



**TRANSLATING
POTENTIAL**

**STANFORD UNIVERSITY
OFFICE OF TECHNOLOGY
LICENSING**

**ANNUAL REPORT
2013**

TRANSLATING POTENTIAL

University research generates new knowledge, and knowledge is at the heart of the inventions that fuel our society's progress. Yet the path from discovery to invention to marketplace is rarely a straight line, but more like a puzzle, with dozens of pieces that must come together in just the right configuration for success.

First, it takes vision to recognize the potential of university innovations that come out of basic, curiosity-driven research; and then it takes time, money and people to move these innovations into the marketplace. To create an innovation culture that effectively translates potential into products requires high quality innovations that can be commercialized by companies willing to take risks and invest resources.

What defines a high quality innovation?

Many companies would say that university innovations have the potential for broad impact but are too early stage. Proof of concept in a petri dish or laboratory scale research results may not be enough to attract corporate investment in new technology. From a corporate perspective, a high quality invention is thus one that is much more developed than is typically found in a university invention. Universities have begun to recognize this problem and many, including Stanford, have created "proof-of-concept" funds to help bridge this gap.

While translating laboratory discoveries into products for the marketplace may not be the focus of many faculty and

students, Stanford supports opportunities for researchers who are interested in developing emerging technologies further so that we can find more receptive partners in industry.

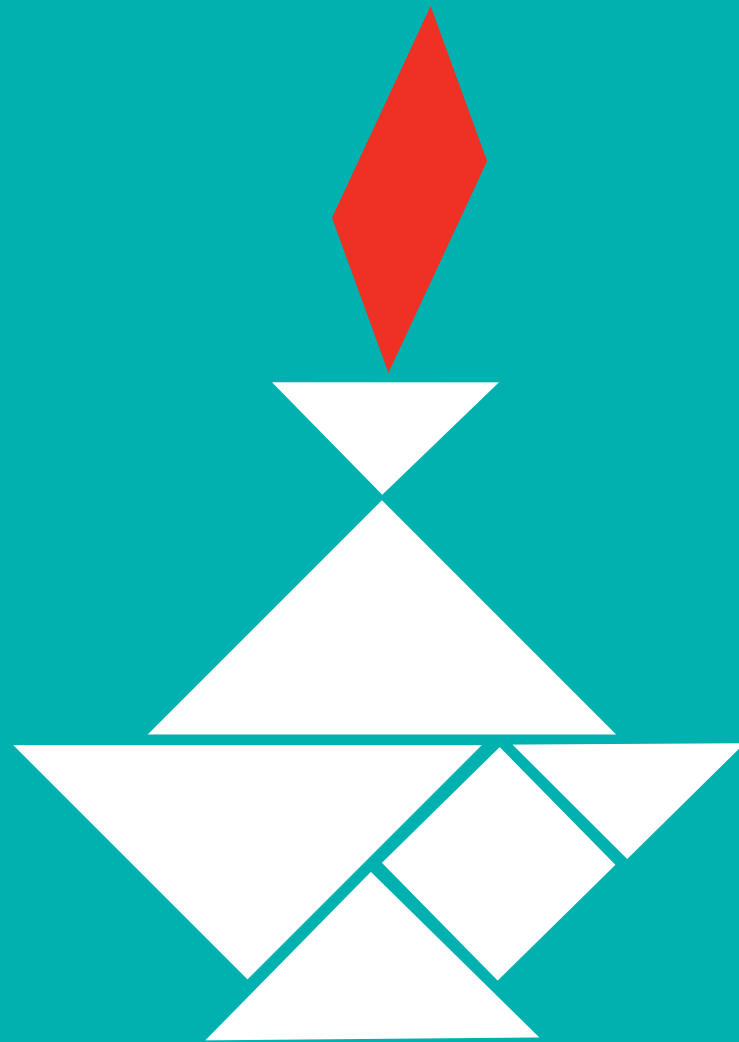
Stanford Innovation Project

Stanford's newest program to support translational work is the Stanford Innovation Project (SIP), a University-wide program supported by general funds to move inventions with high potential further along the development path. Under the auspices of Vice Provost and Dean of Research Ann Arvin, with a substantial commitment from Stanford President John Hennessy, SIP will enable Stanford inventors working with OTL to develop prototypes, find compounds through drug screening and scale up research devices, with the ultimate goal of licensing the technology.

The project had its origins in the Birdseed Fund, a small fund of \$150,000 started in 1997 to support modest commercialization efforts. The SIP funding replaces the Birdseed Fund and is significantly larger, but like the Birdseed Fund, SIP funding is available university-wide and not restricted to particular areas of innovation.

