, so that consumers pay higher per kilowatt hour costs when demand is high. There are many versions of these time varying rate design schemes (real time pricing, time of use pricing, variable and critical peak pricing, etc.). By changing the economic incentives facing consumers, these policies could impact the introduction of various distributed energy resources on the grid. You may, for example, be more inclined to install solar panels on your roof to generate your own power on hot, sunny summer afternoons to avoid paying much higher electricity rates during those times.

Spiller, Mohlin, and their team plan to expand existing engineering simulation models and then apply them to real world data supplied through a partnership with ComEd of Illinois. This will allow them to estimate how various dynamic pricing schemes would affect investments in solar panels and other distributed energy resources, and the subsequent impacts such investments would have on pollution, electricity prices, and total system costs.

Environmental Defense Fund Inc.

NEW YORK, NEW YORK

$350,000 over 24 months to design and implement a training and networking program that enhances the development of early-career energy and environmental professionals.

Project Director: Steven Hamburg, Chief Scientist

The Environmental Defense Fund (EDF) employs a substantial number of postbaccalaureate and postdoctoral scientists and economists. These positions train scholars how to undertake policy-relevant science and economics research in an applied setting, outside the university. This grant provides support to EDF to develop a more formalized training, networking, and mentoring program that will train 25 to 30 early-career researchers in the ancillary skills needed to succeed in applied research environments. Training will cover such topics as communications, proposal writing, program management, and team leadership. EDF will also organize a series of workshops that separately target postbaccalaureates and postdoctoral researchers to reflect the different skill development needs among these two groups and will implement a formal mentoring system that will link their postdoctoral fellows with senior scholars across the institution. Finally, EDF's in-house social scientists will implement a series of surveys among participants to track the impact of this program over time.

National Bureau of Economic Research, Inc.

CAMBRIDGE, MASSACHUSETTS

$224,170 over 26 months to undertake a research project examining how market forces, public policies, and technological change affect energy consumption and use in the transportation sector.

Project Director: Christopher Knittel, Professor of Energy Economics

This grant funds a project led by Meghan Busse (Northwestern), Christopher Knittel (MIT), and Kate Whitefoot (Carnegie Mellon University) to spur research on energy consumption in the transportation sector by fielding an open call for papers on the topic and providing funding and support to the best submissions. Areas of interest include changing patterns of personal vehicle demand, vehicle electrification, the economics of changing fuels for commercial and heavy-duty vehicles, and the rise of vehicle automation and ride-sharing. The group will widely distribute an open call for papers, evaluate submissions, select

eight papers to receive funding, organize an initial working session to discuss methodology and preliminary research approaches, and hold a final conference to share and disseminate results. Papers will be published as NBER working papers and then submitted to top economics journals.

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$1,348,653 over 34 months to develop and implement a transparent, multidisciplinary research initiative to update comprehensively the framework for social cost of carbon dioxide estimation reflecting the best available science and economics analysis.

Project Director: Raymond Kopp, Vice President

Among the most critical, unanswered research questions in energy and environmental policy is determining the economic impact of carbon dioxide emissions on society. This measure, the social cost of carbon (SCC), is defined as the dollar value cost to society of emitting one ton of carbon dioxide (or carbon dioxide equivalent gas) into the atmosphere. Estimating the SCC is necessary for conducting cost-benefit analyses of more than 150 federal laws and regulations in the United States.

This grant to Resources for the Future (RFF) provides partial support for a large scale initiative that would develop an improved computational platform for estimating the SCC. RFF plans to put in place an integrated, modular framework that disaggregates the SCC estimation process into four distinct modules: socioeconomics, climate, damages, and discounting. Doing so will allow the best natural and social science research in each area to inform projections and estimations on each topic. These modules will then be linked together through an open source, computationally efficient, publicly accessible, and fully documented platform. This approach will help economists and climate scientists better compare similarities and differences among the three major integrated climate assessment models that underpin the SCC.

Grants Made Against Prior Authorizations

In October 2016, the Trustees authorized the expenditure of up to $250,000 in support of workshops and conferences that advance the development of energy and environmental research and that involve the training of students and emerging practitioners. The following grants were made against this previously authorized fund.

University of California, Berkeley

BERKELEY, CALIFORNIA

$60,000 over 8 months to organize a conference for academics, policymakers, and practitioners to celebrate the contributions to energy economics of Paul L. Joskow.

Project Director: Catherine Wolfram, Professor

University of California, Berkeley

BERKELEY, CALIFORNIA

$20,000 over 7 months to organize a workshop that will facilitate a better understanding of the energy and environmental impacts of artificial intelligence.

Project Director: Jordan Diamond, Executive Director

The University of Chicago

CHICAGO, ILLINOIS

$60,375 over 7 months to organize a workshop that will foster deeper, more productive dialogue between economists and engineers regarding the impact of energy efficiency programs.

Project Director: Michael Greenstone, Professor

International Energy Program Evaluation Conference

CHATHAM, MASSACHUSETTS

$20,000 over 7 months to continue support in accelerating and advancing the profession of energy evaluation by enabling graduate students to attend the 2017 IEPEC Conference at no charge.

Project Director: Jane Peters, President

(From left) Economists Severin Borenstein (UC Berkeley) Christopher Knittel (MIT), and Carla Peterman, Commissioner of the California Public Utilities Commission participate in a panel discussion at a March 2018 conference honoring the work of Sloan President and economist Paul L. Joskow. (PHOTO BY JIM BLOCK, ENERGY INSTITUTE AT THE HAAS SCHOOL OF BUSINESS, UNIVERSITY OF CALIFORNIA, BERKELEY)

University of Michigan

ANN ARBOR, MICHIGAN

$9,625 over 8 months to facilitate the participation of undergraduate and graduate students at the 2017 Transportation, Economics, Energy and the Environment (TE3) conference.

Project Director: Mark Barteau, Professor & Director

Ohio State University

COLUMBUS, OHIO

$20,000 over 15 months to support participation of early career scholars and students at the 2017 Energy Impacts Symposium.

