

ADVANCING ARIZONA



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Technology and Research Initiative Fund
Fiscal Year 2011 Annual Report

September 1, 2011

As required by A.R.S. § 15-1648 (D)



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**ARIZONA BOARD OF REGENTS
TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF) ANNUAL REPORT**

For the Fiscal Year Ended June 30, 2011

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President's Letter

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Arizona State University

Northern Arizona University

University of Arizona

September 1, 2011

The Honorable Jan Brewer
Senate President Russell Pearce
Speaker of the House of Representatives Andy Tobin
Arizona State Capitol
1700 West Washington Street
Phoenix, AZ 85007

Dear Governor Brewer, President Pearce, and Speaker Tobin:

On behalf of the Arizona Board of Regents, Arizona State University, Northern Arizona University, and The University of Arizona, and in accordance with A.R.S. §15-1648(D), I am pleased to submit this Annual Report for the Arizona Board of Regents Technology and Research Initiative Fund (TRIF) for the fiscal year ended June 30, 2011. TRIF is continuously appropriated to the Arizona Board of Regents with Education 2000 (Proposition 301/November 2000) sales tax revenues pursuant to A.R.S. §42-5029(E)(2).

As required, ABOR has adopted rules to administer TRIF and has incorporated these rules into Board Policy 3-412 found in the appendix to this report.

Under the hard work and direction of a tri-university workgroup, the TRIF Annual Report has been reformatted this year. It begins with the university reports on the TRIF research areas, success stories and personal reflections. All of the financial reports and metrics have been placed behind the narrative section for easier access and comparison.

This Annual Report provides budget and expenditure information on the TRIF projects funded in FY 2011. The projects and initiatives are consistent with statutory language calling for use of TRIF funds to support university research, development, and technology transfer related to the knowledge-based global economy; to expand access to baccalaureate or post-baccalaureate education for time- and place-bound students; to implement recommendations of the Governor's Task Force on Higher Education and the Arizona Partnership for the New Economy; and to develop programs that will prepare students to contribute in high technology industries located in Arizona.

Board Members: Chair **Fred P. DuVal**, Phoenix Ernest **Calderón**, Phoenix Dennis **DeConcini**, Tucson
Mark **Killian**, Mesa LuAnn **H. Leonard**, Polacca Anne **Mariucci**, Phoenix
Bob **J. McLendon**, Yuma Rick **Myers**, Tucson
Governor Janice **K. Brewer** Superintendent of Public Instruction John **Huppenthal**
Student Regents: William **R. Holmes**, UA Tyler **Bowyer**, ASU
President **Thomas K. Anderes**, PhD

The FY 2011 TRIF budget supported significant research projects in the biosciences; sustainability and renewable energy, including water, solar, and forest health; and optical sciences, all critical to the future economic development of the state of Arizona and to a quality educational experience for our students. TRIF supported workforce development projects, especially in Arizona's high-need areas, including The University of Arizona College of Medicine-Phoenix to train more doctors to address the shortage of physicians in Arizona.

The Arizona University System's efforts to provide access to more Arizonans were supported through TRIF funding for programs such the NAU-Yuma campus; and teacher education, commerce/entrepreneurship, and information science-based programs offered in Arizona's southern border counties by The University of Arizona through a combination of on-site and distance education, to name only a few.

All TRIF-funded projects have been designed and implemented to better position Arizona as a major player in the global marketplace. Detailed business plans for each initiative have been developed and approved by the Arizona Board of Regents and are available on our website at: www.azregents.edu

As we move into our third 5-year cycle, in an attempt to remain true to the voter's intent and to state needs, we have met with community and foundation partners for guidance on aligning our research focus areas. The TRIF Annual Report continues to evolve into a relevant reporting document.

Please contact me at 602-229-2505 or Tom.Anderes@azregents.edu if I can answer any questions or provide additional information.

Sincerely,



Thomas K. Anderes, PhD
President

- c: The Honorable Ken Bennett, Secretary of State
- Ms. GladysAnn Wells, Director and State Librarian, Arizona State Library, Archives and Public Records
- Members of the Arizona Board of Regents
- Dr. Michael Crow, President, Arizona State University
- Dr. John Haeger, President, Northern Arizona University
- Dr. Gene Sander, President, The University of Arizona

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TRIF Executive Summary

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Technology and Research Initiative Fund (TRIF)

BACKGROUND

- ▶ Education 2000 (Proposition 301), passed by Arizona voters in November 2000, approved a six-percent increase in the state sales tax to be dedicated to K-12, the community colleges, and the Arizona University System (Arizona State University, Northern Arizona University, and The University of Arizona). Collection of the tax began on June 1, 2001, and will continue through June 30, 2021, under current law.
- ▶ A.R.S. §15-1648 establishes the Technology and Research Initiative Fund (TRIF) in the State Treasurer's Office and gives the Arizona Board of Regents (ABOR) the responsibility to administer the fund.
- ▶ Pursuant to A.R.S. §42-5029, the State Treasurer's Office must first allocate from Proposition 301 sales tax revenues one-twelfth of the School Facilities Board annual debt service on K-12 school improvement revenue bonds for the current fiscal year. After this monthly allocation, ABOR receives 12 percent of remaining monies.
- ▶ TRIF monies are continuously appropriated to ABOR and do not lapse at the end of the fiscal year.

TRIF BUDGET

- ▶ The Arizona Board of Regents approves the TRIF budgets and business plans in 5-year cycles. The FY 2012-2016 budget was approved by the Board in April 2011. The Board approves revisions to the annual budgets and performance measures annually. These business plans and brochures are available on the ABOR web site at: www.azregents.edu
- ▶ Projected revenue for FY 2012-2016 is approximately \$269.8 million. In light of the continuing national and state recession, the universities have taken appropriate steps to manage the revenue shortfall. The proposed FY 2012-2016 budget for each university, the central office and the system reflect a 38.6% reduction in revenue; and a 37.3% reduction in expenditures on a systemwide basis from the FY 2007-2011 budget.
- ▶ Total TRIF revenue received to date since the inception of the program in June 2001 is \$572.5 million.
- ▶ The TRIF statute includes a 20 percent limitation on use of TRIF funds for capital projects expenditures.

(continued)

- ▶ Pursuant to statute, each annual TRIF budget allocates funding for Certificates of Participation costs for lease-purchase of buildings and associated infrastructure at ASU Polytechnic and ASU West campuses.

TRIF INITIATIVES

- ▶ Pursuant to A.R.S. §15-1648(C), TRIF monies will be used to support initiatives and projects that meet one or more of the following criteria:
 - Promote university research, development, and technology transfer related to the knowledge-based global economy
 - Expand access to baccalaureate or post-baccalaureate education for time-bound and place-bound students
 - Implement final recommendations from the Governor's Task Force on Higher Education and/or the Arizona Partnership for the New Economy
 - Develop programs that will prepare students to contribute in high technology industries located in Arizona
- ▶ Priority will be given to proposals that involve collaboration between and among the universities and/or collaboration with private industry or public sector agencies.
- ▶ The above criteria are included in ABOR Policy 3-412, along with formats for submission of proposals and other guidelines.
- ▶ The universities' investments of TRIF funds in FY 2012-2016 will be limited to and focused in four research areas and one workforce development area:

Research investment areas:

Improving Health—ASU, NAU, UA

Water, Environmental, and Energy Solutions—ASU, NAU, UA

National Security Systems—ASU

Space Exploration and Optical Solutions—UA

Workforce development investment areas:

Higher Education Access for Workforce Development—NAU, UA

TRIF REPORTING

- ▶ A.R.S. §15-1648(D) requires the Board to submit to the Governor and the Legislature by September 1 of each year a report of prior year TRIF expenditures.
- ▶ The FY 2010 TRIF report, along with the previous reports, is available on the ABOR web site.

July 7, 2011

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ARIZONA STATE UNIVERSITY



TRIF Executive Summary: FY07-FY11

Introduction

Over the last five years, TRIF funds have been vital to furthering the research enterprise at ASU. TRIF has allowed ASU's target research initiatives to expand, which has had a substantial impact on the university's research growth. TRIF investments have also had a radiating impact on the University and community, not only allowing ASU to develop and expand its portfolio, but also providing an opportunity to seed larger initiatives and provide more educational opportunities. Through leveraging ASU's unique institutional capabilities, and by setting clear goals aligned with the metrics identified by ABOR, TRIF funding has helped poise ASU for future growth.

ASU has successfully used TRIF funds for strategic investments that have catalyzed research in important areas, resulting in Arizona becoming more competitive locally, regionally and nationally. The investments have evolved over time to reflect current needs and projected long-term opportunities. Over the last several years, ASU has streamlined and focused its TRIF target investments in the following areas: Biosciences, Advanced Electronic Materials, and Sustainability. Each of these areas target strengths specific to ASU and align with ASU's long-term strategic plans.

Overview of Goals

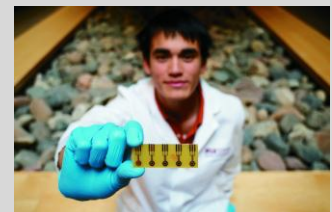
Several overarching goals have informed our investment decisions over the past five years:

- Enhance interdisciplinary, collaborative research in the strategic research areas
- Focus on use-inspired research that will result in demonstrated improvements to quality of life for Arizona citizens
- Train a new generation of scientists and engineers who will expand emerging research areas and bring transformational change
- Increase government and private funding in the strategic research areas, in part by leveraging TRIF funds
- Increase the rate of technology transfer and commercial development from all strategic investments.



"I am amazed by the sheer amount of opportunities that I have been presented with as an ASU student. Through ASU programs, I have been able to really cultivate and strengthen my leadership, critical thinking, and communication skills, and I know these tools will be invaluable in the workforce."