"Innovation
distinguishes
between a leader
and a follower."
— STEVE JOBS

"You're only given
a little spark of
madness. You
mustn't lose it."
— ROBIN WILLIAMS



The goal of SIP is to assemble the missing pieces of information that would push an invention past the tipping point and render it licensable. Toward this end, OTL licensing associates will select certain marketed but unlicensed inventions, and work with inventors to develop plans to move technology further down the commercialization path.

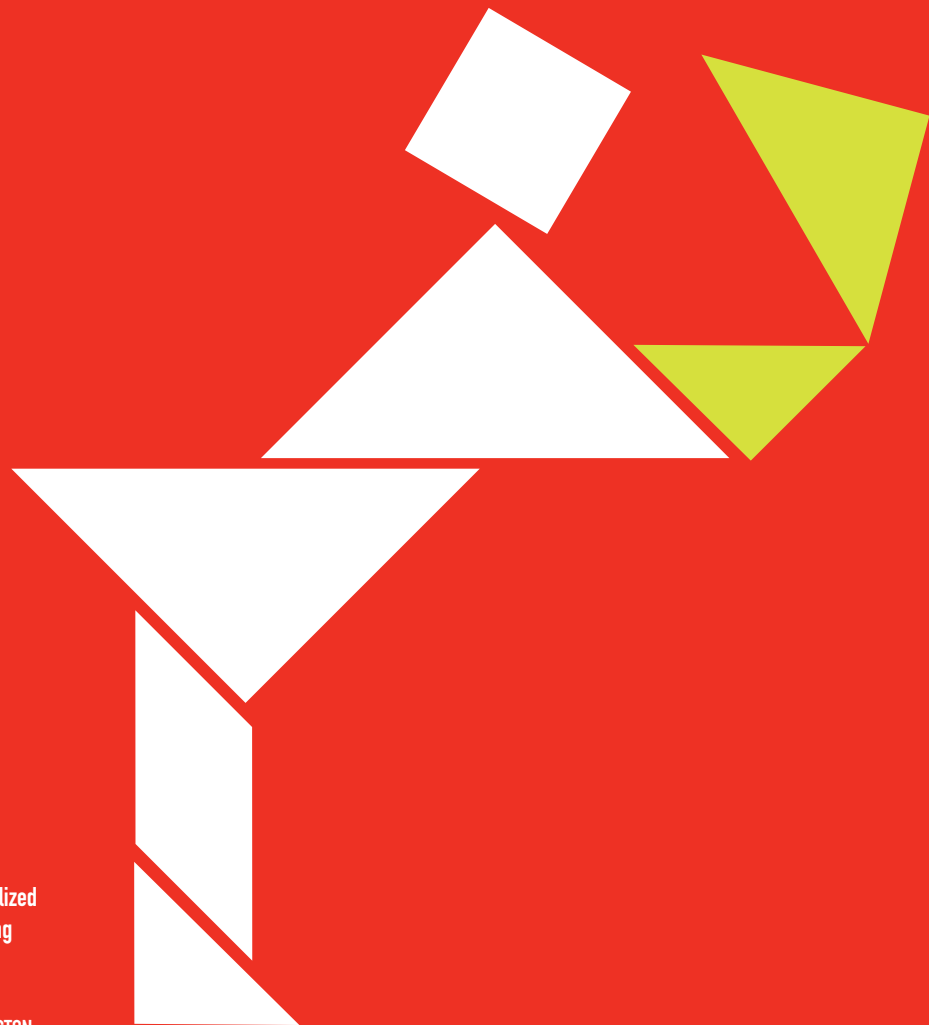
The merits of each proposed partnership between OTL and the inventor will be evaluated by a committee led by Channing Robertson, Emeritus Professor of Chemical Engineering, and comprised of the Senior Associate Deans from the Schools of Medicine, Engineering, and Humanities & Sciences together with Dean of Research Ann Arvin and Director of OTL Katharine Ku. To the extent particular expert advice is required to determine whether to back the project, such advice will be sought either internally from Stanford or externally as needed. The duration and amount of financial support will be tailored to fit each specific situation; the goal is to provide targeted funding to a project to make it attractive to industry to license.

The following pages summarize other Stanford initiatives designed to enable researchers to more easily and effectively take their inventions to the next stage. These programs demonstrate Stanford's commitment to moving early stage research results to later stage developments so that we can successfully advance these innovations for the benefit of all. Whether through research, graduated students, publications, or licensing, each piece of the puzzle is critical to the successful transfer of knowledge to the world.