Project Director: Jeffrey Jacquet, Assistant Professor

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 4 months to support participation of top economists in a one-day conference focused on examining the landmark contributions to environmental economics of the essay "Conservation Reconsidered" on its fiftieth anniversary.

Project Director: V. Kerry Smith, University Fellow

Stanford University

STANFORD, CALIFORNIA

$20,000 over 7 months to provide support for the participation of students and post-doctoral researchers at the 2017 Behavior, Energy and Climate Change Conference and to produce a report to guide the strategic planning and development of the conference going forward.

Project Director: James L. Sweeney, Director & Professor

University of Texas, Austin

AUSTIN, TEXAS

$10,000 over 7 months to support students from multiple disciplines to participate in the 2018 Austin Electricity Conference.

Project Director: Ross Baldick, Professor

United States Association for Energy Economics

CLEVELAND, OHIO

$10,000 over 3 months to support the participation of graduate students at the Ph.D. Day event to be held at the 2017 North American conference in Houston, Texas.

Project Director: Anastasia Shcherbakova, Assistant Professor

In March 2017, the Trustees authorized the expenditure of up to $1,020,000 to support four research projects examining the economics of energy efficiency using experimental and quasi-experimental methods, along with an assessment of the field. The following grants were made against this previously authorized fund.

Appalachian State University

BOONE, NORTH CAROLINA

$213,254 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, by examining how behavioral nudges in the form of electronic notifications impact electricity consumption and energy efficiency program participation.

Project Director: Tanga Mohr, Professor

University of California, Berkeley

BERKELEY, CALIFORNIA

$222,289 over 20 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, by estimating the impacts of an industrial energy efficiency program on electricity use, water use, and welfare in the agricultural sector.

Project Director: Maximilian Auffhammer, George Pardee Professor of Sustainable Development

University of California, Davis

DAVIS, CALIFORNIA

$256,933 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, by studying how changing default participation options in a commercial energy efficiency program impacts program enrollment and energy use.

Project Director: Katrina Jessoe, Associate Professor

University of California, Davis

DAVIS, CALIFORNIA

$250,000 over 24 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, by examining the relationship between electricity rate structures and consumer investments in energy efficient appliances.

Project Director: David Rapson, Associate Professor

University of Michigan

ANN ARBOR, MICHIGAN

$57,524 over 12 months to research the economics of energy efficiency, as recommended by a Request for Proposals review committee, by characterizing profiles of households who fall into financing coverage gaps for energy efficiency programs.

Project Director: Tony Reames, Assistant Professor

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 8 months to prepare an updated, comprehensive literature review on the effectiveness of energy efficiency interventions to reflect recent findings and advancements in program evaluation methodologies.

Project Director: Karen Palmer, Director and Senior Fellow

Officer Grants

American Academy of Arts and Sciences

CAMBRIDGE, MASSACHUSETTS

$50,000 over 12 months to better understand the benefits and challenges of international science partnerships, including energy and environmental issues, through a workshop and white paper.

Project Director: John Randell, Senior Program Director

University of California, Berkeley

BERKELEY, CALIFORNIA

$124,997 over 26 months to continue to train highly qualified Ph.D. graduate students from across North America in energy and environmental economics topics and techniques through an advanced summer training program.

Project Director: Maximilian Auffhammer, George Pardee Professor of Sustainable Development

University of California, Berkeley

BERKELEY, CALIFORNIA

$113,859 over 17 months to broaden understanding of distributional equity of transportation policy by quantifying the heterogeneous impact of fuel economy standards.

Project Director: James Sallee, Assistant Professor

Columbia University

NEW YORK, NEW YORK

$50,000 over 12 months to providing continuing support for the Center on Global Energy Policy's external speaker series and roundtable discussions to increase overall knowledge and understanding of key energy issues and trends.

Project Director: Jason Bordoff, Founding Director

Council on Foreign Relations

NEW YORK, NEW YORK

$125,000 over 12 months to wind down support for current phase of research undertaken by the Program on Energy Security and Climate Change to examine the economic, geopolitical, and technological factors associated with advancing energy innovation.

Project Director: Varun Sivaram, Acting Director

Council on Foreign Relations

NEW YORK, NEW YORK

$25,000 over 16 months to organize a study group and roundtable series of meetings to better understand how the United States energy system will evolve in the coming decades, with a focus on exploring the impact of advanced digital technologies and related geopolitical implications.

Project Director: Amy Myers Jaffe, David M. Rubenstein Senior Fellow

Harvard University

CAMBRIDGE, MASSACHUSETTS

$20,000 over 11 months to identify principles for conducting retrospective review of energy and environmental regulations.

Project Director: Joseph Aldy, Assistant Professor of Public Policy

International Energy Program Evaluation Conference

CHATHAM, MASSACHUSETTS

$17,750 over 10 months to continue support in accelerating and advancing the profession of energy evaluation by enabling graduate students to attend the 2018 IEPPEC Conference.

Project Director: Sharyn Barata, President

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$125,000 over 12 months to develop an initial framework and set of modeling tools to examine novel energy storage technologies.

Project Director: Jessika Trancik, Professor

National Academy of Sciences

WASHINGTON, DISTRICT OF COLUMBIA

$20,000 over 16 months to provide final support to the Roundtable on Unconventional Hydrocarbon Development.

Project Director: Elizabeth Eide, Director

Resources for the Future, Inc.

WASHINGTON, DISTRICT OF COLUMBIA

$124,708 over 5 months to develop a research agenda and workplan to comprehensively update the framework for social cost of carbon dioxide estimation to ensure that updated estimates reflect the best available science and economics analysis.

Project Director: Raymond Kopp, Vice President

American Friends of Toulouse School of Economics

SALISBURY, MARYLAND

$50,000 over 24 months to support two annual conferences organized by the Toulouse School of Economics Centre on Energy and Climate Change.

Project Director: Stefan Ambec, Director

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New York 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 New York City 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 New York City 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

Fund for the City of New York

NEW YORK, NEW YORK

$350,000 over 12 months to improve local decision-making by building technical capacity in NYC borough president offices and community boards.