Tessa Causland, undergraduate student who conducted research on biodiesel, vitamin D and cancer care



"Coming from ASU and performing research at the Biodesign Institute has given me the unique perspective of not just thinking, 'what am I curious about?' but also thinking about a big societal problem that this curiosity can drive a solution for."

Daniel Bishop, undergraduate student who conducted research on diabetes monitors



“The grant will allow us to put together a complete system that starts with the absorption of sunlight and ends with the creation of a clean fuel, such as hydrogen. It will also provide resources to students at all levels about renewable energy, and it could lead to whole new industries.”

Devens Gust, director of the Energy Frontier Research Center for Bio-Inspired Solar Fuel Production

Awards

A number of notable research grants have been awarded over the last several years in all three strategic research areas supported with TRIF investments. ASU experienced success in its pursuit of highly competitive, highly funded Department of Energy projects. Specifically, ASU received a \$14M Energy Frontier Research Center (EFRC) for Bio-Inspired Fuel Production and \$10M for two projects from the DOE’s Advanced Research Projects Agency Energy (ARPA-E) program to develop high-energy metal-air batteries and for the use of photosynthetic bacteria for automotive fuel. ASU was the only university to receive two awards in the first round of ARPA-E funding, affirming its position among cutting-edge renewable energy research institutions. ASU was also part of “Energize Phoenix,” a \$25M joint project with APS and the City of Phoenix to transform the light rail corridor into a model of efficiency. External funding for TRIF-related projects in biosciences, including capacity building areas, have surpassed the \$65M mark. In addition, the \$100M/10-year Army Flexible Display Center received an additional \$4M for procurement of a Gen II OLED deposition tool in FY10, which is being used to create full-color high-resolution displays.

Faculty Recruitment

The recruitment of faculty in the biosciences and sustainability initiatives further demonstrates the impact that TRIF has had on ASU’s ability to grow its research enterprise and expand its impact.

- In FY10, Nobel Laureate Dr. Lee Hartwell was recruited to become the Chief Scientist of the Biodesign Institute’s Center for Sustainable Health
- Dr. Josh LaBaer was recruited from Harvard to lead the Virginia G. Piper Center for Personalized Diagnostics.
- Dr. Christiana Honsberg joined the electrical engineering faculty in 2008 from the University of Delaware, where she was director of the High Performance Solar Power Program, the most extensive university solar program in the country. Dr. Honsberg is now the co-director of ASU’s Solar Power Laboratory. She is considered a pioneer in photovoltaics and a world leader in her field.



Impact

Going beyond simply providing funding for science, TRIF funds have also positively affected educational and economic opportunities for students and the community. The Biodesign Institute offers students unique research opportunities via ASU's Biological Design Ph.D. program. The program seeks to develop a new type of scientist by training students in core disciplines related to biology, while simultaneously preparing them to conduct use-inspired research that contributes directly to solutions for some of society's most important challenges. With the help of TRIF, the first class of students graduated from the Master's program in Biomedical Informatics in FY09. Educational and research opportunities for biomedical informatics students will continue to expand as a result of the recent move of the Biomedical Informatics group to the Mayo Clinic Scottsdale campus. The Global Institute of Sustainability (GIOS) helps Arizonans connect with resources, programs, partnerships and services through "Community Connect." In addition, undergraduate, graduate and postgraduate positions have resulted from TRIF funding. TRIF funding has provided expanded educational and financial opportunities for students, increased engagement with the community and created a more highly skilled local workforce.

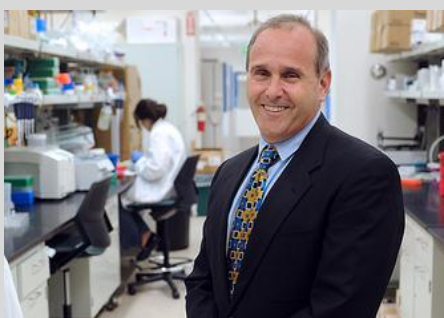
Biosciences

TRIF sustains and advances ASU's flagship initiative, biosciences, primarily with support for the Biodesign Institute (BDI). Investment in BDI has already resulted in over \$300M in external funding since its inception.

At BDI, diverse teams of scientists come together in order to find real-world solutions that improve health, sustainability and security. All research is conducted with a "use-inspired" and "bio-inspired" approach designed to maximize its benefit to society. BDI strives to create a culture of innovation that builds and thrives upon hands-on laboratory training for post-docs and students. Here, scientists are spearheading ASU's innovative application of bio-inspired research that fuses previously separate areas of knowledge to serve as a model for 21st century academic research. These principles also include an entrepreneurial research culture that is attractive to scientists capable of working across disciplines and in close cooperation with industry. It is within this culture that a number of successful projects have been undertaken in the last several years, yielding promising results which will positively impact the state of Arizona.

The following are a few examples of researchers and projects at the Biodesign Institute that have been supported by TRIF over the last 5 years.

Dr. Roy Curtiss' Center for Infectious Disease and Vaccinology is designing a biological system that uses salmonella bacteria to deliver immunizing antigens to the body. This new way of delivering vaccines to both humans and animals has the potential to combat a variety of disease-causing pathogens. It can also improve our ability to deliver vaccines to challenging populations such as infants and those in developing countries. A wide variety of infections and pathogens are currently being targeted in this research. The promising method has drawn over \$15M in support from the Gates Foundation.



"Our lab hopes to help develop new diagnostic tools that pinpoint the specific molecular disease for each patient and directs physicians to the right therapeutic strategy for that individual. We are especially excited to be doing this in Arizona where there is a strong collaborative atmosphere and a palpable excitement about this new direction for medicine."

Josh LaBaer, Virginia G. Piper Chair of Personalized Medicine, Biodesign Institute



Dr. Sudhir Kumar leads an interdisciplinary team of scientists in the Center for Evolutionary Functional Genomics. They are developing new computer-based methods of studying and analyzing the tens of thousands of genes in humans and related species, enabling researchers to learn their functions and origins. He participated in history's largest comparative DNA analysis of higher organisms, which involved assembling complete genomes from a dozen different fruit fly species to understand the difference between species at the DNA level. These efforts have the potential to generate a new understanding of the human genome and aid in the development of targeted treatments. In 2004 Kumar became one of the top ten most-cited researchers in the field of computer science; a paper detailing his "MEGA4" analysis tool has been designated the "Current Classic" paper in the field of biology and biochemistry since October 2009, according to Thomson Reuters.

Drs. Neal Woodbury, Roy Curtiss and Willem Vermaas are working to advance development of an environmentally friendly, high-energy source of biofuel using photosynthetic bacteria. By optimizing tiny photosynthetic bacteria to produce a sustainable, high-yield fuel that can be used in conventional engines, we can reduce our dependence on fossil fuel and carbon dioxide emissions. Additionally, the production processes employed by these BDI researchers are expected to have a much higher yield than other alternatives such as corn-based ethanol. Using photosynthetic bacteria does not require fertilizer, uses less water than current biofeedstocks and will not compete with food production.

Dr. John Chaput has developed methods to rapidly evolve new proteins that do not exist in nature. His work has multiple applications, including the development of proteins for new, more effective medical treatments. His team also creates novel tools for molecular medicine, explores the landscape of the human genome and examines the magnitude of the protein universe.

Dr. N.J. Tao's work revolves around the creation of electronics-based biosensors that perform a range of functions, such as analyzing breath for the first signs of disease, identifying pollutants in drinking water, or detecting trace vapors and signatures of explosives that would help keep travelers safe. The sensors range from embedded to handheld devices. The Keck foundation recently awarded Dr. Tao \$1M to further develop self-assembled nanomechanical systems for molecular detection.

Dr. Hao Yan develops biologically inspired nanomaterials for nanoelectronics and biosensing applications. He developed the world's first gene detection platform made entirely from self-assembled DNA nanostructures, which will have significant implications for gene chip technology in the future. He was also among the first scientists to see the potential of programming DNA to recognize chemical patterns and respond in a way that causes matter to self-organize at the nanometer scale. His work combines chemistry, biology, physics and materials science.

Dr. Cheryl Nickerson uses the microgravity environment of space as a model system to study the ways cells respond and adapt to infection. Dr. Nickerson performed a first-of-its-kind study in which microbial pathogens aboard the space shuttle Atlantis were shown to be affected by spaceflight, increasing the ability of the organisms to cause disease. Scientists believe this research will lead to infection-fighting therapies and advanced vaccines.

The Center for Environmental Biotechnology, led by Dr. Bruce Rittman, uses microorganisms to develop more abundant and cleaner sources of energy and water. By developing microbiological systems that capture renewable resources and clean up environmental pollution, the center is developing ways to reclaim polluted water, generate energy from waste substances and improve public health.



Through faster sequencing of DNA, Dr. Stuart Lindsay's work holds great potential for biology and medicine, especially for personalized diagnosis and treatment. Lindsay has developed a process where a single-stranded ribbon of DNA is threaded through a carbon nanotube, producing voltage spikes that "read" the DNA bases as they pass through the tube. This new method for single-molecule DNA sequencing holds tremendous promise for lowering costs and making sequencing more accessible. Dr. Lindsay is also part of a collaborative effort with Dr. Paul Davies to bring together physical science and engineering insights in the fight against cancer. The National Cancer Institute-funded Center for the Convergence of Physical Sciences and Cancer Biology regularly holds workshops, lectures and conferences to understand how the physical properties of cancer cells correlate to cancerous activity.