Legend for the following programs:

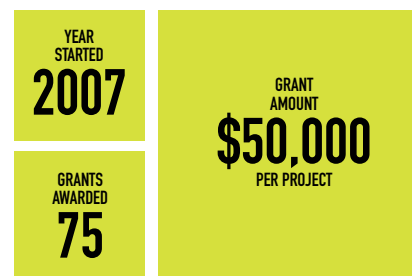


"Research is formalized curiosity. It is poking and prying with a purpose."
 — ZORA NEALE HURSTON



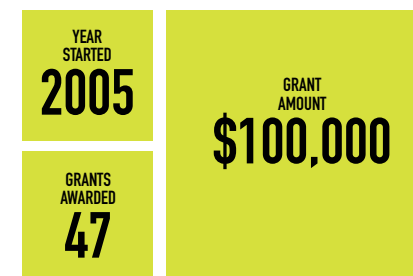
SPARK

One of Stanford's oldest programs for helping to move scientific innovations from "bench to bedside," SPARK has provided funding to over 75 projects since 2007. Although originally begun as a way to mentor faculty, graduate students and postdocs on the commercialization of medical treatments and diagnostics, SPARK has gone further, helping move projects to companies. Selected projects receive approximately \$50,000 from the SPARK program and mentoring from industry volunteers for each of two years with the proviso that PI's attend SPARK meetings and regularly report on progress. Because funding is strongly tied to milestones and demonstrated progress, SPARK's success rate is high – 45% of projects have been taken up by commercial companies to date.
<http://sparkmed.stanford.edu/>



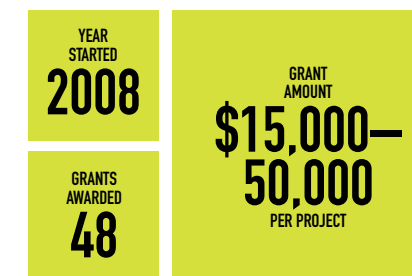
Coulter Translational Research Grants

The Wallace H. Coulter Foundation awarded Stanford's Bioengineering Department an endowment to fund translational projects to develop new technologies that address unmet clinical needs, improve health care and lead to commercially available products. The funding supports collaborative research projects with co-investigators from the Department of Bioengineering and the School of Medicine. Desirable outcomes include inventions, patents, licenses, commercial partnerships, and start-up companies that lead to products that improve diagnosis and treatment of disease. Intellectual property is an important component of each project plan and specific quarterly milestones are required; project teams report progress to an oversight committee. Grants are up to \$100,000 for one year with the possibility of a second year of funding. As of September 2013, the program has funded 47 projects. To date, 21 of the projects have either formed a start-up company or licensed their technology to an existing company.
<http://bioengineering.stanford.edu/coulter/>



Innovation Accelerator Seed Grant Program

The Stanford Center for Clinical and Translational Research and Education (Spectrum) provides seed grants to promising translational technologies with funding from \$15,000–50,000/year with the possibility of a single renewal. The emphasis is on novel translational technology in four thematic areas of the translational spectrum: medtech; therapeutics; diagnostics; and population health sciences and community engagement projects. Priority is given to studies with the potential to advance rapidly into clinical care through commercialization or other pathways. Seed grants are administered by Biodesign (medtech), SPARK (therapeutics) and Spectrum with funding from the NIH Clinical and Translation Science Award and the School of Medicine Dean's Office. The record of translation is sustained and impressive with the Biodesign program spawning 27 start-up companies and 350 patents and the SPARK program producing over 23 products in clinical studies, 10 licensed patents and 7 new companies.
<http://spectrum.stanford.edu/>



"Don't refuse to go on an occasional wild goose chase; that's what wild geese are for."
 — HENRY S. HASKINS



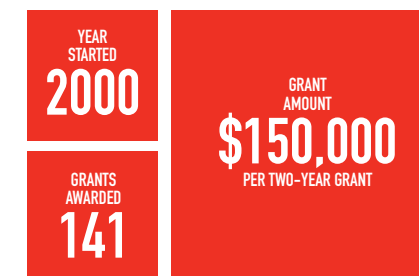
Department of Medicine TRAM Program
 Translational Research and Applied Medicine (TRAM) offers pilot grants that support translational projects between scientists and clinicians within the Department of Medicine. TRAM was established to provide an infrastructure to rapidly translate novel genomic/proteomic, nanoscale and imaging research discoveries from the laboratory to the clinic and to facilitate bench to bedside development of cellular therapies. A core facility helps with translational research and TRAM offers faculty grants up to \$25,000 and fellows grants up to \$15,000. In addition, TRAM offers a seminar and workshop series.
<http://tram.stanford.edu/about/>