Project Director: Noel Hidalgo, Executive Director

Founded by civic technologist Noel Hidalgo, BetaNYC is a not-for-profit organization dedicated to helping key New York City constituencies take advantage of already-accessible open civic data. Hidalgo has identified New York's borough president offices and community boards as particularly promising sites of leverage where better access to civic data could be of direct and immediate value to local governance, and where better technical literacy and capacity could tangibly improve New Yorkers' experience of government.

Among its programs, BetaNYC runs a Community Information Fellowship that places CUNY undergraduates in the Manhattan Borough President's office, where they identify and work to fill gaps in technical expertise at the community board. This grant would build on that program to pilot a "Civic Innovation Lab" in the Borough President's office that will build prototype solutions to data problems identified by these fellows. The grant is being made to the Fund for the City of New York, a not-for-profit that provides fiscal sponsorship and administrative support to charitable efforts aimed at benefiting the City and its residents.

Grants Made Against Prior Authorizations

In October 2016, the Trustees authorized the expenditure of up to $250,000 to provide support for conferences and workshops aiming to increase diversity in STEM higher education. The following grant was made against this previously authorized fund.

New York Academy of Sciences

NEW YORK, NEW YORK

$110,140 over 15 months to provide a diverse cadre of 30 advanced doctoral students in STEM fields with leadership skills to give them maximum flexibility in considering career options through a 5-day workshop and 9-month webinar program called Science Alliance Leadership Training (SALT).

Project Director: Meghan Groome, Senior Vice President

Vilma Raquel Daza received a Sloan Public Service Award in 2017 for her extraordinary work as manager of the Corona Branch of the Queens Public Library. The awards honor lifetime NYC civil servants whose perform their work with dedication, devotion, passion, and imagination.

Officer Grants

Art of Problem Solving Foundation

NEW YORK, NEW YORK

$20,000 over 8 months to provide partial support for the BEAM 6 program.

Project Director: Ruthi Hortsch, Program Manager

Research Foundation of the City University of New York

NEW YORK, NEW YORK

$4,000 over 4 months to increase the number of doctoral degrees in the Mathematical Sciences awarded to students from underrepresented groups through the launch of the NYC Math Sciences Alliance.

Project Director: Brooke Feigon, Associate Professor

Code for America Labs Inc.

SAN FRANCISCO, CALIFORNIA

$20,000 over 6 months to partially support the 2017 Code for America Brigade Summit.

Project Director: Christopher Whitaker, Brigade Program Manager

Fund for the City of New York

NEW YORK, NEW YORK

$124,893 over 6 months to build technical capacity within NYC borough president offices and community boards, and to develop a sustainable model for such activities going forward.

Project Director: Noel Hidalgo, Executive Director

New York University

NEW YORK, NEW YORK

$19,866 over 2 months to provide partial support for the Cyber Security program for High School Women.

Project Director: Phyllis Frankl, Professor

Rockaway Waterfront Alliance, Inc.

FAR ROCKAWAY, NEW YORK

$20,000 over 12 months to provide partial support for the Environmentor Program, a science research internship program.

Project Director: Jeanne DuPont, Executive Director

New York City H2O, Inc.

NEW YORK, NEW YORK

$20,000 over 8 months to provide support for 15 Water Ecology and Engineering Field Trips.

Project Director: Matt Malina, Director

Sponsors for Educational Opportunity, Inc.

NEW YORK, NEW YORK

$20,000 over 12 months to promote unrepresented minorities within the investment management industry by maximizing the pipeline of diversity into finance and top business sectors and to ensure that diverse talent is identified early and provided with the access, resources, and professional development needed to succeed.

Project Director: Julian C. Johnson, Executive Vice President

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.

Trustee Grants

Institute of International Education

NEW YORK, NEW YORK

$750,000 over 36 months to provide 25 life-saving fellowships and academic placements for persecuted scholars from around the world over three years.

Project Director: Sarah Willcox, Director

The Institute for International Education's Scholar Rescue Fund rescues endangered scholars from any country and discipline in the world and relocates them to a safe haven where they can continue their work as teachers, researchers, writers, and intellectuals to date, the Fund has rescued and awarded academic fellowships to 681 threatened scholars from 56 countries and relocated them to safety in 360 partner institutions in 42 countries, including such U.S. universities as Stanford, Columbia, Harvard, Cornell, and the University of Michigan. These academics have gone on to publish thousands of books and journal articles, often including groundbreaking research; they have filed dozens of scientific patents, attended thousands of academic conferences, and taught thousands of students.

This grant provides support to the Scholar Rescue Fund for the rescue and safe relocation of 25 endangered scholars from STEM disciplines over the next three years.

Massachusetts Institute of Technology

CAMBRIDGE, MASSACHUSETTS

$500,000 over months As a gift to MIT to establish a Fund in honor of Professor Paul Joskow to recognize his ten years of exemplary service as President of the Alfred P. Sloan Foundation.

Project Director: Israel Ruiz,
Executive Vice President and Treasurer

The $500,000 grant to MIT will establish the Paul L. Joskow Fellowship Fund (the "Fund") in honor of Paul L. Joskow, president of the Alfred P. Sloan Foundation from 2008 through 2017. MIT will hold the grant as an endowment, allowing donors and others to add to the Fund at any time through gifts, donations, and distributions from trusts, estates, or other entities.

MIT will use Fund income to provide financial support, including fellowship support, to graduate students studying energy economics, environmental economics, and industrial organization, in accordance with MIT graduate student financial assistance policies and procedures. Support may include funds for the acquisition of research data, for travel to pro-

fessional meetings, and for other research-related outlays by the students. Recipients of fellowship assistance from the Fund shall be known as Paul L. Joskow Fellows.

This grant was made on the occasion of Dr. Joskow's retirement as President of the Sloan Foundation and in tribute to his decade of service to the Foundation and its mission.