During FY11, BDI continued to move forward with significant accomplishments, including:

- Submission of over \$250M in proposals
- Pursuit of 7 new faculty recruits
- Filing 49 invention disclosures
- Establishing a massive DNA repository with a state-of-the-art, 855,000 sample automated freezer and handling system
- Adding 20,000 genes to the LaBaer Lab
- Establishing next-generation DNA sequencing capability

Advanced Electronic Materials

As the centerpiece of the Advanced Electronics Materials Initiative, the Flexible Display Center and its success have been vital to the advancement of ASU's research enterprise. It has also become a model of a successful government, industry and university partnership. The TRIF-supported Advanced Electronic Materials Initiative seeks to advance technology in the areas of materials characterization, sensor development, nanoelectronics and flexible electronics. The future market for these activities is expected to increase significantly in coming years. ASU has been successful in establishing itself in this market, which has resulted in strong and important industry partnerships. Since its inception, the FDC has been successful in large part due to consistent results and funding. In 2004, the U.S. Army made the initial \$43.7M/five year cooperative agreement to establish and lead the collaborative partnership to develop flexible, rugged, light weight, low-power information displays for the future soldier and other military applications. An option for an additional five years/\$50M renewal was executed in 2008. More than 20 industrial partners have provided an additional \$20M. The center has successfully implemented a flexible electronics pilot line, which has delivered working flexible displays to partners. As a result of being an emerging leader in the flexible microelectronics industry, ASU research and the state's economy will continue to grow.

The FDC continues to garner tremendous interest from constituencies across the country and world. Since 2009, FDC Director Nick Colaneri has been interviewed by various news outlets, including CNN, ABC, PBS and CBS. A major news source listed Flexible Displays as one technology that will "change our lives." The FDC will remain a cornerstone of ASU research and the Advanced Electronic Materials Initiative for many years as the industry and demand for flexible displays continue to grow. The army will field test working prototypes in late 2011. Over the last five years, several other projects within the Advanced Electronic Materials Initiative have been developed and made possible with TRIF support. Some of these include the Adaptive Intelligent Materials and System Center (AIMS), work in the field of nanophotonics, the ASU NanoFab Facility, and the spin-out company, Axon Technologies Corporation.



"The military, high-tech manufacturers and academia have made Arizona ground zero for bringing [flexible display] technology into mainstream use. They are pinpointing key materials and testing manufacturing techniques needed to make the sophisticated screens at the Flexible Display Center."

William D'Urso, Arizona Republic, April 10, 2011



Gathering a large group of faculty across varying disciplines, the Center for Nanophotonics carries out research on topics ranging from fundamental studies of photon-matter interactions to practical optical sensors for medical and biological applications. The center integrates education and research and is committed to the commercialization of its technology for the medical device, electronics and communication industries. Two multimillion dollar awards from the prestigious MURI (Multidisciplinary University Research Initiative) program, both of which are led by center faculty members, have marked milestones for the center.

ASU spinout company Axon Technologies makes programmable metallization cell memory (PMCm). Researchers in the Center for Nanophotonics developed the foundation for the ionic technology that forms the core of PMCm's. Collaborative works between ASU researchers and Axon Technology scientists continues to this day. PMCm uses electrochemistry to attain large non-volatile resistance changes in simple structures at levels of voltage and energy that have been unattainable in the past. This represents a radical departure from all existing memory technologies, including those in development, and is a significant breakthrough in this field.

Managed by the Center for Solid State Electronics Research, the ASU NanoFab Facility led by Trevor Thornton is part of an NSF network of 14 major universities. For the past 7 years, the network has offered device processing and characterization tools to companies and individuals. The NanoFab facility has proven a valuable asset with over \$12M in sponsored research conducted there last year.

The AIMS Center, led by Aditi Chattopadhyay, brings together researchers with backgrounds in smart materials and adaptive systems in order to solve large-scale problems associated with aerospace, mechanical system and civil infrastructures. The center's research aims to improve the aerospace industry's ability to predict when parts and systems within a fleet will fail, thereby helping the industry plan unit maintenance to ensure passenger safety and extend fleet longevity.

Sustainability

Much of society has realized that finding solutions to the environmental, economic and social challenges resulting from increased urbanization are vital to preserving our economic strength and overall quality of life. ASU advances its TRIF Sustainability Initiative with this understanding in mind.

The Global Institute of Sustainability (GIOS) serves as the primary vehicle for organizing and evaluating sustainability research across many ASU units. GIOS projects range from well established and well funded projects, such as the Central Arizona-Phoenix Long-Term Ecological Research Project (CAP LTER), to new initiatives being pursued in the School of Sustainability. The School of Sustainability is the first in the U.S. and offers degree programs focused on discovering practical solutions to pressing environmental, social and economic challenges. By nature, sustainability projects directly address society's most urgent needs. For instance the Decision Center for a Desert City (DCDC), led by Dr. Patricia Gober and Dr. Charles Redman and sponsored by the NSF since 2004, develops best practices for Central Arizona's water management decisions, under the context of regional climate, politics, urbanization and economy, and global climate change.

Under the umbrella of GIOS, investments have been made in a broad range of projects with a more recent focus on the area of renewable energy. The Arizona Institute for Renewable Energy (AIRE) was first added to the TRIF portfolio in FY08. AIRE was created to accelerate ASU's participation in the renewable energy research enterprise. AIRE's vision was to establish an interdisciplinary environment that developed research into useful applications in renewable energy. Following the addition of Gary Dirks, a former BP China and BP Asia-Pacific president, to the ASU faculty, AIRE evolved and reorganized its strategic goals in renewable energy into a new initiative, LightWorks. LightWorks was a response to the increasing level of opportunities in the renewable energy space and a means for ASU to leverage its unique strengths, particularly in the fields of photosynthesis, biofuels and photovoltaics.



Since the reorganization, LightWorks has submitted two proposals to highly competitive DOE programs. After ASU submitted a \$67M proposal to the DOE for an algal biofuel research program, the DOE awarded the university \$6M in funding. In FY10, ASU submitted a \$55M proposal to the DOE Hub program for a project on photosynthetic-inspired fuel production.

In addition to biofuel research, work in photovoltaics continues to advance with support from TRIF funds. ASU ranks among the top three in the number of Solar America Initiative R&D Grants for photovoltaics module testing, advanced solar cell material development and next generation photovoltaic devices. The Solar Power Lab, led by Dr. Christiana Honsberg and Dr. Stuart Bowden, continues its work to become the pre-eminent academic solar energy research, development and training program in the United States. The lab has had success developing collaborations with industry and accelerating the expansion of the state's economy. In addition, the National Science Foundation (NSF) recently awarded Dr. Honsberg an Engineering Research Center (ERC) to design photovoltaic systems that can be manufactured using less complicated processes and less material – producing ample power at a low cost-per-kilowatt-hour of energy production.

In addition to support for renewable energy research, TRIF funds have also been allocated to support the Decision Theater (DT). Decision Theater (DT) is a world-class policy informatics and visualization laboratory that studies how decisions for a more sustainable future are made. Presented with holistic, data-driven visualizations, decision makers at all levels are enabled to make the most informed decisions possible for the future. DT held a successful decision science workshop regarding Arizona's options for advancing as a leader in solar energy production. The Robert Wood Johnson Foundation awarded DT a grant to examine the types of legal decisions that need to be made quickly in public emergencies. As DT evolves its strategy to promote "better decision making for a sustainable future," they look to continue to positively impact policy outcomes in Arizona.



"In a technical community replete with creative engineers and scientists, Christiana Honsberg stands out as a talent of unique vision."

Craig Cornelius, former director of the DOE solar energy program and leader of its Solar America Initiative.

Conclusion

ASU's research enterprise, students and the community have greatly benefited from TRIF support over the past five years. The funds have been instrumental in not only funding research activities but also serving as motivation for ASU to think strategically about the direction of the research enterprise and where ASU is best suited to create, influence and respond to opportunities that impact the lives of individuals locally, regionally, nationally and internationally. As a result, we have developed a strategically targeted and measurable approach to our investments with an eye toward continued support and future growth. TRIF funds have been crucial to our past growth and are essential to our future success.



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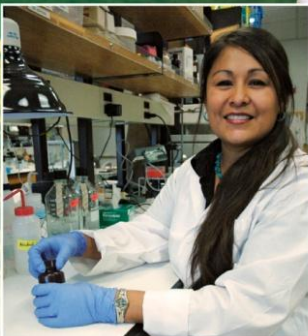
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**NORTHERN ARIZONA
UNIVERSITY**



Northern Arizona University is proud of its accomplishments supported with TRIF funds, and is looking forward to continuing its achievements through continued funding. The university's projects fall into three broad categories: Advancing Science, Access/Workforce Development (including AZUN) and University Initiatives – Fostering Economic Development and Partnerships.

ADVANCING SCIENCE

Advancing Science consists of three main initiatives: improving Forest Health, Economic Research, Development and Education for the New Economy (ERDENE), and Growing Biotechnology Initiative (GBI).

FOREST HEALTH

The importance of research and action in addressing forest overgrowth was brought sharply into focus this summer by the wildfires that burned nearly 900,000 acres of Arizona's forests. The cost of these fires is stunning in both ecological and economic measures. The largest, the Wallow Fire, impacted over 530,000 acres cost over \$100 million dollars to suppress. However, that number tells only a small part of the story. The real cost of the fire will be much larger when the value of emergency services, lost wages, insurance claims, reduced property values and tax receipts, disrupted tourism, and the full cost of damage to the forests and natural resources are calculated. Based on previous research the total cost of the fire will approach an astronomical \$1 billion.



"Losses are far greater than an initial reconnaissance would indicate."

ERI Executive Director and Regents' Professor Dr. Wally Covington, regarding the damage from the Wallow Fire

For three decades, and with the support of TRIF investments over the past five years, Dr. Wally Covington, Executive Director of the Ecological Restoration Institute (ERI) and colleagues at the School of Forestry have developed and tested forest management approaches designed to reduce the threat of unnatural fire and restore the health of forests.

