



## Elevating Science through Collaboration

University research and the people who conduct it are an important part of the solution to nearly every major challenge facing our country, according to the Association of American Universities (AAU) in its recently published "Science as a Solution: An Innovation Agenda for the Next President." The document goes on to name some of the national and international challenges for which science is an important part of the solution: energy self sufficiency, environment and climate change, 21st-century life sciences, and homeland security.

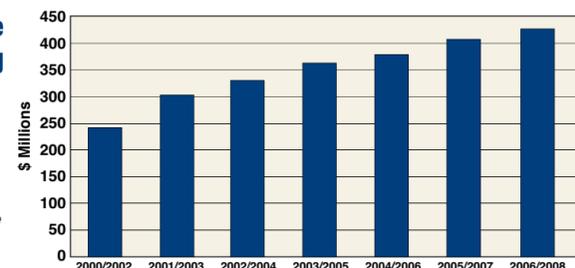
At the University of Pittsburgh, we are deeply engaged in research that addresses each of the above challenges—and more—through our multidisciplinary, multischool centers, some of which are highlighted in this publication. In every case, the work in these centers crosses disciplines and traditional boundaries, in order to extend the frontiers of knowledge into the realms where truly transformational research is most likely to occur.

Take Pitt's newest Center for Simulation and Modeling (SAM) as an example. It has the potential to revolutionize the way science is conducted, to foster transformational research, and to stimulate the advancement of new technologies that can have an unprecedented impact on challenges as diverse as pandemics, disease detection and treatment, global warming, banking meltdowns, and clean and alternative energy.

Coming from a tradition of research that encourages multiple perspectives, theories, and approaches, we at the University of Pittsburgh strongly support and invest in research that fosters the multidisciplinary team approach to answering some of the most complex questions of our times. We are committed to elevating science to the highest levels through collaboration.

## Federal Science and Engineering Research and Development Obligations at Pitt

(Source: National Science Foundation; data year/release date)



## Recent Pitt Faculty Honors

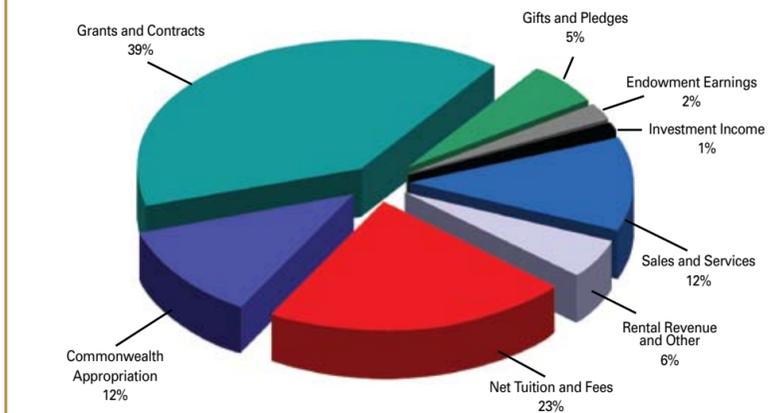
- Isabel L. Beck, emeritus professor in the School of Education and senior scientist in the Learning Research and Development Center, was elected to the **National Academy of Education**.
- William E. Klunk, professor of psychiatry and neurology, and Chester A. Mathis, professor of radiology and pharmacology, were awarded the **Potamkin Prize**—considered to be the "Nobel Prize of Neurology" for their pioneering work in the early diagnosis of Alzheimer's disease.
- George E. Klinzing, vice provost for research and W.K. Whiteford Professor of Chemical and Petroleum Engineering; Ching-Chung Li, professor in the Department of Electrical and Computer Engineering and professor in the Department of Computer Science; and Susan G. Amara, Thomas Detre Professor and chair of the Department of Neurobiology; were elected fellows to the **American Association for the Advancement of Science**.
- Nuel D. Belnap Jr., Alan Ross Anderson Distinguished Professor of Philosophy, has been elected a 2008 fellow of the **American Academy of Arts and Sciences**. This is the third consecutive year that a Pitt philosopher has received this honor.
- Steven R. Little, assistant professor of chemical engineering, received a 2008 **Beckman Young Investigators** award for developing synthetic cellular constructs that could allow for better understanding of the immune system.
- Marcus Rediker, professor in the Department of History, received both the 2008 Merle Curti Award from the **Organization of American Historians** and the George Washington Book Prize for his book, *The Slave Ship: A Human History*.
- David A. Lewis, UPMC Endowed Professor in Translational Neuroscience and professor of psychiatry and neuroscience, was elected to membership in the **Institute of Medicine** for his research on the treatment of schizophrenia. Lewis became the 19th member of this prestigious group from Pitt for which election is considered to be one of the highest honors in the field of medicine.
- Lee Antoinette Darville, professor in the Department of Pediatrics and the Department of Immunology in the School of Medicine, was selected by The Hartwell Foundation to receive an **Individual Biomedical Research Award**. She was one of only 12 medical research scientists in the country to earn the prestigious award.