Grants Made Against Prior Authorizations

In June 2015, the Trustees approved the expenditure of up to $185,000 for grants to support work on behalf of the nonprofit and charitable community. In December 2016, the Trustees approved the expenditure of an additional $170,000 for the same purpose. The following grants were made against these previously authorized funds.

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

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: Allyson Goldhagen, Assistant Director

Technology Affinity Group

CHICAGO, ILLINOIS

$5,000 over 12 months For 2017 Membership Dues.

Project Director: Lisa Dill Pool, Executive Director

In October 2016, the Trustees approved the expenditure of up to $500,000 to encourage charitable giving in support of basic scientific research through Sloan membership in the Science Philanthropy Alliance. The following grant was made against this previously authorized fund.

New Venture Fund

WASHINGTON, DISTRICT OF COLUMBIA

$179,000 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

New Venture Fund

WASHINGTON, DISTRICT OF COLUMBIA

$125,000 over 12 months to pilot a Science Philanthropy Alliance fellowship to train a PhD scientist in basic science philanthropy.

Project Director: Bruce Boyd, Managing Director & Principal

Open Space Institute

NEW YORK, NEW YORK

$25,000 over 16 months to implement technology upgrades to the Cultural Performance Center at Harlem's Riverbank State Park.

Project Director: Erik Kulleseid, Senior Vice President

2017 Financial Review

The financial statements and schedules of the Foundation for 2017 and 2016 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 2017 was $7,230,016, a decrease of $570,397 from $7,800,413 in 2016. After the deduction of investment expenses and provision for taxes, net investment income/(loss) was ($1,964,385) in 2017 as compared to ($1,959,534) for the prior year. Investment expenses for 2017 consisted of $5,393,594 of direct and allocated management expenses and $1,950,807 for management fees. Total investment expenses and provision for taxes equaled $9,194,401 versus $9,759,947 in 2016. Total investment gains for 2017 were $214,037,943 as compared to $101,099,880 in 2016.

The fair value of the Foundation's total assets was $1,909,215,902 at December 31, 2017 including investments valued at $1,861,218,765 as compared with total assets of $1,794,057,711 at December 31, 2016.

Grants authorized (net of grant refunds) and management expenses during 2017 totaled $109,667,990 as compared to $84,170,086 for the prior year. Of this total, grants authorized (net of refunds) amounted to $97,934,672 and management expenses were $11,733,318. For the prior year, grants authorized (net of refunds) amounted to $72,814,814 and management expenses were $11,355,272. Grant payments in 2017 were $84,035,928 compared to $73,410,178 for the prior year.

Grants authorized and payments made during the year ended December 31, 2017 are summarized in the following table:

Grants unpaid at December 31, 2016	$	54,487,194
Authorized during 2017		97,934,672
Payments during 2017		(84,035,928)
Grants unpaid at December 31, 2017	$	68,385,938

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

ALFRED P. SLOAN FOUNDATION

December 31, 2017 and 2016

Audited Financial Statements and Schedules

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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, 2017 and 2016, 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 consolidated 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 consolidated financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the consolidated 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 consolidated financial statements in order to design audit proce-

dures 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 consolidated 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 financial position of the Alfred P. Sloan Foundation as of December 31, 2017 and 2016, 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 2017 consolidated financial statements as a whole. The schedule of management and investment expenses for the years ended December 31, 2017 and 2016 on page 121 and the schedule of grants and appropriations for the year ended December 31, 2017 on pages 122 through 128 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
July 2, 2018

Alfred P. Sloan Foundation

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

As of December 31, 2017 and 2016

	2017	2016
ASSETS		
Cash	$ 1,563,174	$ 1,263,525
Redemption receivable	46,433,963	—
Investments (Note 3):		
Direct investments—equities	95,433,925	113,525,052
Direct investments—fixed income	24,080,791	137,525,804
Direct investments—mutual and exchange traded funds	172,086,786	90,722,502
Alternative investments	1,569,617,263	1,451,020,828
Total investments	1,861,218,765	1,792,794,186
Total assets	$ 1,909,215,902	$ 1,794,057,711
LIABILITIES AND NET ASSETS		
LIABILITIES		
Grants payable (Note 8)	$ 68,385,938	$ 54,487,194
Federal excise tax payable (Note 5)	11,689,871	14,440,403
Deferred compensation arrangements	1,573,500	1,041,000
Accrued postretirement health benefit obligation (Note 7)	8,238,465	9,212,504
Other liabilities	245,726	94,433
Total liabilities	90,133,500	79,275,534
Commitments (Notes 3, 4, and 9)		
NET ASSETS—unrestricted	1,819,082,402	1,714,782,177
Total liabilities and net assets	$ 1,909,215,902	$ 1,794,057,711

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, 2017 and 2016

	2017	2016
INVESTMENT INCOME		
Interest and dividends	$ 7,230,016	$ 7,800,413
Less:		
Investment expenses	(7,344,401)	(6,509,947)
Provision for taxes (Note 5)	(1,850,000)	(3,250,000)
	(9,194,401)	(9,759,947)
Net investment income	(1,964,385)	(1,959,534)
Other income	5,850	23,975
Net total income	(1,958,535)	(1,935,559)
EXPENSES		
Grants, net of refunds of $467,561 in 2017 and $447,034 in 2016	97,934,672	72,814,814
Management expenses	11,733,318	11,355,272
	109,667,990	84,170,086
Excess of expenses over net investment income	(111,626,525)	(86,105,645)
INVESTMENT GAIN (LOSS)		
Net realized gain on disposal of investments	94,320,461	140,217,704
Unrealized gain (loss) on investments, net of deferred federal excise tax expense of $5,391,894 in 2017 and $8,450,612 in 2016	119,717,482	(39,117,824)
	214,037,943	101,099,880
Increase in net assets before postretirement benefit adjustments	102,411,418	14,994,235
Amounts not yet recognized as a component of net periodic benefit cost	1,888,807	(296,338)
Increase in net assets	104,300,225	14,697,897
Net assets at beginning of year	1,714,782,177	1,700,084,280
Net assets at end of year	$ 1,819,082,402	$ 1,714,782,177