We have seen graphic evidence of the benefits that thinning and restoration can provide. One of the projects ERI assisted with is a wildland urban interface project of thinning and restoration called Eagar South. According to reports, an intense wall of flames moving through untreated forests entered the area of the treatments. When it hit the restoration area, the fire behavior changed and the fire progression slowed. The change in behavior allowed fire fighters to gain ground in their battle to keep fire out of the community. There are other success stories like this where forest treatments enabled fire fighters to protect communities in the Wallow Fire perimeter. It is the research enabled by leveraging TRIF and federal dollars that make Arizona a national leader in developing solutions to the problem of wildfire by restoring forest health.

It is the interdisciplinary configuration of services that makes the ERI unique. ERI research and technical assistance efforts have been key contributors to the momentum of the 4 Forest Restoration Initiative, a large collaborative planning effort to bring regional-scale solutions to bear on forest health challenges through four of Arizona's national forests.



Economic Resources, Development and Education for the New Economy (ERDENE)

Over the past five years, the Environmental Research, Development and Education for the New Economy (ERDENE) program has stimulated innovation and partnership in an area of significant research strength at Northern Arizona University -- sustainable solutions for the state's economy and environment. ERDENE encourages research, teaching and public outreach that crosses the boundaries of renewable energy technologies, water resources, ecological restoration, monitoring and management of complex systems, and applied research for rural communities.

Examples of product development include:

- An integrated electro-magneto hydrodynamic micro pump for proton exchange in membrane fuel cells, including a full patent application and collaboration with ASU and UA towards streamlining its micro fabrication.
- A proof of concept and prototype for a portable, battery-powered mass spectrometer to conduct instant gas and liquid field analysis. One application tested chemical signatures of pine trees to predict susceptibility to bark beetle infestation.
- A patented device to monitor and control wood-infesting insects through acoustic technology, reducing the need for pheromones/chemical control.
- A set of ArcGIS 9.1 tools to design and evaluate multi-species wildlife corridors, including web download capability and training of 175 people in software use.
- Progress towards development of a model system utilizing amphibian behavior assays to monitor biologically relevant pollutants in Arizona's water supply.
- A methanol synthesis prototype unit employing a recycle loop to capture un-reacted gases, showing improvements to methanol synthesis of 28% by weight.
- A low-cost system to treat surface water in rural communities utilizing a wind-powered slow sand filter.

"I am fascinated by diverse responses of terrestrial ecosystems to climate change. NAU research programs offered me the opportunity to explore these issues"

Zhuoting Wu, graduate student, using the field spectrometer to estimate the response of plant productivity to climate change.



Two new research institutes aimed at providing economic and social benefits to Arizona's rural communities are under development as a result of TRIF investments over the past five years:

- A sustainable energy solutions institute to conduct cross-disciplinary research and facilitate industry and academic partnerships in renewable energy, energy efficiency and energy utilization research and training.
- A landscape ecology and conservation institute to enhance collaborative, science-based decision-making to reduce conflict and inefficiencies in the state's resource conservation and management.

With a focus on economic development and sustainable systems, ERDENE promotes environmental, economic and community health to benefit all Arizona citizens.



GROWING BIOTECHNOLOGY INITIATIVE (GBI)

Biotechnology is an area in which Arizona has made significant investments. NAU's efforts in this area parallel the plans set for the Arizona Bioscience Roadmap, led by the Flinn Foundation and Batelle, which led to those investments.

The Growing Biotechnology Initiative (GBI) has enabled translation of outstanding interdisciplinary research and development in biosciences, biotechnology, and bioengineering into applications that address critical health, technology, and education issues in the Arizona economy. GBI investments support research in emerging areas of the biosciences, including infectious diseases, forensic genetics, cancer, musculoskeletal and cardiopulmonary rehabilitation, endocrine systems, biomaterials, and respiratory failure.

Highlights of GBI accomplishments include:

- The acquisition of a Real Time PCR instrument allowed augmentation of the NAU Environmental Genetics & Genomics (EnGGen) facility; an expansion of faculty, graduate and undergraduate research activities; and an increase in the number and competitiveness of NAU graduates to meet the workforce demands of bio-industry in Arizona and beyond. In addition, instrument acquisition catalyzed a new partnership with an Arizona-based company to develop drought-tolerant plant genotypes and potential commercial exploitation.
- The synthesis of azapeptide compounds for investigation as antiviral and antibacterial agents, through optimization of the Huisgen Zwitterion Condensation reaction. Continued research aims to demonstrate the utility of this unusual reaction, and to better understand the mechanism that drives it.
- Investigations of the circulatory system biomechanics of a Pacific coastal squid as an inspiration for the treatment of peripheral arterial disease. A device based on this idea—a vascular grant implant—has now been provisionally patented.
- Development of a new hypothesis for the role of titin in active muscle viscoelasticity that lays the groundwork for design of an affordable actuator for prostheses and robotics (U.S. and International patents pending).
- Exploiting a new, inexpensive DNA sequencing method to address a problem in microbial pathogen diversity and evolution, improving NAU's core genomic competencies in bioengineering, biotechnology and computational biology.
- Evaluating the potential for bioremediation at a Tucson groundwater contamination site. An advance in this work involved using a stable isotope probing method to differentiate microbial organisms that degrade chemicals, those that can tolerate chemicals but do not degrade them, and those that are killed by chemical exposure.



Richard Hofstetter and Kasey Yturalde, IGERT PhD student, of Forestry setting up the acoustic arena and placing insects inside it to assess whether commercial insects repellents work against bedbugs.

Many of these innovations have been the basis for beginning to work more closely with NACET (Northern Arizona Center for Emerging Technologies) on regional economic development activities. GBI's vision is to position Arizona as a global leader in the fast-growing biotechnology industry through research, technology transfer, business recruitment, and workforce development.



ACCESS/WORKFORCE DEVELOPMENT

One of Northern Arizona University's strengths is access and workforce development. For over 30 years, NAU has served rural and urban communities throughout Arizona, providing opportunities for place- or time-bound citizens to continue their educational progress. Three-quarters of NAU's distance learning students work at least 32 hours per week.

During the past five years, the Access/Workforce Development (AWD) initiative has been instrumental in better preparing Arizona's workforce. By dedicating resources to high demand fields such as education, health professions, business and non-profit sectors NAU has successfully prepared thousands of students to meet the needs of Arizona employers. Through technological advancements, innovative and strategic program delivery, and partnerships in communities throughout Arizona, the AWD initiative provided place bound students access to education and subsequent employment. The AWD initiative has allowed for program expansion to communities at affordable tuition rates. NAU's commitment to access and affordability coupled with the AWD objectives has resulted in a financially viable approach to better educating Arizonans.

This initiative focuses on shortages of teachers, health-care professionals, trained managers and information technology professionals. The goal is to make quality programs available in locations and through delivery methods that suits students' needs. Thirty-five rural and urban sites offering face-to-face contact, a wide variety of on-line and hybrid programs, innovative scheduling that allows courses to be completed in as little as seven weeks (over 90 separate courses were offered in this format in 2011) and programs into which students can transfer as many as 90 credit hours, leaving only 30 needed to complete the degree are some of the options available. The NAU 90-30 programs represent the most affordable four year degree option in the state of Arizona, the NAU portion can be completed in as little as six months. Students can also receive admission, enrollment, payment, and other services in person and through the Extended Campuses Service Center, which is available by toll-free phone, email, and online chat. More details on the size and outcomes of these programs can be found on the AWD metrics page.

The Arizona Board of Regents provided five years of funding to focus on expanding offerings and sites statewide. Statewide expansion investments allowed NAU to enter into a long-term lease of a high profile commercial building on I-17 between Bell and Greenway Roads. Designated as "NAU North Valley", this site is an anchor facility for NAU's technical and administrative operations in the Phoenix area.

In addition, it helped us strengthen partnerships throughout the state by increasing commitments to students within urban communities, especially in partnership with the Maricopa and Pima Community Colleges.



In the fifth year of a partnership between the Maricopa Community Colleges and Northern Arizona University, the NAU-Maricopa Connection has flourished (www.maricopa.edu/connection). Through the site, students can easily identify programs, locations, advisors and scholarship information in one central location. In the spring of 2010, Maricopa Colleges and NAU agreed to launch a joint admission program allowing first year Maricopa students to be immediately admitted to NAU while they complete their first two years at the community college. These students are now able to access NAU online and advising resources to promote the completion of both the associate and baccalaureate degrees. The partnership provides on-site bachelor's completion programs on Maricopa campuses, along with a wide variety of baccalaureate and certificate programs available online. NAU has already seen a 12% increase in transfer students from the Maricopa system.

One of the university's key approaches is to offer (face-to-face and/or on-line), "umbrella" degrees that offer a core curriculum along with a variety of focus areas allowing students to tailor the degree to their needs or interests. The Bachelor of Interdisciplinary Studies, Bachelor of Business Administration, Bachelor of Applied Science and Masters of Administration are examples of these degrees. Focus areas are available in such topics as Administration of Justice, Emergency Services Administration, and Public Management, along with many others.

AZUN

A special part of NAU's distance operations was its management of the Arizona University Network (AZUN), promoting the on-line activities of all three of Arizona's public universities. AZUN provided students access, in one location, to many courses and programs offered online by the three universities, either individually or cooperatively.

AZUN has been a successful partnership between ASU, UA, and NAU. The opportunity for students to make progress toward their educational goals through access to the resources at all three Arizona Universities has been a significant effort in collaboration. Throughout the AZUN initiative, each institution made progress toward increasing student access to online course work, improvements in online student services, as well as significant advancements in collaborative technology. The AZUN initiative successfully implemented technical tools that had not been accomplished prior to the project. The program identified opportunities for improved efficiencies as well as opportunities that are best explored individually.