BIO-X Interdisciplinary Initiatives Program
 Bio-X catalyzes discovery, education and innovation by crossing the boundaries between disciplines to develop interdisciplinary solutions and to create new knowledge of biological systems for the benefit of human health. Bio-X provides seed grants through the Bio-X Interdisciplinary Initiatives Program (IIP), which funds high risk, high reward, collaborative and innovative projects across the university. The IIP awards approximately \$3 million every other year in the form of two-year grants averaging about \$150,000 each. From inception in 2000 through the sixth round in 2012, the program has provided critical early-stage funding to 141 interdisciplinary projects involving more than 400 faculty representing five Stanford schools and dozens of departments. In addition, Bio-X coordinates proposals from Stanford to Sanofi, Amgen, Agilent, Johnson & Johnson, Novo Nordisk, Gilead, and Celgene.
<http://biox.stanford.edu/>



Precourt Institute Seed Grants
 Launched in 2010, the Precourt Institute seed grant program funds faculty research with potential for high impact on energy supply and use. These "proof of concept" awards, which encourage interdisciplinary research, bridge theory to early experiments and analysis. Positive results allow researchers to proceed to large-scale studies. The seed funding grants are supported by the Precourt Energy Fund, the Steyer-Taylor Energy Fund, the Schmidt Family Foundation and the Stinehart/Reed Donor Advised Fund:
 For energy-related proposals, the Precourt Institute for Energy (PIE) provides seed grants of \$300,000 for up to two years.
 For energy efficiency projects, funds of \$150,000 for one year are available from the Precourt Energy Efficiency Center (PEEC).
 For sustainable energy projects, the TomKat Center for Sustainable Energy provides seed grants of \$300,000 for up to two years.
<http://energy.stanford.edu>

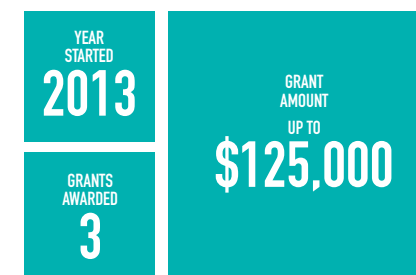


"To see things
in the seed,
that is genius."
— LAO TZU



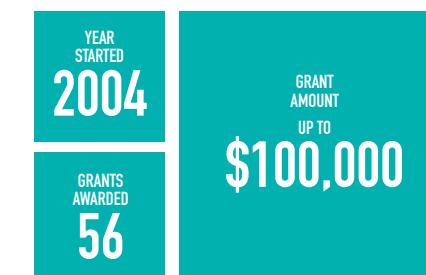
TomKat Energy Innovation Transfer Seed Grants

The Innovation Transfer Program is a new program targeted at sustainable energy innovations and is funded by the TomKat Center for Sustainable Energy. Working closely with other Stanford resources, the TomKat Center focuses primarily on energy (generation, storage, conversion, transmission, distribution, and management), sustainable transportation, and the energy-water nexus. Sustainable energy-related projects with commercialization potential are awarded Energy Innovation Transfer Seed Grants through a competitive selection process. In general, the grants, which are under \$125,000 each, allow researchers to bridge the gap between government support for basic science and private-sector and venture funding for emerging innovations. In addition to funding prototype development and customer and market trials, the grants will assist participants in developing a more business-centric approach to the potential markets and applications of their concepts.
<http://tomkat.stanford.edu/>



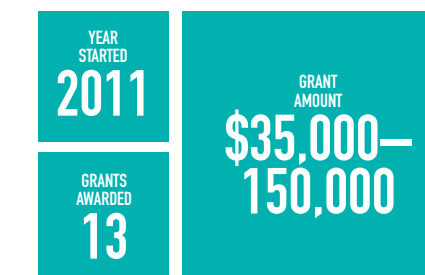
Stanford Woods Institute Environmental Venture Projects