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, 2017 and 2016

	2017	2016
CASH FLOWS FROM OPERATING ACTIVITIES		
Increase in net assets	$ 104,300,225	$ 14,697,897
Adjustments to reconcile increase in net assets to net cash used in operating activities:		
Net realized gain on disposal of investments	(94,320,461)	(140,217,704)
Unrealized (gain) loss on investments	(116,658,764)	39,916,147
Increase in redemption receivable	(46,433,963)	—
(Decrease) increase in federal excise tax payable	(2,750,532)	1,916,485
Increase (decrease) in grants payable	13,898,744	(595,364)
(Decrease) increase in accrued postretirement health benefit obligation	(974,039)	1,082,722
Increase in deferred compensation arrangements	532,500	835,750
Increase in other liabilities	151,293	23,283
Net cash used in operating activities	(142,254,997)	(82,340,784)
CASH FLOWS FROM INVESTING ACTIVITIES		
Proceeds from sales of investments	149,784,663	90,104,454
Purchases of investments	(7,230,017)	(7,800,413)
Net cash provided by investing activities	142,554,646	82,304,041
Net increase (decrease) in cash	299,649	(36,743)
Cash at beginning of year	1,263,525	1,300,268
Cash at end of year	$ $1,563,174	$ $1,263,525

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

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2017 and 2016

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 value hierarchy maximizes the use of observable inputs and minimizes the use of unobservable inputs by

Alfred P. Sloan Foundation

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2017 and 2016

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.

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

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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 2016 consolidated financial statements.

Subsequent Events

The Foundation evaluated its December 31, 2017 consolidated financial statements for subsequent events through July 2, 2018, the date the consolidated financial statements were available to be issued. Subsequent to year end, the Foundation sold multiple limited partnership interests at a value of approximately $105.2 million for approximately $86.3 million. The realized loss due to these sales will be recognized in 2018.

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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, 2017 and 2016:

	Fair Value Measurements at December 31, 2017				
	Total	Level 1	Level 2	Level 3	NAV*
Direct investments:					
Equities:					
Domestic	$ 95,433,925	$ 95,433,925	$ —	$ —	$ —
Fixed income:					
U.S. government	24,080,791	24,080,791	—	—	—
Mutual and exchange-traded funds:					
Equities	23,128,503	23,128,503	—	—	—
Fixed income	148,958,283	148,958,283	—	—	—
	172,086,786	172,086,786	—	—	—
Alternative investments:					
Equities:					
Domestic	335,936,569	—	—	—	335,936,569
International	455,307,684	—	—	—	455,307,684
Absolute return	346,247,209	—	—	—	346,247,209
Hybrid	211,634,443	—	—	—	211,634,443
Real estate	18,000,369	—	—	1,601,312	16,399,057
Private equity	202,490,989	—	—	—	202,490,989
	1,569,617,263	—	—	1,601,312	1,568,015,951
	$ 1,861,218,765	$ 291,601,502	$ —	$ 1,601,312	$ 1,568,015,951

* 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.

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	Fair Value Measurements at December 31, 2016				
	Total	Level 1	Level 2	Level 3	NAV*
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 and 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.

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The following table presents a reconciliation for all Level 3 assets measured at fair value at December 31, 2017:

	Beginning Balance	Purchases	Settlements/ Redemptions	Total Net Realized and Unrealized Gains	Transfers In/(Out)	Ending Balance
Alternative Investments:						
Real estate	$ 1,774,257	$ —	$ (243,685)	$ 70,740	$ —	$ 1,601,312
	$ 1,774,257	$ —	$ (243,685)	$ 70,740	$ —	$ 1,601,312

The following table presents the 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

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The following tables list the redemption terms and unfunded commitments for the alternative investments as of December 31, 2017 and 2016:

	2017					
	# of Funds	Fair Value	Unfunded Commitments (in millions)	Redemption Frequency	Redemption Notice Period	Lock-up Period
Alternative investments:						
Equities:						
Domestic	13	$ 335,936,569	$ —	monthly, quarterly, other	30-60 days	None
International	9	455,307,684	—	monthly, quarterly, other	10-60 days	None
Absolute return	14	346,247,209	—	daily, monthly, quarterly, annually, other	0-60 days	none, rolling 2-year
Hybrid	15	211,634,443	82	monthly, quarterly, other	45-180 days	none, rolling 2-year
Real estate	5	18,000,369	8	None	N/A	N/A
Private equity	40	202,490,989	151	None	N/A	N/A
Total		$ 1,569,617,263	$ 241			

	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
Real estate	5	18,595,620	8	None	N/A	N/A
Private equity	39	178,682,596	153	None	N/A	N/A
Total		$ 1,451,020,828	$ 232			

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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 Equities 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 4 and 8 funds in a drawdown structure for 2017 and 2016, respectively.

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 2017, the Foundation sold options contracts. S&P 500 Index put options sold were valued at approximately $17.2 million at December 31, 2017. 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 met the requirements for the 1% tax for the year ended December 31, 2017, therefore, current taxes are estimated at 1% of net investment income for 2017. The Foundation did not meet the requirements for the 1% tax for the year ended December 31, 2016, therefore, taxes were estimated at 2% of net investment income for 2016. Additionally, certain of the Foundation's investments give rise to unrelated business income tax liabilities. Such tax liabilities for 2017 and 2016 are not material to the accompanying consolidated financial statements; however, the provision for taxes, as of December 31, 2017 and 2016, includes an estimate of tax liabilities for unrelated business income.

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Deferred taxes principally arise from differences between the cost value and fair value of investments. Deferred taxes represent 1% and 2% of unrealized gains at December 31, 2017 and 2016, respectively.

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 $879,709 and $868,441 in 2017 and 2016, 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.

