2010

Annual Report: Fiscal Year 2010

University of Tennessee Office of Research

THE UNIVERSITY of TENNESSEE KNOXVILLE

Quest

Research, Scholarship, Creative Activity

UT Office of Research Annual Report

Fiscal Year 2010

THE UNIVERSITY of TENNESSEE KNOXVILLE

Quest

Research, Scholarship, Creative Activity

The Great Valley of the Tennessee
has always been known for its fertility,
its fruitful bottomlands,
the abundance of its forested ridges.
Before there was history in Tennessee,
there were ancient peoples settled along its rivers
who reaped its riches and
drew from it a wisdom all their own.

European cultures that followed
also harvested the region's resources,
creating a welcoming, productive society.

Now the Great Valley is blooming afresh
with a 21st-century vitality,
And the University of Tennessee is at the center of
one of the nation's most fertile environments
for research and scholarship,
doing work that
explains the world and
creates new possibilities
for living in it successfully.

The University of Tennessee has been caught up in an explosion of computational power.

The University of Tennessee built and now operates **Kraken**, the world's fourth most powerful supercomputer, on behalf of the National Science Foundation, which has dedicated its use exclusively to academic research. UT's neighbor and colleague, Oak Ridge National Laboratory, operates the world's most powerful supercomputer.

This concentration of supercomputing capacity has driven the need for equally powerful ways of analyzing and understanding the value of results data and transforming information into knowledge. UT's research agenda has grown in response to that need.

With support from the NSF, researchers at UT's National Institute for Computational Science are developing **Nautilus**, a shared-memory supercomputer that will examine data generated by simulations on other supercomputers and create visualizations that will make it easier to identify new knowledge. Principal investigator ***Sean Ahern*** and colleagues have created the **Center for Remote Data Analysis and Visualization**, which will analyze results from mathematical models with many variables – climate simulations, for example, or input from many sensors distributed over a wide geographic region. The new machine can also study large bodies of text or aggregations of documents. Nautilus is part of TeraGrid XD, the next phase of the NSF's high performance network.

The challenge extends beyond analyzing data to curating the resulting knowledge in ways that guarantee its accessibility and increase its value to both specialists and the public.

University of Tennessee information scientists have significant roles in **DataONE**, a project funded by the National Science Foundation that is improving scientific and public access to environmental data collections. **DataONE** links environmental observation systems and research networks, existing archives and libraries, and data and information management with science synthesis centers and professional societies.

The project, headquartered at the University of New Mexico, draws heavily on University of Tennessee talent. ***Suzanne Allard***, associate professor, and ***Carol Tenopir,*** professor and director of research – both in the College of Communication and Information – serve on the project's leadership team; and ***Maribeth Manoff,*** associate professor in University Libraries, and ***Bruce Wilson***, UT research associate from Oak Ridge National Laboratory, are co-investigators.

Tenopir is also the principal investigator on a major study of the value of academic libraries. The Institute of Museum and Library Services had made Tenopir the leader in a project titled "**Value, Outcomes, and Return on Investment of Academic Libraries (Lib-Value)**," which will develop ways to measure the impact and value of academic libraries. Assisted by co-investigators from the University of Illinois and the Association of Research Libraries, Tenopir will work on tools that will allow academic librarians to concentrate efforts and allocate funds appropriately.

Vitality implies reach. Fertility means spread.
Education means getting knowledge to people who need it.

In fiscal 2010, the university received major state and federal support for **VolsTeach**, a $1.8 million replication study that streamlines and improves teacher preparation in the sciences, technology, engineering, and mathematics. **VolsTeach** is projected to help alleviate a critical shortage of math and science teachers in Tennessee.

The project, originally modeled at the University of Texas in Austin, will be housed in the new Center for Enhancement in Education for Math and Science. The program is a cooperative effort between the College of Education, Health, and Human Sciences and the College of Arts and Sciences. Education professor ***Susan Benner*** and biology professor ***Susan Riechert*** are co-directing VolsTeach. Math and science students enrolled in VolsTeach will earn their bachelor's degree plus their teaching certificate in only four years, while undergraduate teaching programs in other disciplines will continue to require five years.

The sharing extends internationally. In Fiscal Year 2010, UT faculty ***Bonnie Callen, Cindy Davis, William Dewey, Mae Catherine Quinn,*** and ***Lorraine Wallace*** became **Fulbright Scholars**, taking their expertise to countries around the world. The campus welcomed Fulbright scholars from Japan, Serbia, and Moldova.

The benefits of a university education are not limited to the goods and services that can be developed, the technologies deployed.

Understanding and enrichment are more intangible products—elusive and subtle but no less essential to human wellbeing.

The Office of Research supported programs that melded UT Knoxville scholarship with that of other notable institutions worldwide. ***David Reidy,*** UT's leading scholar in the thought of American political philosopher John Rawls, assembled a symposium that brought Rawls scholars to UT to consider "**Rawlsian Liberalism in Context(s)**," where recently published Rawls manuscripts were considered in light of ethics and political theology.