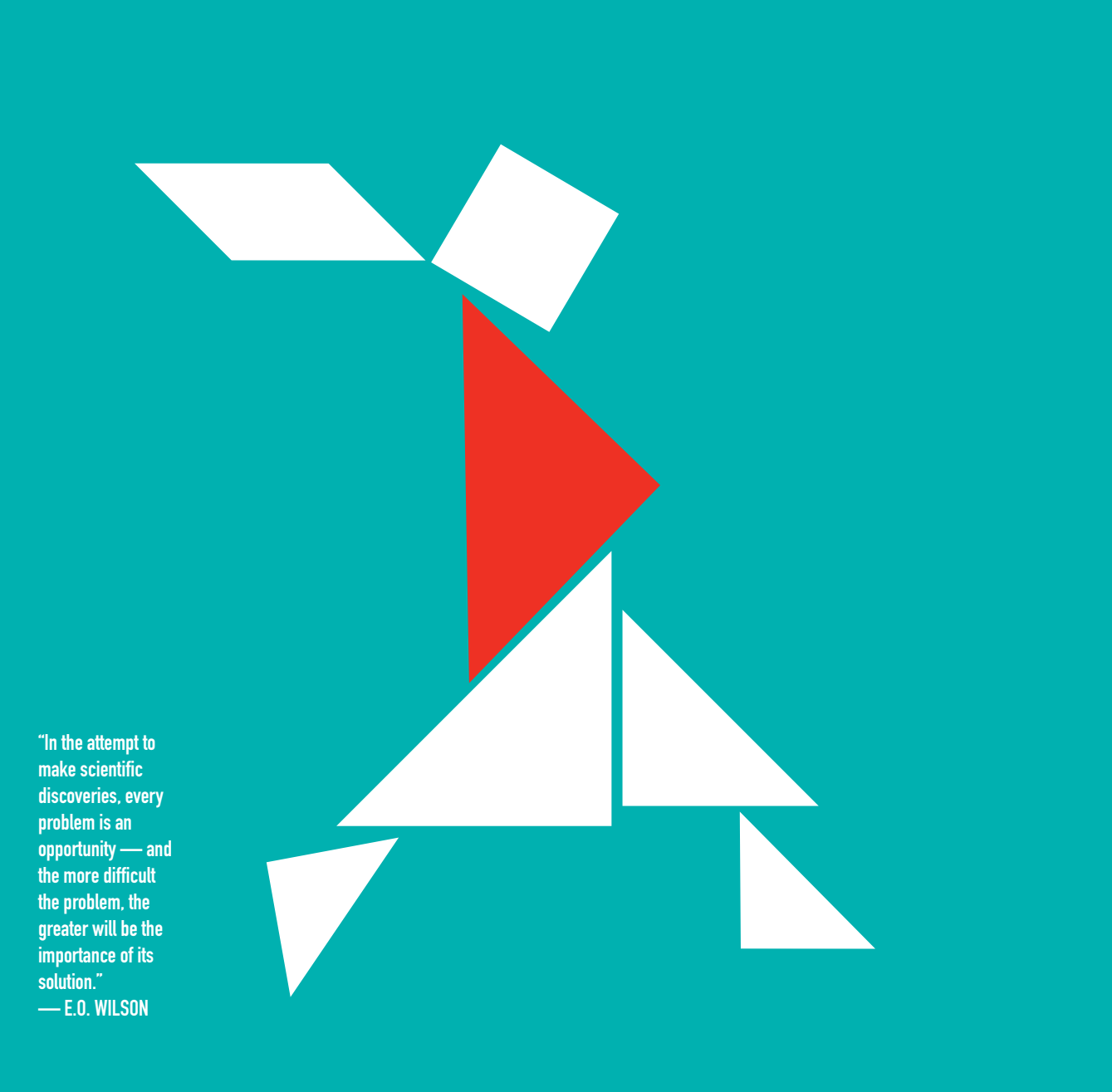
To catalyze transformative solutions to environmental and sustainability challenges globally, the Stanford Woods Institute has awarded millions of dollars in Environmental Venture Projects (EVPs) seed grants to interdisciplinary research teams from all seven of Stanford's schools and 34 of its departments. Woods has awarded more than \$8.5 million in EVP grants to 56 research teams working in 24 countries since the annual program started in 2004. These innovative research projects focus on finding solutions to challenges ranging from the protection of endangered species in California to the delivery of clean drinking water in Africa. EVPs have led to development of natural resources valuation software and biodegradable building materials. EVP seeds grants fund up to \$100,000 per year for up to two years (\$200,000 maximum).
<http://woods.stanford.edu>



Stanford Institute for Innovation in Developing Economies (SEED) Grants

The Stanford Institute for Innovation in Developing Economies (SEED) seeks to stimulate the creation of economic opportunities through innovation, entrepreneurship and the growth of businesses that change the lives of people who live in poverty around the world. Full-time Stanford faculty members may apply for two types of SEED grants: exploratory grants not exceeding \$35,000 for projects that are exploratory in nature or are of a scale that can be completed in a year; and full research grants for larger-scale projects not to exceed \$150,000. Faculty are encouraged to collaborate with the Graduate School of Business and other schools and departments on larger-scale research projects. The research grants are active for a period of one academic year. A request for extension must be reviewed and approved by SEED's Research Advisory Committee.
<http://seed.stanford.edu>