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The following table sets forth the financial information for the plan for 2017 and 2016:

	2017	2016
Change in accrued postretirement benefit obligation:		
Benefit obligation at beginning of year	$ 9,212,504	$ 8,129,782
Service cost	384,124	334,048
Interest cost	369,941	341,469
Actuarial (gain) loss	(1,412,746)	772,399
Benefits paid	(315,358)	(365,194)
Benefit obligation at end of year	$ 8,238,465	$ 9,212,504
Fair value of plan assets	$ —	$ —
Funded status of plan	$ (8,238,465)	$ (9,212,504)
Components of net periodic postretirement benefit cost:		
Service cost	$ 384,124	$ 334,048
Interest cost	369,941	341,469
Amortization of transition obligation	476,061	476,061
Amortization of gain	(9,451)	(47,947)
Net periodic postretirement benefit cost	$ 1,220,675	$ 1,103,631
Benefit obligation weighted average assumptions at December 31, 2017 and 2016:		
Discount rate	3.57%	4.10%
Periodic benefit cost weighted average assumptions for the years ended December 31, 2017 and 2016:		
Discount rate	3.57%	4.29%

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The medical trend and inflation rate is 7.25% in 2018 grading down to 5.38% in 2024.

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:

	2017		2016	
	1% Increase	1% Decrease	1% Increase	1% Decrease
Effect on total service and interest cost	$ 248,062	$ (171,472)	$ 190,423	$ (89,071)
Effect on postretirement benefit obligation	1,582,952	(1,203,031)	1,692,495	(1,221,826)

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

Year ending December 31:	
2018	$ 351,347
2019	322,743
2020	339,129
2021	335,334
2022	334,744
Thereafter through 2027	1,739,027
	$ 3,422,324

The accumulated amount not yet recognized as a component of net periodic benefit cost was $(1,443,751) and $435,605 at December 31, 2017 and 2016, respectively. The components are as follows:

	2017	2016
Transition obligation	$ 1,035,040	$ 1,511,101
Net actuarial gain	(2,478,791)	(1,075,496)
	$ (1,443,751)	$ 435,605

The transition obligation and actuarial gain that will be amortized into net periodic benefit cost in 2018 will be $476,061 and $99,635, respectively.

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8. GRANTS PAYABLE

The Foundation estimates that the grants payable balance as of December 31, 2017 will be paid as follows:

Year:		
2018	$	41,284,954
2019		15,368,402
2020		4,051,711
2021		3,371,871
2022		2,559,000
Thereafter		1,750,000
	$	68,385,938

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, 2017.

9. LEASE

Rent expense for 2017 and 2016, including escalations, was $1,848,933 and $1,823,305, 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 2.38% and 2% at December 31, 2017 and 2016. 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, 2017 and 2016

	2017	2016
Management expenses:		
Salaries and employees' benefits:		
Salaries	$ 8,579,885	$ 7,770,239
Employees' retirement plan and other benefits	3,293,691	3,045,451
Total	11,873,576	10,815,690
Rent	1,848,933	1,823,305
Program expenses	966,573	961,917
Office expenses	1,094,140	778,281
Professional fees	1,343,690	1,437,572
Total management expenses	17,126,912	15,816,765
Less direct investment and other management expenses allocated to investments	(5,393,594)	(4,461,493)
Management expenses	$ 11,733,318	$ 11,355,272
Investment expenses:		
Investment management fees	$ 1,950,807	$ 2,048,454
Direct investment and other management expenses allocated to investments	5,393,594	4,461,493
Investment expenses	$ 7,344,401	$ 6,509,947

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

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SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
Abt Associates	$ 558,389	$ —	$ 558,389	$ —
Academy Foundation	—	20,000	20,000	—
American Academy of Arts and Sciences	40,000	50,000	90,000	—
American Assembly	—	749,399	375,000	374,399
American Association for the Advancement of Science	—	500,251	250,000	250,251
American Association of the National Theatre	—	10,820	10,820	—
American Film Institute	90,000	—	90,000	—
American Friends of Toulouse School of Economics	—	50,000	50,000	—
American Indian Science and Engineering Society	—	20,000	20,000	—
American Museum of the Moving Image	254,595	—	126,111	128,484
American Society for Engineering Education	—	20,000	20,000	—
Annual Reviews	250,000	—	—	250,000
Appalachian State University	—	213,254	150,000	63,254
Arizona State University	—	499,574	339,959	159,615
Arizona, University of	116,050	—	116,050	—
Art of Problem Solving Foundation	—	20,000	20,000	—
Aspiration	—	20,000	20,000	—
Association of American Universities	—	20,000	—	20,000
Association of Research Libraries	—	315,100	150,437	164,663
Astrophysical Research Consortium	—	16,731,000	5,050,000	11,681,000
Aspen Institute	250,000	—	100,000	150,000
ASU Foundation for a New American University	—	248,648	155,000	93,648
Baylor College of Medicine	—	60,000	60,000	—
Becker, Adam	50,000	—	50,000	—
Benefits Data Trust	30,515	—	30,515	—
Bigelow Laboratory for Ocean Sciences	—	86,128	86,128	—
Bologna, University of	—	124,993	124,993	—
Boston College	62,630	—	62,630	—
Boston University	154,982	484,360	489,982	149,360
Brandeis University	—	473,385	282,682	190,703
British Columbia, University of	—	120,000	120,000	—
Brookings Institution	—	632,355	532,355	100,000
Brown University	—	60,000	60,000	—
Business-Higher Education Forum	250,000	—	250,000	—

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

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For the year ended December 31, 2017