"It was convenient to have the option of earning my bachelor's degree from NAU at South Mountain Community College's campus," During an NAU orientation session we were given a two-year academic plan that was broken down by semester and courses. It was nice to see the big picture and work toward it."

Lily Lough, recent Elementary Education graduate



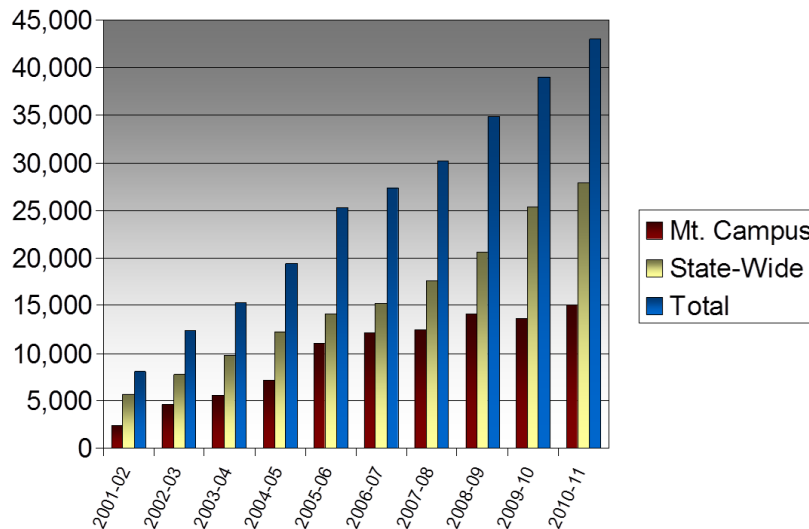


E-LEARNING

To provide distance education and meet the needs of students both off and on campus, NAU has invested TRIF and other funds in an “E-Learning” initiative. The E-Learning Center supports on-line course delivery and use of technology to increase student achievement. E-Learning’s mission is to improve student learning. Northern Arizona University’s E-Learning and Access and Workforce Development initiatives are closely aligned, sharing staffing and leveraging limited funding to accomplish goals.

Nearly 650 web courses have been developed since FY 2003 with AWD funding. Over 1,300 Web classes were taught during Academic Year 2010-2011 using a combination of TRIF and Extended Campuses funding with approximately 10% growth in web enrollments from FY10 to FY11.

Enrollment in online classes as increased dramatically over the last 5-10 years.



And enrollment in hybrid courses, where a portion of the class is taught in person and a portion is delivered via the web, has recently taken off. We had over 300 hybrid courses with 6,762 enrollments in FY11.

In addition to the fully online classes, NAU uses the Blackboard Learning Management System to provide a shell for every class the university offers. This shell helps the instructor enhance the traditional classroom with on-line content, course communication, and a grade-book. Over 70% of faculty use these shells -- clear evidence that faculty find using technology to manage certain course functions extremely useful. The E-learning Faculty Help Desk provides advice and troubleshooting support for using all types of technologies in classes. In FY11 over 10,000 calls for support were answered.

The E-Learning Center also sponsors the “Southwest Institute for Learning With Technology” a two-day conference dedicated to the use of technology in instruction. Now into its 8th year the conference has attracted over 1,000 educators over the eight years, with participants and presenters not only from NAU but also coming from the three state universities, nearly every community college in Arizona and from several neighboring states and countries.



ECONOMIC DEVELOPMENT/PARTNERSHIPS

Through NAU's TRIF investment in Economic Development and Partnerships, we have been able to partner with the City of Flagstaff to create the city's largest convention center, meet the university's commitment to the Phoenix Biomedical Center, provide support for Arizona's investment in TGEN, erect the first LEED platinum building in Northern Arizona which houses, among others, partners from the United States Geological Survey and National Park Service, and allowed NAU's newest science buildings (including the Applied Research and Development building – the platinum building referenced above) to have more technical capacity than would have been possible without the funds. The dividends paid by leveraging TRIF funds from other sources and partners have been enormous.

The crown jewel of the Economic Development/Partnerships initiative is the High Country Conference Center (HCCC), built in part with TRIF funds and in partnership with the City of Flagstaff. The Drury Inn and Suites, while not participating directly in the financing of the Conference Center, has contributed significantly to its attractiveness by building an adjacent hotel. The conference center opened in March, 2008 and contains more than 25,000 square feet of upscale conferencing space.

Since opening in April, 2008, the HCCC has hosted over 1,000 events with over 100,000 total attendees. In FY11 it brought in nearly \$2M in revenue (up 15% from FY10), with average conference size being 90+.. About 40% of the revenues were generated from outside of Flagstaff, with 15% from other locations in Northern Arizona, another 17% from the Phoenix Metro area and business from the West Coast, along with other locations. In 2011, 70% of its business came from repeat clients. About a quarter of the business came from corporate entities, with another 20% from non-profit and education groups. NAU's (paid) business and Native American, Health Care, State associations, and social service agencies rounded out the total.



“The luncheon buffet presentation was absolutely beautiful and everyone seemed to really enjoy it. Staff was friendly and GREAT as always! HCCC is a great asset to our community. Thanks to everyone involved in pulling our events off with grace and professionalism.”

Elizabeth Harris, VP, Flagstaff Community Branch Manager

In 2010, the HCCC's business brought over 17,500 visitors to Flagstaff, was responsible for over \$600K in revenue at the Drury Inn and Suites alone, generated over \$60,000 in “Bed, Board and Booze” taxes that benefitted the City of Flagstaff, and poured over \$700,000 in wages into the Flagstaff. Since it opened, it has been responsible for well over 10,000 room nights throughout Flagstaff.

The HCCC recently received a Pinnacle award from “Successful Meetings” for hospitality excellence that sets standards for others to follow. It has also received recognition for its sustainable building design and practices. As Flagstaff's first conference venue approved by the International Association of Conference Centers (IACC), the HCCC has significantly bolstered Flagstaff's conference center capacity and economy.

Another project that has significant ramifications both for NAU and the State of Arizona is NAU's participation in the Phoenix Biomedical Center, which will house the University of Arizona's medical school extension, will result in the first Physician Assistant program available at a public institution in Arizona, and an expansion of NAU's already-successful Doctor of Physical Therapy program to Phoenix. Both programs are scheduled to begin in Fall, 2012. When these programs are fully ramped up, we expect to produce 100 Physician Assistants and 40-50 fully-trained Physical Therapists annually.

CONCLUSION

We are pleased to present this evidence of our successful stewardship of TRIF resources. If you have questions about any particular program, please contact Dr. John Haeger, NAU President, who will direct your inquiry to the person best able to address it.