"In the attempt to make scientific discoveries, every problem is an opportunity — and the more difficult the problem, the greater will be the importance of its solution."
— E.O. WILSON

YEAR IN REVIEW

Stanford received \$87M in gross royalty revenue from 622 technologies, with royalties ranging from less than \$10 to \$55M. Forty-two of the 622 inventions generated \$100,000 or more in royalties. Six inventions generated \$1M or more. We evaluated 502 new invention disclosures in calendar year 2013. Filing and maintaining patents is an expensive proposition and we spent \$9.3M in legal expenses. Of the 103 new licenses we signed this year, 66 were nonexclusive, 20 were exclusive and 17 were option agreements.

Royalty Distribution

Stanford's royalty-sharing policy provides for the distribution of cash net royalties (defined as gross royalties less 15% for OTL's administrative expenses, minus direct expenses) to inventors, their departments, and their schools. In 2012-13, inventors received personal income of \$21.7M, departments received \$19.4M, and schools received \$18.8M. The University assessed an infrastructure charge on the department and school shares of royalty income.

We contributed \$1M to the University General Fund and \$2M to the OTL Research Incentive Fund, which is administered by the Dean of Research to support of early-stage, innovative research ideas, novel interdisciplinary research, cost sharing of shared instrumentation, and other research facilitation needs.

With respect to liquidated equity, we transferred \$331,696.60 each to the Dean of Research for the OTL Research Fund and to the Vice Provost for Graduate

Education for the VPGE/OTL Graduate Education Fund. Stanford also paid the University of California and other organizations \$706,959.86 for jointly owned technologies for which Stanford has licensing responsibility.

Expenses

OTL spent \$9.3M on patent and other legal expenses, of which \$4.0M was reimbursed by licensees. We have an inventory of \$18.8M, which represents patent expenses for unlicensed inventions. Our operating budget for the year (excluding patent expenses) was \$6.6M.

We take a financial risk each time we decide whether or not to file for a patent. In this period of tremendous change in the intellectual property landscape as court cases determine new patent law, we must weigh the likelihood of licensing a technology versus the expense of patenting or litigation. In addition, because of the America Invents Act, we sometimes need to decide whether or not to file patent applications earlier than would be optimum.

Equity

As of August 31, 2013, Stanford held equity in 161 companies as a result of license agreements. For institutional conflict-of-interest reasons and insider trading concerns, the Stanford Management Company sells our public equities as soon as Stanford is allowed to liquidate rather than holding equity to maximize return. This year, we received \$1.0M in liquidated equity from 7 companies and acquired equity holdings in 11 companies; 9 of them are defined as a “start-up based primarily on Stanford technology.”

New Disclosures

In calendar year 2013, we received 502 new technology disclosures. About 10% of the inventions were considered such an amalgam of both physical science and life sciences so as not to be able to categorize them in one group or the other, evidence of the results of interdisciplinary research. Of the remaining inventions, approximately 55% were in the life sciences and 45% were in the physical sciences.

Stanford Trademark Enforcement Fund and Patent Expenses

The Stanford Trademark Enforcement Fund was established as a source of funding for extraordinary cases associated with the protection of the Stanford name and associated logos and trademarks. Funding for the STEF comes from 1% of the department and school shares of net revenue OTL receives. The President authorized OTL to set aside an additional 1% to provide a fund to offset expenses associated with the new America Invents Act patent law, described below.

America Invents Act

The most significant event for OTL was the change on March 16, 2013, under the America Invents Act, when the U.S. moved from a “first to invent” to a “first inventor to file” system, thus bringing it into line with most other patent jurisdictions around the world. In addition, it is now

easier to challenge a patent after issuance. As a result of this shift, we will not file patents if the invention has been published. In order to inform our researchers, we organized several seminars by patent attorneys to answer questions about the new law. *Stanford Report* explained the law via the news media and OTL sent information to all our current inventors. Although we must now decide whether or not to file a patent application earlier than we may have in the past, we understand the challenge and have modified our patent strategies accordingly.

Foundation Relationships

In May, 2013, Stanford hosted a small meeting of university colleagues to discuss our relationship with foundations. Universities and foundations share many research, education, and public service goals. Both are non-profit organizations that depend on third parties to provide funding to support their missions. Both have obligations to be good stewards of these funds and to use them to advance and disseminate knowledge in their areas of interest.