Grantee	Unpaid December 31, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
California Institute of Technology	$ —	$ 120,000	$ 120,000	$ —
California, University of, Berkeley	2,789,778	1,606,471	3,546,341	849,908
California, University of, Davis	41,063	1,813,504	1,264,564	590,003
California, University of, Irvine	193,006	1,120,000	820,000	493,006
California, University of, Los Angeles	480,299	2,819,434	1,999,534	1,300,199
California, University of, Regents	—	767,258	396,685	370,573
California, University of, Riverside	—	559,480	225,592	333,888
California, University of, San Diego	—	2,228,690	1,403,930	824,760
California, University of, Santa Barbara	—	120,000	120,000	—
California, University of, Santa Cruz	—	60,000	60,000	—
Carnegie Institution of Washington	1,198,534	1,365,000	2,313,534	250,000
Carnegie Mellon University	386,039	13,473	399,512	—
Catticus Corporation	100,000	—	100,000	—
Cell Motion Laboratories, Inc.	250,000	—	—	250,000
Center for Economic and Policy Research	—	15,000	15,000	—
Center for State and Local Government Excellence	—	109,450	109,450	—
Chicago, University of	1,405,487	1,840,375	1,582,265	1,663,597
City Lore, Inc.	—	500,000	500,000	—
Code for America Labs Inc.	—	20,000	20,000	—
Code for Science and Society	—	394,000	394,000	—
Colorado School of Mines	—	417,334	247,334	170,000
Colorado State University	—	120,000	120,000	—
Colorado, University of, at Boulder	760,000	1,311,611	1,221,611	850,000
Colorado, University of, at Denver	—	278,239	190,000	88,239
Columbia University	747,462	1,608,522	1,636,518	719,466
Coolidge Corner Theatre Foundation	149,292	761,440	439,732	471,000
Cornell University	—	285,065	262,534	22,531
Council for Economic Education	190,000	—	100,000	90,000
Council on Foreign Relations	—	150,000	150,000	—
Council on Foundations, Inc.	—	25,000	25,000	—
Council on Library and Information Resources	—	1,446,562	846,562	600,000
Dartmouth College	—	60,000	60,000	—
Delaware, University of	—	60,000	60,000	—
Digital Public Library of America, Inc.	1,899,383	—	1,051,709	847,674

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

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SCHEDULE OF GRANTS AND APPROPRIATIONS

For the year ended December 31, 2016

Grantee	Unpaid December 31, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
Drexel University	$ —	$ 84,797	$ 84,797	$ —
Duke University	—	285,000	208,000	77,000
Earth Science Information Partners	—	89,015	89,015	—
Ensemble Studio Theatre, Inc.	1,200,000	—	600,000	600,000
Environmental Defense Fund Incorporated	200,000	939,260	664,260	475,000
Farmer, Jared	—	50,000	25,000	25,000
Film Independent, Inc.	—	1,097,904	697,904	400,000
Fletcher, Seth	—	25,000	15,000	10,000
Florida, University of	—	124,999	124,999	—
FORCE11	—	20,000	20,000	—
Foundation Center	—	75,000	75,000	—
Fund for the City of New York	820,000	474,893	1,294,893	—
Fund for Public Health in New York, Inc.	244,516	—	244,516	—
Gertner, Jon	—	42,000	42,000	—
Georgia Institute of Technology	—	110,000	110,000	—
George Mason University	100,227	60,000	60,000	100,227
George Washington University	—	74,962	74,962	—
Georgetown University	149,940	7,000	7,000	149,940
Gordon Research Conferences	—	94,750	94,750	—
Graeber, Charles	50,000	—	50,000	—
Greater Washington Educational Telecommunications Association Inc.	400,000	1,000,000	1,400,000	—
GuideStar USA, Inc.	—	10,000	10,000	—
Harman, Oren	50,000	—	50,000	—
Harvard University	1,650,740	1,460,391	1,830,874	1,280,257
Haverford College	—	365,358	163,112	202,246
Hawaii, University of	—	120,000	60,000	60,000
Hopewell Fund	—	211,091	81,662	129,429
Illinois, University of, Urbana-Champaign	149,700	240,000	389,700	—
Indiana, University of	109,900	60,000	169,900	—
Industrial Organizational Society, Inc.	—	20,000	20,000	—
Innovations for Poverty Action	—	660,365	400,000	260,365
Institute of International Education Inc.	—	750,000	250,000	500,000
International Documentary Association	—	50,000	25,000	25,000

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

Alfred P. Sloan Foundation

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Grantee	Unpaid December 31, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
International Energy Policy and Programme Evaluation Conf.	$ —	$ 20,000	$ 20,000	$ —
International Energy Program Evaluation Conference	—	17,750	17,750	—
Ithaka Harbors Inc	—	20,000	20,000	—
Johns Hopkins University	—	60,000	60,000	—
Johnson Jr., John M.	—	38,517	—	38,517
Julia Computing	—	912,609	506,403	406,206
L.A. Theatre Works	—	500,000	250,000	250,000
Louisiana State University	—	60,000	60,000	—
Manhattan Theatre Club	200,000	—	200,000	—
Marine Biological Laboratory	—	1,250,000	550,000	700,000
Maryland, University of, Baltimore County	—	1,304,560	195,316	1,109,244
Maryland, University of, College Park	845,803	209,500	1,032,053	23,250
Massachusetts Institute of Technology	3,291,279	2,481,885	3,438,342	2,334,822
Mathematical Sciences Research Institute	—	549,500	251,500	298,000
McGill University	—	60,000	60,000	—
Memorial University of Newfoundland	—	49,800	49,800	—
Michigan State University	248,631	—	248,631	—
Michigan, University of	279,559	1,255,149	1,071,534	463,174
Miller-McCune Center for Research Media and Public Policy	—	50,000	50,000	—
Minnesota, University of	—	162,500	162,500	—
Minnesota, University of, Foundation	75,000	—	75,000	—
Montana State University, Bozeman	—	48,417	—	48,417
Mozilla Foundation	450,000	—	200,000	250,000
National Academy of Sciences	—	940,000	390,000	550,000
National Action Council for Minorities in Engineering, Inc.	3,100,000	4,155,078	2,370,750	4,884,328
National Bureau of Economic Research, Inc.	1,485,070	3,014,306	2,207,575	2,291,801
National Opinion Research Center	—	285,804	285,804	—
National Press Foundation	—	106,553	106,553	—
National Public Radio, Inc.	—	600,000	400,000	200,000
National Science Communication Institute	—	20,000	20,000	—
Nevada, University of, Las Vegas	—	60,000	60,000	—
New Jersey Institute of Technology	—	509,038	400,000	109,038
New School for Social Research	200,000	—	200,000	—
New Venture Fund	—	354,000	354,000	—