## Major and Multiyear Grants

- The University of Pittsburgh's Center for Vaccine Research received three major grants recently: from the Bill and Melinda Gates Foundation—a \$10.1 million dollar grant over five years to fund the creation of **computer simulations of epidemics**, which will be used to evaluate new vaccine technologies and modes of delivery; an \$11.4 million grant to aid in the creation of new methods to control the **worldwide TB epidemic**; and a \$3.6 million award from the National Institute of Allergy and Infectious Diseases to conduct studies of vaccines designed to protect against **avian flu**.
- Identifying the earliest signs of **autism** will be the focus of a \$9.6 million grant over five years awarded by the National Institutes of Health (NIH) to Pitt's Center for Excellence in Autism Research.
- The Richard King Mellon Foundation made a gift of \$23 million to the University of Pittsburgh and Children's Hospital of Pittsburgh of UPMC for the establishment of a new **pediatric research institute**.
- The McGowan Institute for Regenerative Medicine has been selected as one of the leaders of a national \$85 million program to use the science of regenerative medicine to develop new **treatments for wounded soldiers**—through a new federally funded enterprise, the Armed Forces Institute of Regenerative Medicine.
- Mathematicians in the School of Arts and Sciences have received \$1.8 million from the National Science Foundation to develop mathematical models to treat **immune system diseases**.
- To **advance nanoscale science and technology**, the W.M. Keck Foundation awarded \$1 million to Pitt for the development of groundbreaking tools to probe, control, and observe molecules.
- The National Institute of Mental Health awarded the University a \$10 million grant to support a new Conte Center for the Neuroscience of Mental Disorders (CCNMD), which will focus on developing new **treatments for schizophrenia**.
- Bioengineering researchers will be part of a five-year, \$18.5 million, multiple-university NSF-funded project to develop **implantable devices** made from biodegradable metals.

- Pitt faculty members are engaged with 22 other institutions to develop the world's most powerful telescope for **observing and recording deep space** from a mountain in northern Chile. The project recently received \$30 million from Microsoft founder Bill Gates and the Charles Simonyi Fund for Arts and Sciences.
- As part of a multi-institutional, five-year initiative by the U.S. Department of Defense, Pitt researchers from the School of Arts and Sciences and the School of Information Sciences have received \$2.7 million to investigate **high-density electronics** and to assist in the creation of effective **diplomacy skills within the military**.
- The Centers for Disease Control and Prevention (CDC) has awarded \$8.4 million over the next five years to the Graduate School of Public Health to create a Preparedness and Emergency Response Research Center. One of seven centers being established nationwide, it will develop methods to evaluate emergency response plans to **handle public health emergencies** caused by the spread of infectious diseases, natural disasters, or intentional acts.

## Sources of Current Operating Funds FY 2007



## Research Initiatives Update

- A new **Center for Simulation and Modeling (SAM)** has been created at the University of Pittsburgh that will foster collaboration across an extraordinarily broad range of disciplines to tackle the biggest challenges in energy and sustainability, materials engineering and nanoscience, medicine and biology, and public health. Powerful computer models are being created to simulate complex phenomena that will lead to new ways of thinking about infectious diseases, immune systems, alternative energy sources, global warming, pandemics, and even the world economy. More than 50 faculty members and their graduate students—from chemistry, biology, and physics to materials science and mechanical and chemical engineering to computer science and the health sciences and social sciences—are part of the new center. Visit [www.sam.pitt.edu](http://www.sam.pitt.edu).
- Global public health is a major area of focus at the University of Pittsburgh. Several very large grants received this past year will enable Pitt researchers in the **Center for Vaccine Research** to investigate epidemic control strategies and safer, more effective vaccines for infectious diseases, dengue fever, tuberculosis, and avian flu—all of which threaten the lives of millions of people worldwide. Because modeling can be used to understand the behavior of pandemic disease, computer modeling and simulation will be a critical aspect of the work in this center. Visit [www.cvr.pitt.edu](http://www.cvr.pitt.edu).
- The **Center for Energy**, created in 2007, received funding to develop clean and efficient technologies for the use of fossil fuels, which could reduce regional as well as national dependence on foreign oil. The \$26 million funding, to a consortium of three universities, was received through a subcontract with RDS Inc., an onsite contractor at the National Energy Technology Laboratory (NETL), the national laboratory for the U.S. Department of Energy's Office of Fossil Energy. Visit [www.energy.pitt.edu](http://www.energy.pitt.edu).



This mobile lab, acquired by the University's Clinical and Translational Science Institute, will provide regional middle and high school students with hands-on science experience through a program in the Department of Biological Sciences.