innovation

exploration

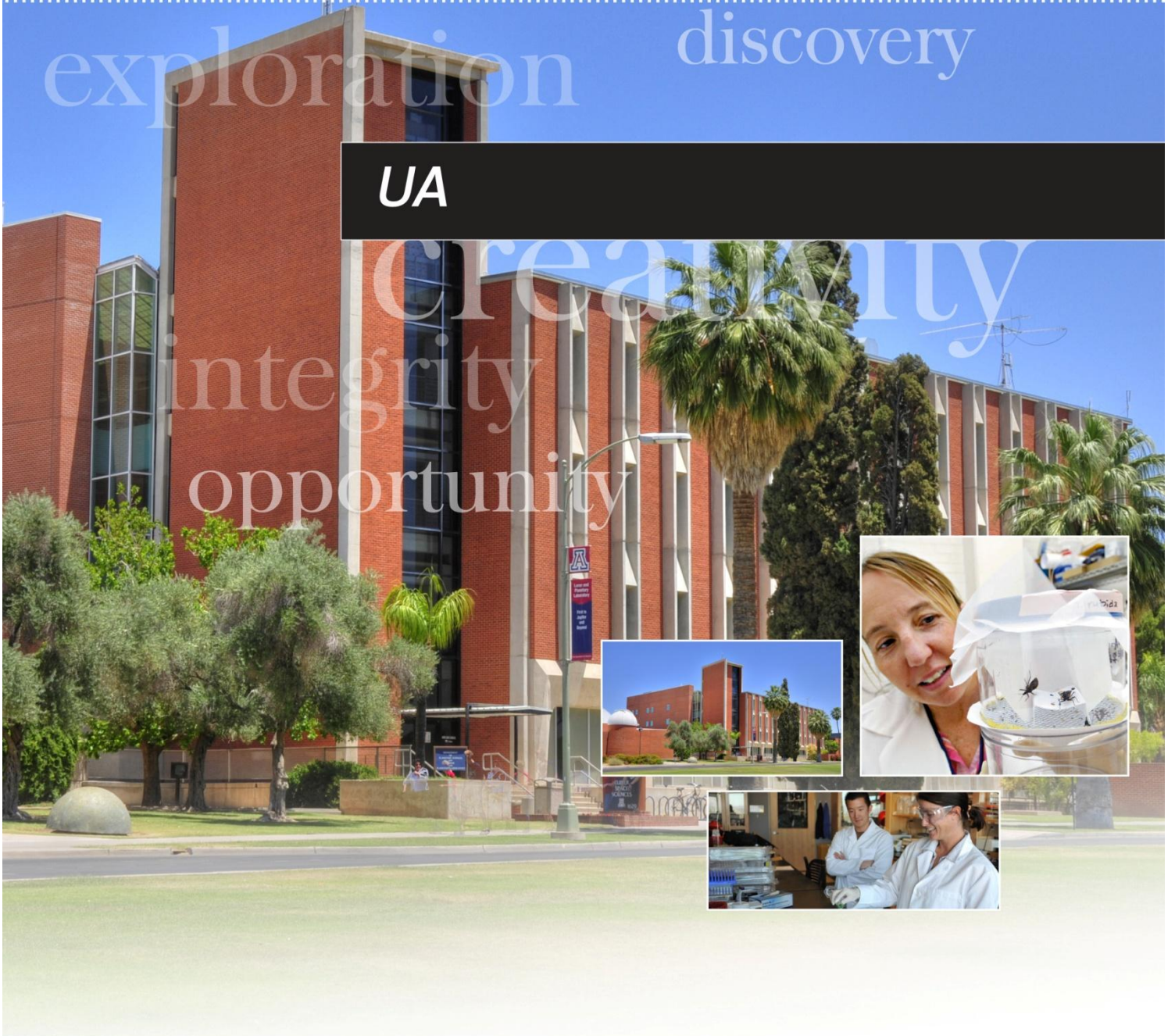
discovery

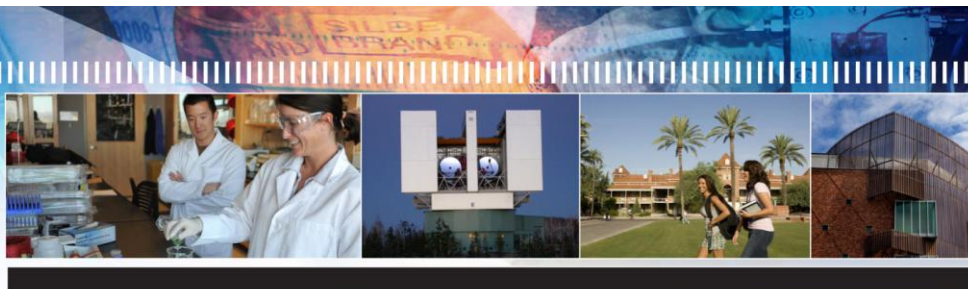
UA

creativity

integrity

opportunity





At the University of Arizona, TRIF supported innovative research efforts in critical high-technology areas, translation of research results to practical application, and education of a workforce prepared for the knowledge-based economy of the 21st Century. We continued our focus on enhancing applied research and leveraging federal or other grants.

Research-intensive TRIF activities fall under thematic programs:

- **Bioresearch** which covered many projects, including UA leadership of a \$50M NSF project to enhance plant and biomedical research as well as 50 clinical research protocols.
- **Optical Sciences and Technology** which supported applied research and commercialization in our top-ranked optics and space sciences programs, spun out two new companies, and leveraged a record \$57 million in grants and contracts this year.
- **Water and Environmental Sustainability** which launched a new master's program, attracted \$15.7 in external funding this year, and excelled in K-12 outreach.

Two additional programs are funded by ABOR's TRIF Strategic Investments Fund. The **UA-ASU Solar Energy Initiative** supported basic and applied research activities in science, engineering, and public policy that leveraged over \$7.8 million in external funding this year, and **Higher Education in Rural Southern Arizona** delivered training and border commerce programs in Arizona border counties in a hybrid of on-site and distance education. Our final program, **Education and Infrastructure**, dramatically increased the number of students served through several educational programs and provided for multiple infrastructure improvements that build UA's research capacity.

BIORESEARCH

Arizona's TRIF investment in the UA is funding research to improve the lives and health of citizens, while creating high quality jobs within the state's expanding bioindustry sector.

Goals

BIO5 Institute - Foster collaborations to address major scientific challenges in the life sciences. Promote connections within the state's bioindustry sector to develop small, regional companies while bringing faculty discoveries to market.

iPlant Collaborative – Create new tools and communication models to speed research in plant and biomedical sciences, ultimately, addressing global hunger.

Clinical and Translational Science Institute – Advance the development of therapies for the prevention and treatment of disease by attracting outstanding clinical scientists studying brain, heart, and endocrine- related diseases.

BIO5 Oro Valley – Expand UA's translational drug discovery and development program by staffing a progressive facility with an exceptional team of academic and industrial chemists and offering available partner space equipped to state-of-the-art standards.

Evelyn F. McKnight Brain Institute – Explore how normal aging effects memory.



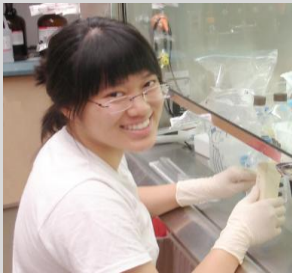
Regents' Professor Carol Barnes, Ph.D., McKnight Brain Institute Director and BIO5 Associate Director

"We study the healthy brain for clues about how to optimize cognitive health as we age. This is especially important to large numbers of Arizonans, who want to enjoy full, active lives long after retirement."



Results - Impact

- Leveraged TRIF support to bring in more than \$225 million of federal funding to Arizona during the past five years for conducting state-of-the-art research and education by BIO5 Institute's transdisciplinary faculty.



Teachers in Tucson, Flagstaff and Yuma enjoy science coursework, classroom kits, and guest scientists as part of BIO5's BIOTECH and Jr. BIOTECH initiatives

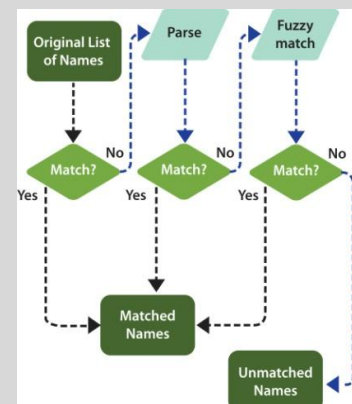
- Founded the *Evelyn F. McKnight Brain Institute* in 2006 with a donation of \$5,000,000 from the McKnight Brain Research Foundation and partial matching TRIF funds. Dr. Carol Barnes' research attracted more than \$2.2 million in philanthropic and government funding during FY2011.
- Nurtured four new bioscience companies during the past five years that promoted faster cancer drug development, sped disease detection, improved crop production, and pointed to a cure for Valley Fever.
- Established the *iPlant Collaborative* with a National Science Foundation award of \$50 million. BIO5 is now using iPlant advancements to decipher the biological codes of cancer, diabetes, and heart disease.
- Offered transformative experiences to thousands of Arizona students annually through BIO5 education programs. The KEYS (Keep Engaging Youth in Science) intensive research experience recently graduated its 100th high school intern.
- Provided significant support for BIOTECH and Jr. BIOTECH statewide teaching initiatives with a Helios Education Foundation award of \$750,000.

- Established BIO5 Oro Valley in 2010, a strategic presence near Innovation Park. This burgeoning biotech area is anchored by global pharmaceutical companies Sanofi-Aventis and Ventana-Roche.



Did you know that many scientific names for plants are just plain wrong?

The iPlant Collaborative's new online Taxonomic Name Reference Service quickly and accurately standardizes plant names, improving the quality and comparability of plant research data worldwide.





OPTICAL SCIENCES and TECHNOLOGY

The TRIF Optical Sciences and Technology Program provides the type of financial and leadership support needed to engage in novel optics initiatives which will continue to secure the University's position as the best optics program in the world.

Goals

Leverage TRIF funds to obtain at least a 10x return-on-investment and generate increased research funding to support more students in photonics and optical imaging.

Enhance the University's outreach to local industries and under-represented populations in Arizona.

Encourage technology transfer in the photonics and imaging areas to promote the creation of new start-up companies and expand innovation activities.

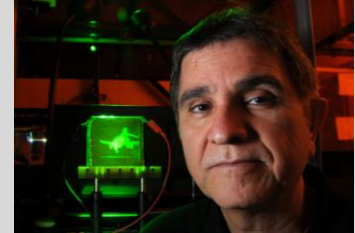
Results – Impact

- Recruited 13 new faculty members who have attracted more than \$40 million over the past 5 years in research funding, which contributed to the UA's internationally recognized reputation of excellence.
- Supported graduate student attendance at the Annual Computer Generated Holography Workshop.



*Daniel P. Marrone, Ph.D.,
Assistant Professor,
Astronomy*

TRIF funding supported the relocation and recommissioning of a specialized millimeter-wavelength spectrometer, designed to search for emission lines (and thus determine the distance to) violently-star-forming galaxies in the early universe. Dr. Marrone also focuses on the development of next-generation compact spectrometer technology, which has the potential to revolutionize submillimeter astronomy.



*Nasser N. Peyghambarian, Ph.D.,
Chair, Photonics and Lasers
Professor, Optical Sciences/
Materials Science and Engineering*

Collaboration with Nitto Denko Technical Corp. resulted in a rewritable holographic display that may revolutionize and enable 3D holographic video and cinema.

“Holographic telepresence was reported for the first time in *Nature* (Nov 4, 2010). We showed that objects in one location can be seen in another location in holographic 3D at a speed of one image every other second.” These results were featured in USA Today, New York Times, CNN, NPR and other international media.

- Provided support towards 150 Research Assistantships.
- Leveraged funding from NSF-supported *Engineering Research Center for Integrated Access Networks* (\$18.5M) and AFOSR-supported *Mathematical Modeling and Experimental Validation of Ultrafast Nonlinear Light-Matter Coupling* (\$7.5M) to increase research funding, joint collaborations with industry partners, and technology transfer through licensing intellectual property primarily to university related start-up companies.
- Created a new degree program for a Master of Science in Photonic Communications Engineering, jointly sponsored through the Colleges of Optical Sciences and Engineering.



- Received federal support to provide specialized equipment to be shared in multi-user facilities. The equipment included stimulus visualization in human MRI research, imaging in the tree-ring research laboratory, imaging for teaching laboratories, a laser for maskless lithography, and the foundation for the development of enhanced magnetic resonance Imaging.
- Provided outreach to K-12, undergraduate, women and minority populations including organizations in Math, Engineering and Science Achievement (MESA) Saturday Academy, Research Experience for Undergraduates, Women in Optics, The Upward Bound Program at the Navajo Reservation, and the Annual Optical Sciences Camp.
- Sponsored outreach to industry and other educational institutions including activities such as the Binational Consortium of Optics (BNCO) and the Technology Advisory Committee at Pima Community College.
- Created two new companies in FY2011: *Arizona Optical Systems* (optical metrology and fabrication) and *Real Time Optics* that enables technologies for virtual reality (VR) and augmented reality (AR).