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SCHEDULE OF GRANTS AND APPROPRIATIONS

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Grantee	Unpaid December 31, 2016	2017		Unpaid December 31, 2017
		Authorized	Payments	
New York Academy of Sciences	$ —	$ 110,140	$ 110,140	$ —
New York City H2O, Inc.	—	20,000	20,000	—
New York Public Radio	350,000	—	200,000	150,000
New York University	1,092,486	2,029,116	1,599,855	1,521,747
North Carolina State University	443,199	—	233,544	209,655
North Carolina, University of, at Chapel Hill	—	750,000	250,000	500,000
Northwestern University	119,017	348,349	467,366	—
Notre Dame, University of	—	60,000	60,000	—
NumFOCUS	602,158	1,236,223	1,235,400	602,981
O'Connor, Maura R.	—	32,100	—	32,100
Ohio State University	—	20,000	20,000	—
Olson, Stephen E.	—	50,000	—	50,000
Open Mind Legacy Project	—	200,000	100,000	100,000
Open Source Hardware Association	—	58,920	58,920	—
Open Space Institute	—	25,000	25,000	—
ORCID	—	19,900	19,900	—
Oregon, University of	250,000	1,125,000	1,225,000	150,000
Oxford, University of	179,129	65,000	244,129	—
Paris School of Economics	—	900,000	300,000	600,000
Pecan Street, Inc.	200,000	—	100,000	100,000
Pennsylvania State University	—	180,000	180,000	—
Pennsylvania, University of	508,591	76,565	352,699	232,457
Philanthropy New York	—	56,000	56,000	—
Phoenix Bioinformatics	414,300	—	414,300	—
Princeton University	223,655	723,577	723,577	223,655
Private Capital Research Institute	—	500,000	250,000	250,000
PRX Incorporated	—	510,744	275,744	235,000
Public Lab	—	124,849	124,849	—
Purdue University	—	443,754	210,000	233,754
RAND Corporation	199,814	—	199,814	—
Ramirez, Ainissa	—	27,500	10,000	17,500
Rensselaer Polytechnic Institute	250,000	774,770	624,563	400,207
Research Foundation of the City University of New York	—	4,000	4,000	—
Resources for the Future, Inc.	250,000	1,602,990	1,402,990	450,000

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Alfred P. Sloan Foundation

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For the year ended December 31, 2016

Grantee	Unpaid December 31, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
Rhode Island, University of	$ 467,731	$ 60,000	$ 527,731	$ —
Rockaway Waterfront Alliance, Inc.	—	20,000	20,000	—
Rockefeller University	800,000	—	350,000	450,000
Rochester Institute of Technology	—	470,458	370,458	100,000
Rutgers, The State University of New Jersey	55,832	—	—	55,832
San Diego State University	—	60,000	60,000	—
San Francisco Film Society	—	467,500	237,500	230,000
Science Festival Foundation	250,000	—	250,000	—
Science Friday Initiative, Inc.	456,500	—	228,500	228,000
Shetterly, Susan Hand	—	22,500	—	22,500
Stephens-Davidowitz, Seth	20,000	—	20,000	—
Social Science Research Council	655,976	125,000	340,000	440,976
South Carolina, University of	—	60,000	60,000	—
South Florida, University	—	60,000	60,000	—
Southern California, University of	100,000	60,000	60,000	100,000
Southern Regional Education Board	399,645	—	300,000	99,645
Stanford University	2,244,018	1,918,631	2,190,662	1,971,987
Stony Brook Foundation	—	15,000	15,000	—
Sundance Institute	—	500,000	300,000	200,000
Sponsors for Educational Opportunity, Inc.	—	20,000	20,000	—
Sydney, University of	—	100,000	100,000	—
Technology Affinity Group	—	5,000	5,000	—
Temple University	—	60,000	60,000	—
Texas, University of, Austin	878,302	70,000	743,663	204,639
The Brookings Institution	213,229	500,000	413,229	300,000
The Conversation	75,000	500,000	475,000	100,000
Toronto, University of	385,000	1,330,641	713,411	1,002,230
Tribeca Film Institute	106,320	830,000	436,320	500,000
Tufts University	—	20,000	20,000	—
Urban Institute	—	2,492,938	1,266,926	1,226,012
United States Association for Energy Economics	—	10,000	10,000	—
University College London	20,000	90,000	90,000	20,000
Vanderbilt University	—	60,000	60,000	—
Virginia, University of	—	60,000	60,000	—

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, 2016	2017 Authorized	2017 Payments	Unpaid December 31, 2017
Wake Forest University	$ 99,933	$ —	$ 99,933	$ —
Waldman, Jonathan	—	50,000	50,000	—
Washington Monthly Corporation	—	50,000	50,000	—
Washington, University of	600,000	180,000	780,000	—
WGBH Educational Foundation	1,100,000	2,000,000	1,650,000	1,450,000
Western Washington University	109,304	—	109,304	—
Wikimedia Foundation	3,515,000	20,000	2,285,000	1,250,000
Wisconsin, University of, Madison	—	245,000	245,000	—
WNET.ORG	50,000	750,000	450,000	350,000
Women Make Movies, Inc.	—	50,000	50,000	—
Woodrow Wilson International Center for Scholars	250,000	—	250,000	—
Yale University	652,646	1,120,000	1,074,169	698,477
Yale University Press	—	30,250	—	30,250
Yeshiva University	20,000	—	20,000	—
Zimmer, Carl	—	50,000	50,000	—
TOTAL	46,604,654	97,829,341	84,532,909	59,901,086
Sloan research fellowships to be granted in ensuing year	7,560,000	640,000	—	8,200,000
Other appropriations authorized but not committed	322,540	857,339	895,027	284,852
	54,487,194	99,326,680	85,427,936	68,385,938
Reduction for grant transfers	—	(924,447)	(924,447)	—
Refunded grants	—	(467,561)	(467,561)	—
	$ 54,487,194	$ 97,934,672	$ 84,035,928	$ 68,385,938

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

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