Patricia Tinajero, a UT faculty member in art, spent time in a fellowship affiliated with the **American Academy in Rome**, and Office of Research support brought eight international scholars and editors to the university in visiting-scholar and humanities research programs.

In an article for the journal ***Inquiry,*** UT philosophy professor ***John Nolt***, laid the groundwork for an ethical approach to human impacts on the environment. The article, "**Hope, Self-Transcendence and Environmental Ethics,**" was followed by presentations in the Netherlands and China and at the annual meeting of the International Society for Environmental Ethics.

The key tasks of the future and the most meaningful careers for today's undergraduates require more than rote mastery of static information.

Education at its most dynamic and relevant includes an awareness of, an ability to use, research methods and the processes of scholarship.

PHOTO BY JACK ROSE

Students active in research and scholarship can approach future problems systematically, confident that they will be able to produce insightful solutions and evaluate the proposals of others.

In fiscal 2010 the UT Office of Research offered university undergraduates expanded opportunities to involve themselves in hands-on research and scholarly investigations that will shape the way they approach problems for the rest of their lives.

For the first time, six undergraduate scholars from UT Knoxville participated in **Posters at the Capitol,** a showcase of research put on for members of the Tennessee Legislature during spring 2010. The six presented during a day-long poster session in the state Legislative Plaza in Nashville. ***Greg Reed***, associate vice chancellor for research, escorted the scholars and ***Tim Burchett***, state senator from Knoxville, introduced them to members of the Tennessee General Assembly. The student projects included a study of state healthcare reform, underwater mapping techniques, anti-tumor drug synthesis, plant growth, and national financial policy.

The 14-year-old Exhibition of Undergraduate Research and Creative Achievement (EUReCA) was made the centerpiece of the university's first-ever **Research Week**, which featured not only the traditional exhibition but also a concert, an honors symposium, a student paper competition, and an art competition. The university drew inspiration from former governor and U.S. Sen. Lamar Alexander and author Richard Rodriguez, who keynoted selected programs during the week.

Premiering during Research Week was ***Pursuit: The Journal of Undergraduate Research at the University of Tennessee,*** a semiannual peer-reviewed journal featuring scholarly articles by undergraduates from across the Knoxville campus. Facilitated by the Office of Research in cooperation with the Chancellor's Honors Program, Pursuit was produced by editor-in-chief Todd Skelton and co-managing editors Will Barnes and Jenny Bledsoe, aided by a review board of 22 undergraduates.

The purpose of doing the manifold calculations, of interpreting the data, disseminating the knowledge, is to explore concrete problems and create applications that offer useful solutions.

A multidisciplinary team of UT students and faculty will compete in the **U.S. Department of Energy's Solar Decathlon**. *Team Living Light* is drawn from the university's colleges of Architecture and Design, Engineering, and the School of Art. The team is one of only 20 finalists selected to build a solar-powered, energy-efficient demonstration house on the National Mall in Washington, DC, in October 2011. The UT group is building on a preparatory project done by UT Zero, an interdisciplinary team focused on developing new technologies that limit the amount of energy which goes into a structure.

UT nuclear engineer ***Jason Hayward*** has tackled ways to detect and decrease the threats presented by nuclear material. His proposal to create glasses that use the vivid blue glow of the Cherenkov effect to detect penetrating radiation has won support from the Defense Threat Reduction Agency, and the Office of Navel Research is supporting his development of instrumentation that will detect and measure radiation in marine or river environments.

Other faculty drew noteworthy attention from the scientific community, including mathematician ***Steven Wise***, for work in computational materials science and mathematical biology; ***Jon Camden***, a chemist studying the optical properties of nanoparticles for use in imaging and sensing technologies; ***Mingjun Zhang***, looking at the nano-adhesive properties of English ivy; ***Taylor Feild***, for field studies of the evolution of leaf structures; ***Kate Jones***, a particle physicist winning support from the Department of Energy; and ***Francisco Ubeda de Torres***, studying genomic imprinting in evolutionary theory and genetic disorders.

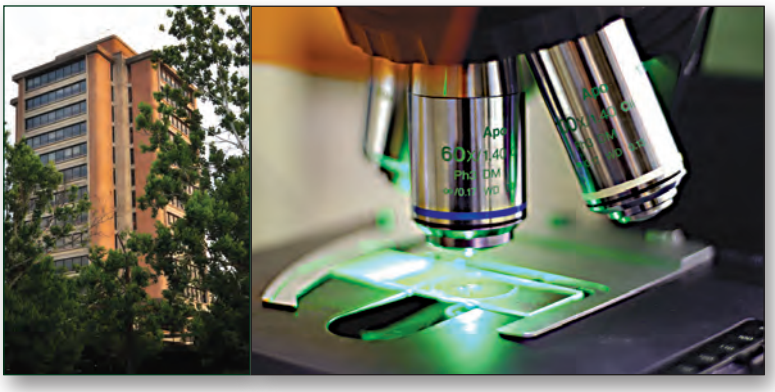
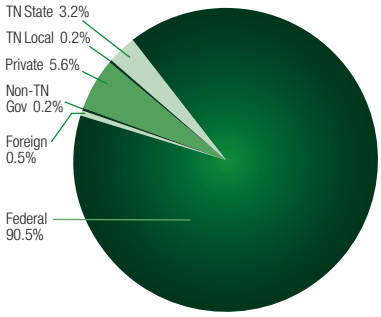
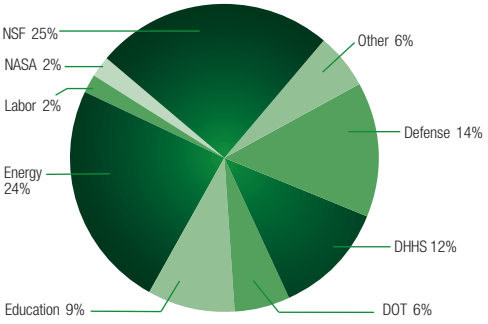