For all of these reasons, the relationships between universities and foundations are long-standing and strong. Foundations support a range of research and educational activities at universities with the hope that their mission and stakeholders will benefit from the research they sponsor. While foundations provide a relatively small percentage of a university’s overall research budget compared to that funded by the federal government, foundation support provides much needed and important flexible funding that enables faculty to expand their research horizons.

University researchers conduct basic and applied research across a broad spectrum of disciplines that often leads to early stage innovations. Universities throughout the country have established technology transfer offices to help move these new technologies to industry quickly and effectively so that society can benefit from these

innovations. Foundations, too, want these innovations to have a timely impact, so university and foundation goals are closely aligned.

The university participants agreed upon several principles:

- Universities and foundations should work together to publicize the importance and impact of foundation-sponsored research support.
- Universities and foundations should work together so that intellectual property created under foundation funding benefits the public.
- Universities and foundations should work together to determine how best to share the benefits of licensing.
- Universities and foundations should work together to ensure the viability of basic and applied research.

China

OTL has been gradually developing closer relationships with a few Chinese entities as we explore how to transfer technology into China and work with Chinese companies. We signed a memorandum of understanding with UPEX, a company based in Shenzhen, China that is translating OTL’s TechFinder website into Chinese. This will enable Chinese companies to review our technologies as potential licensees.

We have also been begun to work with the International Technology Transfer Center at Peking University, in support of Stanford’s broader collaboration with the university. OTL will introduce certain inventions that could be commercialized by Chinese companies and the Center will assist OTL in licensing Stanford inventions to these companies.

Motorola Mobility

Motorola Mobility accomplished a major feat by crafting one agreement that seven universities could sign. Interested in simplifying contracting with several

universities, Motorola Mobility convened a meeting with the universities after studying our various policies and practices around sponsored research. At this meeting, they proposed an agreement and the universities and Motorola discussed the various issues in a very open and honest group meeting; the result was a document that we could all agree to.

SLAC National Accelerator Laboratory

OTL has been working with SLAC to encourage SLAC researchers to disclose potential licensable technologies and become more involved in technology transfer efforts, in concert with the efforts of the federal government to encourage innovation in the national laboratories. With SLAC’s new research directions based on the laboratory’s unique light source capabilities, we believe there will be important developments at SLAC in the coming years.

Start-up Guide

Many Stanford students, faculty and researchers are entrepreneurial; the start-up spirit seems to be in the water. In order to help entrepreneurs understand how Stanford handles start-up licensing, OTL published a *Start-up Guide* to provide an overview of the processes and policies when newly formed companies want to license Stanford technology.

iFarm Teams

In 2013 the Innovation Farm Teams (iFarm Teams) program has matured into an ongoing initiative, offering two sessions, one in the Spring and one in the Fall, for the broader Stanford community. Applications to the program have been steadily increasing: the Spring 2013 program accepted 24 applicants and the Fall 2014 program, 38. Eleven teams from 2013 gave final presentations in their respective sessions covering diverse technologies such as Eye Glass Mounted Displays, Golf Swing Analysis, Dry Adhesives, Microbial Batteries, and Jet Lag Treatment. In 2014 the iFarm Teams program will continue to expand and will initiate collaborations with other Stanford entrepreneurship programs. (<http://www.stanford.edu/group/ifarmteams/>)

ICO

Part of OTL, the Industrial Contracts Office (ICO) specializes in research agreements with industry. In FY13, ICO finalized 110 new industry sponsored research agreements, where companies fund, and sometimes collaborate on, research projects in Stanford laboratories.

The School of Medicine accounted for just over 40% of the sponsored research agreements and the School of Engineering accounted for about 35% of these agreements. The School of Earth Sciences accounted for another 8% of the total. The rest of the agreements were for projects in the School of Humanities and Sciences, the Graduate School of Education, the Graduate School of Business and the Independent Laboratories.