Russell S. Witte, Ph.D., Assistant Professor, Radiology/Optical Sciences/Biomedical Engineering

“We established a highly innovative research lab focused on pulse echo (PE) ultrasound imaging, photoacoustics (PA), and acoustoelectric (AE) imaging, and are working on developing acoustoelectric systems for imaging electrical potentials in humans with clinical applications in cardiac and neurological diseases.”

WATER and ENVIRONMENTAL SUSTAINABILITY



Sabrina Helm, Ph.D., Petsmart Associate Professor and CESI Co-director with Anita Bhappu of NSFCS, Division of Retailing and Consumer Sciences

“Understanding how consumers respond to environmental issues is of relevance to many Arizona businesses who seek to promote sustainability and take advantage of 'green' markets. Partnering with Petsmart and other major retailers, UA's Norton School has established the Consumers, Environment and Sustainability initiative.”

Through strategic investment of TRIF dollars in research initiatives, faculty recruitment, and student support, the University of Arizona's Water and Environmental Sustainability Program (WESP) has made significant advancements in science-based knowledge, research and technology that address Arizona's water and environmental resource challenges.

Goals

WESP investments aim to support internationally recognized research and technology transfer initiatives, a thriving industry cluster supported by a skilled workforce, stronger relationships across disciplines, and K-12 education to foster awareness of water and environmental issues, problems, and career-related training.

Results – Impact

- Engaged over 220 people in WESP initiatives across UA in FY11 as part of overall workforce development: 83 faculty, 23 researchers, 20 staff, and 98 students.
- Increased Sponsored Awards almost 300 percent since 2007, reaching a high of \$30M in 2010.



- Delivered water education to more than 1,000 teachers' students in Central Arizona in 2011 through teacher trainings, workshops, and new curricula supported by WESP.
- Created the *Critical Zone Observatory for the Southwest* – part of a national network—through a five-year, \$4.35M grant from NSF. Discoveries will help predict how the environment will respond to climate and water variability. The research is led by an interdisciplinary team from the departments of Soil, Water and Environmental Science, Hydrology and Water Resources, Geosciences and Biosphere2.
- Collaborated with The UA Superfund Research Program to bring biomedical and environmental research for the improvement of human health and the environment into the mix. Focused on arsenic, chlorinated hydrocarbons and mine tailings, the center was refunded by National Institute of Environmental Health Sciences for \$16M for five years with support from WESP.



*Todd Gaston,
Masters Candidate, Agricultural and
Resource Economics TRIF Research Fellow,
Agricultural Water Demand along the
Colorado River Mainstem: An Econometric
Analysis.*

"My study investigates the effects of flow shortages and rising urban demand for Colorado River water on farmers' cropping choices. This is no drop in the bucket, as agriculture accounts for nearly 70% of all Arizona freshwater use."



*Gregg Garfin, Ph.D.,
Assistant Professor and
Extension Specialist in
Climate, Policy and Natural
Resources, School of
Natural Resources and the
Environment, and Director
of Science Translation and
Outreach, Institute of the
Environment*

"Our work with fire meteorologists, managers, and intelligence personnel in the Southwest and throughout the US helps officials and managers prioritize resource allocation to prepare for fire seasons, and to prepare public information campaigns that forewarn citizens of fire risk – which is strongly influenced by seasonal climate and weather patterns and improves efforts to save lives and property."

- Developed a new device at UA's Engineering Research Center that could halve water rinse usage in the semiconductor industry. Arizona's vibrant semiconductor industry is dependent on high-quality and high-volume water supplies; UA partners with industry to ensure the environmental sustainability of this manufacturing sector.
- Significantly advanced water reuse research with the 2011 hire of Dr. Shane Snyder, a leading world expert on emerging contaminants and sustainable engineered systems. A Professor in Chemical and Environmental Engineering and Co-director of the Arizona Laboratory for Emerging Contaminants, he has strong ties to the water industry and immediately brought in \$2M in state-of-the-art instrumentation from corporate donors.
- Hired Dr. Armin Sorooshian in 2010, a rising star in Atmospheric Science and Chemical and Environmental Engineering. He received a \$500K Young Investigator Award from the US Office for Naval Research for his research on aerosol particles and their influence on visibility and climate and has helped to secure over \$1M in grant funding.



EDUCATION and INFRASTRUCTURE

UA's TRIF programs aggressively target ABOR's goals to increase the state's high quality workforce of educators and health care professionals, broaden the reach and efficacy of distance education programs, and strengthen the state's technological infrastructure. These goals leverage the UA's vast talent pool of researchers and educators at the forefront of their fields.

Goals

Educator Development Plan - Create seamless K-12 math and science programs, support students to enter math, science, and agricultural science teacher preparation programs, graduate over 450 teachers, and support program graduates to teach locally.

Nursing Online Graduate Degree and Certificate Program - Increase quality and years of healthy life, assure quality safe health care, improve public health infrastructure, and reduce health disparities, particularly in rural, aging, border and minority populations.

Anyplace Access for Arizonans - Offer advanced degrees and certificates through distance education in high-demand fields such as nursing, education, engineering, agricultural and biological sciences, and business. Create information resources that increase on-the-job productivity in agricultural extension, active learning for K-12 teachers, online library reference and digital collections, and UA outreach websites.

Critical Care Initiative - Continuously upgrade Internet connectivity to research buildings, provide access for researchers to high performance networks such as CENIC, Internet2, and National Lambda Rail, provide better supercomputing capability, introduce important new technologies that enable cutting edge research, and develop new research space for TRIF activities.

Technology Transfer Infrastructure Plan - Enhance technology transfer infrastructure, significantly increase UA level and breadth of technology transfer, increase faculty engagement in technology transfer, staff and students, assist efforts to commercialize university technology, and connect these to both State and local community economic development efforts.



2011-2012 Teach Arizona Cohort

Since 2000, the Teach Arizona graduate program has produced 169 secondary math and science teachers. Math and science students in the program indicated that the TRIF tuition assistance enabled them to afford a teacher preparation program and influenced their decision to select Teach Arizona over other programs that did not provide tuition assistance.

Results - Impact

- Leveraged TRIF support to secure over \$31 million in sponsored awards, over \$5 million from gifts and other sources, and over \$4 million in patent royalty income over five years.
- Obtained 616 invention disclosures, 255 licenses and options, 664 patent applications, 30 new start-up companies, and 3 economic impact studies.
- Enrolled 1,715 graduate students, awarded 287 graduate degrees, certified 212 Math and Science teachers, 130 at the undergraduate level, 82 at the graduate level, certified 68 teachers in Agriculture, and granted 613 certificates in AAA and Nursing.
- Offered 233 new online and 226 newly revised courses.
- Reached an audience of 13,790 K-12 students, supported 79 workshops and conferences, served over 6 million users of extension and workplace resources, enrolled 117,512 students in web and hybrid courses.

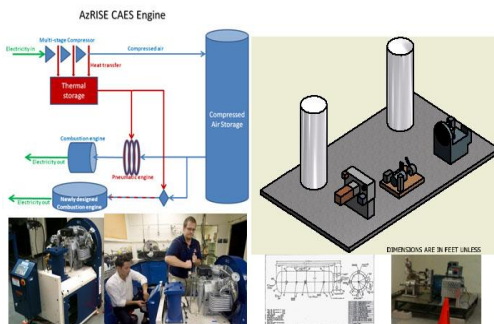


- Brought network standards into compliance for three buildings.
- Created a new distance learning program, the first of its kind in the country, resulted in a Bachelor of Applied Science in Meteorology, providing a pathway to a Bachelor's degree for airmen serving as weather forecasters at Davis-Monthan Air Force Base. More than 2,000 weather forecasters throughout the U.S. Armed Services will be able to access the program.
- Funded expanded graduate and undergraduate distance education in agriculture, business, clinical research, education, engineering, management information systems, and social and behavioral sciences in FY 2010-11 through the Anyplace Access for Arizonans Initiative. More than 1,800 students were enrolled and more than 700 teachers and continuing education professionals were trained. This year's investment of \$800,000 in AAA funding resulted in \$3.7 million in external funding.

Science Teacher Preparation Program graduate:

"I am still convinced I must have come from one of the best teacher preparation programs in the country! As I started this year with my first classes I had a student in one of them ask me how long I had been teaching. They were shocked when I said it was my first year and several told me I didn't seem like a first year teacher. I also got a similar complement from one of the veteran teachers at my school. As I compare myself to some of the other first year teachers at my school I really think that you guys did a great job getting us to think about everything but also accept the fact that the first couple years you are in, to quote on instructor, "survival mode" and that's ok! Thank you!"

UA-ASU SOLAR ENERGY



Goals

- Provide seed funds to stimulate and support faculty/student solar energy research.
- Address technical, economic and policy issues that stimulate putting solar energy in the ground in Arizona.

Results – Impact

- Created *Arizona Research Institute for Solar Energy (AzRISE)*, *Renewable Energy Network (UAREN)*, *Rehnu*, *Electrochemical Energy Storage Lab*, and the DOE-funded *Energy Frontier Research Center* in the department of Chemistry.
- Funded over \$22 million from federal and state sources, industry, utilities and foundations to support 36 faculty and over 70 graduate and undergraduate students' research.
- Created two spin-off companies, appointed new faculty in renewable energy in partnership with the Institute for the Environment, developed research/education programs at the UASTP Solar Zone, and participated in the DOE Solar Decathlon.
- Built the first quasi-adiabatic, small-scale compressed air energy storage system in the world at the UA Science and Technology Park Solar Zone by collaboration of AzRISE, TEP and Solon in the formation of SMRT (a site for testing renewable energy storage).
- Created *Rehnu*, a UA Mirror Lab spin-off company, to build large CPV systems for low-cost solar power generation.
- Developed a solar desalination system for use on the Navajo Reservation through *UAREN*.
- Formed the *Energy Frontier Research Center* to study the potential for organic hybrid PV.