PHOTO BY JACK ROSE

Expenditures from All Sources (FY 10)

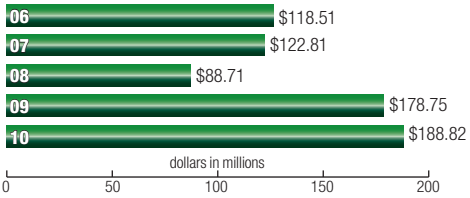


Expenditures from Federal Sources (FY 10)



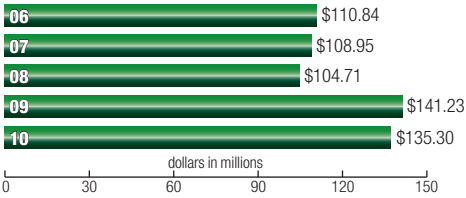
NOTE: (1) FY 10 totals include UT Space Institute. (2) Federal expenditures include funds from both sponsored programs and federal flow-through.

Sponsored Dollars Awarded (FY 06-10)



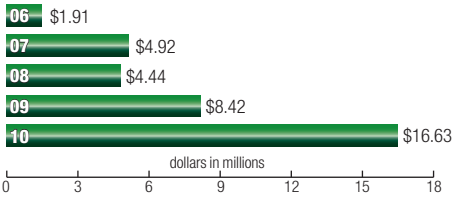
NOTE: Totals for FY 10 include UT Space Institute.

Five-Year Total Sponsored Expenditures (FY 06-10)

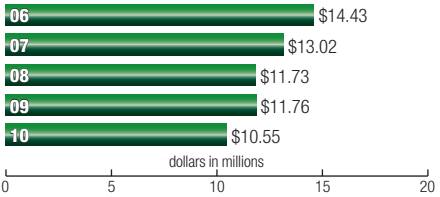


NOTE: Totals for FY 10 include UT Space Institute.

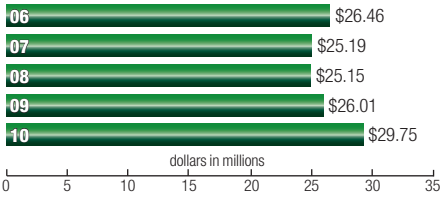
Five-Year Change in Sponsored Expenditures from Defense (FY 06-10)



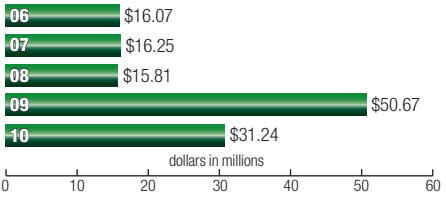
Five-Year Change in Sponsored Expenditures from Education (FY 06-10)



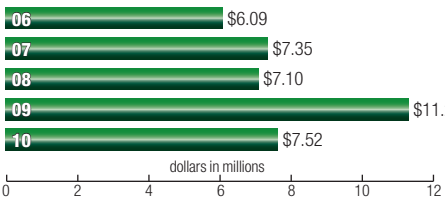
Five-Year Change in Sponsored Expenditures from Energy (FY 06-10)



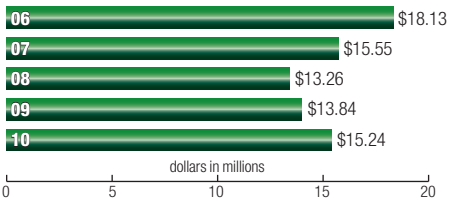
Five-Year Change in Sponsored Expenditures from National Science Foundation (FY 06-10)



Five-Year Change in Sponsored Expenditures from Industry (FY 06-10)



Five-Year Change in Sponsored Expenditures from Health & Human Services (FY 06-10)



THE UNIVERSITY of TENNESSEE
KNOXVILLE

Office of the Vice Chancellor for Research
Blount Hall, 1534 White Avenue
Knoxville, TN 37996-1529
www.research.utk.edu
quest.utk.edu

The mission of the Office of Research is to enable all faculty, other investigators, and students to achieve their full potential as scholars.

PAN E01-0135-002-11 • A project of the Office of Research with graphic design assistance from Barbara F. Hill, graphic designer, Colorplex Design, Knoxville, TN 865-806-4693.