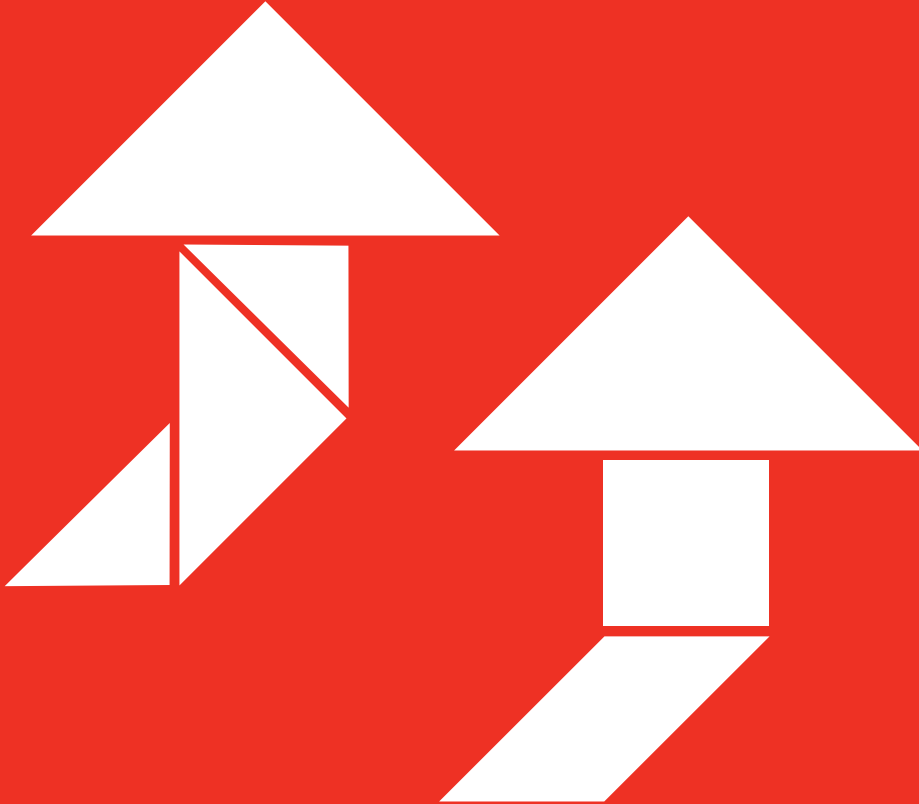
ICO also finalized three new master sponsored research agreements: with Pfizer (for its Centers for Therapeutic Innovation program), Novo Nordisk and Motorola Mobility. Master agreements cover the terms for a range of different projects, significantly reducing contracting time for each project.

Among the other agreements that ICO finalized, material transfer agreements (MTAs) continued to account for the largest number—with about 430 new MTAs for incoming materials and 50 outgoing MTAs. Another 15 agreements were for sending out human tissues for research purposes.

Other ICO agreements included more than 120 amendments to existing sponsored research agreements, plus new collaborations, data sharing agreements, equipment loans, non-disclosure and other research-related agreements. ICO also handles agreements for Industrial Affiliates programs.

In 2012-13, the international chemical company BASF invigorated its relationship with Stanford, by sponsoring several projects with Stanford investigators in materials science research:

- Professor Friedrich Prinz's Nanoscale Prototyping Laboratory (NPL) is collaborating with BASF to use plasma-enhanced atomic layer deposition to grow oxide layers with precise thickness control for electronics. NPL creates, models, and prototypes nanoscale structures to understand the physics of electrical energy conversion and storage.



“Successful innovation is not a single breakthrough. It is not a sprint. It is not an event for the solo runner. Successful innovation is a team sport, it's a relay race.”
— QUYEN NGUYEN

- Professor Zhenan Bao is investigating conjugated polymer hybrid systems to assist in selective carbon nanotube dispersion to increase the efficiency of CNT nanotube semiconducting inks. Bao Group research focuses on synthesis of functional organic and polymer materials, organic electronic device design and fabrication, and applications development for organic electronics.
- Professor Jens Norskov, as part of SUNCAT research activities, is investigating metal-support interactions and build up in catalyst preparation methods. The SUNCAT (Sustainable eNergy through CATalysis) Center for Interface Science and Catalysis is a partnership between SLAC National Accelerator Laboratory and the Stanford Department of Chemical Engineering. SUNCAT explores atomic-scale design of catalysts for chemical transformations for energy conversion and storage.

The Boeing Company is continuing its longstanding relationship with Stanford by supporting several projects in the School of Engineering, including the following:

- Professor Reinhold Dauskardt in Materials Science and Engineering is studying high-performance and reliable composite adhesive bonding for aerospace systems.
- Professor Olav Solgaard in Electrical Engineering's Solid State Photonics Laboratory is researching fiber optical sensors and solar energy conversion for aerospace applications.

Robotic Drilling Systems AS (Seabed Rig AS) is continuing its support of Mechanical Engineering Department Professor Mark Cutkosky, who is studying slippage between a metal gripper and steel pipes in robotic drilling environments for the next generation of automated drilling systems.

The Semiconductor Research Corporation (SRC), a consortium of semiconductor makers, continued its support, funding 18 semiconductor-related projects at Stanford.