## Collaborative Research in Action

Approaching problems from multiple perspectives is often the most effective way to deal with complex challenges that require new and innovative solutions.



Dr. Bruce Lee (left), of Pitt's School of Medicine, and Dr. Donald Burke (right), dean of the Graduate School of Public Health, are using scientific modeling to determine the most effective vaccine technologies to control the spread of infectious diseases and epidemics.



To develop environmentally sustainable thermoacoustic heat engines and refrigerators that may help reduce greenhouse gases, Associate Professor Laura Schaefer and Associate Professor Jeffrey Viperman collaborate in the Swanson School of Engineering Energy Systems Laboratory.



By combining expertise from their respective fields of engineering, medicine, and chemistry and using the latest in nanoscience tools, Professor Hong Koo Kim (standing left), Dr. David Geller (standing center), Professor David Waldeck (seated), and their teams are investigating potential new therapies for killing cancer cells.

## Commercialization

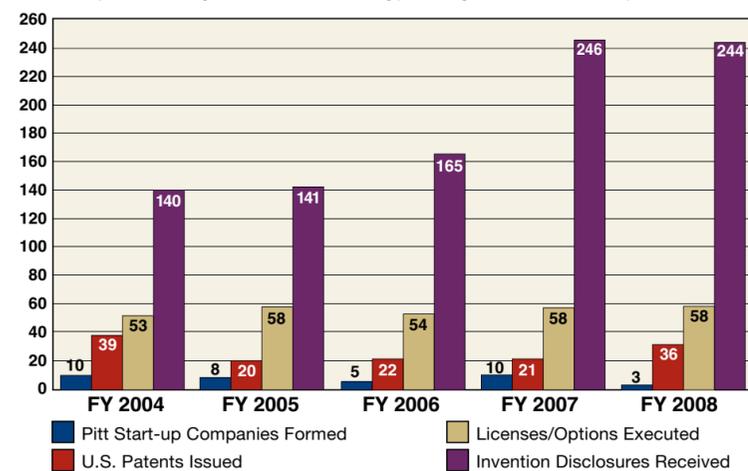
Robotic probes for minimally invasive cardiac surgery. Proteins that identify signs of vascular disease. Emergency hypothermia treatment for trauma victims. These are the technologies behind three new start-up companies that were created in 2008, raising the total number of start-ups to come out of the University of Pittsburgh in the past five years to 44.

As our technology transfer program matures, we see a growing number of innovator participants, resulting in increased flow from the lab to the marketplace and new relationships with businesses that help to further economic development.

In the most recent national survey by the Association of University Technology Managers, Pitt ranked 22nd in licenses executed, ahead of Duke University, Carnegie Mellon University, Pennsylvania State University, the University of Texas, the University of North Carolina, and the University of Pennsylvania.

## Economic Impact

University of Pittsburgh Office of Technology Management: [www.otm.pitt.edu](http://www.otm.pitt.edu)



Total research expenditures by the University of Pittsburgh from all sources, including the federal government, companies and foundations, state and local governments, and other agencies and institutions totaled approximately \$642 million in fiscal year 2008.

(Source: final audited data from the Office of Research)

## NIH Funding FY 2006

(Source: National Institutes of Health)

Educational Institutions and Affiliates	Dollars in Millions
1 Harvard University	\$1,235
2 Johns Hopkins University	\$618
3 University of Pennsylvania	\$536
4 University of California, San Francisco	\$473
5 University of Washington	\$461
<b>6 University of Pittsburgh</b>	<b>\$447</b>
7 University of California, Los Angeles	\$435
8 Duke University	\$431
9 University of Michigan	\$400
10 Washington University	\$378
11 Yale University	\$339
12 Columbia University	\$330
13 Stanford University	\$316
14 University of California, San Diego	\$310
15 University of North Carolina	\$300

## Federal Science and Engineering R&D Obligations FY 2006

(Source: National Science Foundation)

Educational Institutions and Affiliates	Dollars in Millions
1 Johns Hopkins University	\$1,251
2 University of Washington	\$616
3 University of Michigan	\$510
4 University of Pennsylvania	\$498
5 University of California, Los Angeles	\$479
6 Duke University	\$473
7 Columbia University	\$468
8 Stanford University	\$458
9 University of California, San Francisco	\$442
<b>10 University of Pittsburgh</b>	<b>\$427</b>
11 Harvard University	\$420
12 Washington University (St. Louis)	\$411
13 Massachusetts Institute of Technology	\$407
14 University of California, San Diego	\$402
15 University of Wisconsin, Madison	\$374
16 Yale University	\$362

## Multidisciplinary Areas of Research

Understanding some of the really critical challenges in science and technology and other fields more often than not involves collaboration among experts from different disciplines. At the University of Pittsburgh, many researchers work together in the following 12 areas of multidisciplinary research to try to address the complex societal and global problems we face.



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# RESEARCH PROFILE 2008-09

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