HIGHER EDUCATION in RURAL SOUTHERN ARIZONA (HERSA)

Goal

Provide integrated four-year degree programs and certificates with community college partners, in teacher education, commerce/entrepreneurship and information science.

Results – Impact

- The most notable achievements in FY 2010-11 were the launching of graduate certificates in GIS and Information Assurance (both are becoming complete degree programs) and the graduation of nine students in Santa Cruz County (vs. only one last year).
- Enrollments in undergraduate and graduate programs reached nearly 700, and more than 400 teachers and continuing education professionals were trained this year. Over the past three fiscal years, more than 2,000 students have enrolled in undergraduate, graduate and certificate programs offered through the TRIF HERSA Initiative. Finally, the additional infusion of Department of Labor resources seeded by a TRIF grant has led to expanded offerings in Santa Cruz and Yuma counties.



In May 2010, the first person received a UA undergraduate degree without leaving Santa Cruz County. This year, seven undergraduate and two graduate students received their degrees through UA South programs at UA Santa Cruz. An additional 14 Santa Cruz County students who completed an associate's degree this spring will continue at either UA's main campus or UA South in the fall.

ADDITIONAL PROGRAMS

The **Venture Fund** was established to create a mechanism for supporting new projects with compelling strategic need or opportunity and exceptional opportunity for strong return-on-investment. The overall purpose of the Venture Fund was to ensure that the University becomes more nimble in addressing needs and increasing ROI in ways consonant with TRIF requirements and objectives.

The **Planning for Phoenix Biomedical Campus (PBC)** provided \$750,000 to the University of Arizona to complete the preliminary programming for the Medical Education Building and ABC II facilities.

The **UA-ASU Joint Collaborative Biomedical Research Fund** was used to stimulate collaborative projects in the biomedical sciences with other institutions in the State, including ASU and NAU, as well as C-Path, TGen, and various medical facilities. These funds provided seed and matching funds for ten projects.

The **Expansion of the Phoenix Biomedical Campus** provided funds to build the necessary infrastructure for the expansion of the College of Medicine and the College of Pharmacy in Phoenix. The funds were used to support lease costs, operating, maintenance, utilities, research compliance, and faculty research support.

innovation

exploration

discovery

ABOR System Office

CREATIVITY

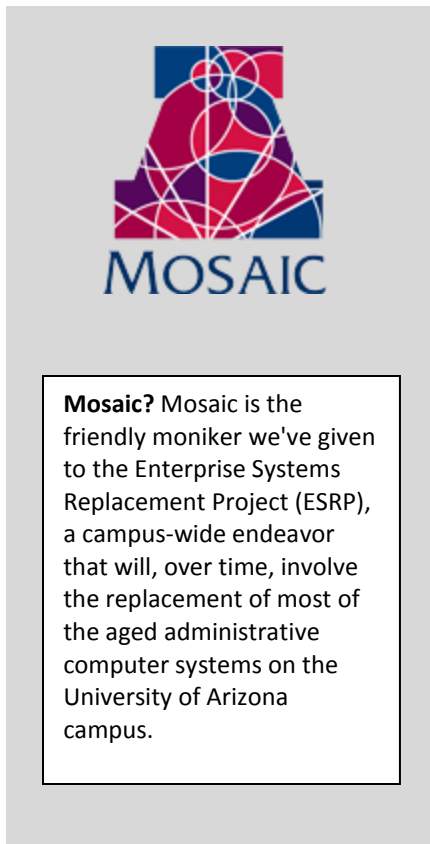
integrity

opportunity



The Regents Innovation Fund has been instrumental in supporting the research activities of the universities, and contributing toward collaborative efforts among the universities and with community partners.

In FY 2011, the Regents Innovation Fund was used to support work in 3 areas: Information Technology Collaborative, UA College of Medicine-Phoenix, and the Center for the Future of Arizona. The final disbursements on the Arizona Regents Reach Out (ARRO) grants were made in FY 11.



Information Technology Collaborative:

Collaborative Information Technology (IT) projects that can improve service and/or result in cost savings or enhance IT security continue to be of particular interest to the Regents. A consultant continues to facilitate The University of Arizona's Mosaic project implementation, which includes Human Resources, Student Administration, Research Administration, and Financial and Business Intelligence systems. SharePoint for the ABOR central office continues to be developed, and a new Arizona Board of Regents website was successfully launched. Various possibilities exist for the efficient and effective use of seed money, such as support of tri-university collaborative IT projects and possibly to help provide matching funds for various federal stimulus projects.

Information Technology Risk Assessment Review

ABOR engaged a consultant to:

1. Review the processes that the Arizona university system uses to conduct IT risk assessments,
2. Assess how the universities are using the results of their IT risk assessments, and
3. Assist the internal auditors in establishing a risk-based IT audit plan.

The consultant provided five recommendations that are largely for improving IT governance at the system level. Thirty-three recommendations were made for the universities, of which 23 are common to or shared by the universities. Key recommendations include increasing the scope of the risk assessments, improving analysis and reporting of results, and developing management/action plans.

The tri-university IT council is leading the effort of analyzing the recommendations and developing an appropriate action plan, which is expected to be presented to the Audit Committee on November 30, 2011.



Arizona Regents Reach Out (ARRO) Grants:

The Arizona Regents Reach Out (ARRO) grant program was first authorized in spring 2005 and issued its first grant awards in November 2005, with funding starting January 1, 2006. ARRO awards supported innovative e-learning or distance-learning projects from faculty and staff at all three universities, with an emphasis on projects that addressed a significant workforce development need and were collaborative, transferable, portable, shareable, and scalable. In 2008 and 2009, the process sought to align with the interests of the governor's P-20 council, addressing teacher preparation and/or certification in science, technology, engineering and mathematics (STEM).

No funding was budgeted for new ARRO grant projects in FY 2011. All current FY 2009 and FY 2010 projects were closed out by June 30, 2011. The final two, largest projects were ARO 09-01 and ARO 10-02.

2009 ARRO Projects:

ARO 09-01: *Masters in Sustainability for Mid- and Early-Career Professionals*—work was completed with corporate partners Dell and APS, and the ASU Carey School of Business to create a flexible program for anytime, anyplace learning.

2010 ARRO Projects:

ARO 10-02: *ArizonaNativeNet Native Peoples University Professional Development On-Line Education Center*—Funding helped to develop and launch ArizonaNativeNet's Native Peoples University, an innovative professional-development extension to the existing ArizonaNativeNet web portal, with fee-based curricula. Revenues generated will be reinvested to fund development of additional course offerings.

Special Project: Advancing AZ Through a Web-based Initiative:

Pursuant to the June 2009 Technology Oversight Committee direction, \$60,000 was transferred from NAU AZUN to support this project under the direction of the Center for the Future of Arizona.

UA College of Medicine - Phoenix:

The Molera Alvarez Group (MAG) provides consultation to the Arizona Board of Regents centered mainly around public/community affairs and government relations, with a focus on the Phoenix Biomedical Campus (PBC). During the past year (Fiscal Year 2010-2011), MAG worked on a number of issues and primarily focused on budget related matters. MAG helped negotiate with the Governor's Office to keep the state's budget reductions to an amount supported by the Board as reasonable, given the current economic climate.

In addition, MAG supported individual university efforts to schedule review hearings by the Joint Legislative Budget Committee (JBLC) in order to obtain the needed statutory review to proceed with capital projects - efforts which will help move along PBC projects in the future

As part of our responsibilities for ABOR, MAG also provides linkages with key stakeholders in the business and community sectors. For instance, Jaime Molera maintains and develops key relationships with leaders in the City of Phoenix to assist in the further development of the Phoenix Biomedical Campus. Along with these specific activities, MAG also provides our Universities' and ABOR's public affairs with guidance on media relations strategy to make sure state and local media contacts understand the significance of our higher education system and the Phoenix Biomedical Campus.



Center for the Future of Arizona:

From its inception in 2002, the Center has focused on a limited set of issues that were determined to have the greatest impact on Arizona’s future, drawing on existing studies and research, augmenting them where necessary, then developing an action agenda with measurable results, engaging civic and political leaders in the process to begin to take the next steps in creating our future. The vision for the future of Arizona that emerged from this deliberative process is to create an Arizona in which there are opportunities—especially education and employment opportunities—and a sustainable high quality of life for all citizens, now and for years to come.

To help realize this vision, the Center has undertaken three major projects designed to advance Arizona’s ability to compete successful in the future. Central to these efforts is the capacity to develop and expand highly functional, sustainable websites and a robust electronic delivery system that enables the Center to strategically disseminate these ideas, encourage discussion and support thoughtful action and implementation that has been supported by the Arizona Board of Regents and TRIF funds. Significant progress has been made in all project areas under the three major initiatives.

The Beat the Odds Institute: 85 K-12 schools partnered with the beat the Odds Institute in FY 11 for their principals to receive mentoring, training and networking opportunities through the School Partners Program. Program results have been impressive with 72% of the partners achieving adequate yearly progress.

Pathways to Postsecondary Success: The underlying concept is that every student should be in an academically rigorous pathway that leads to postsecondary participation and completion. The Center is engaged in two key efforts: The Arizona Move On When Ready initiative, and the College and Career Pathways initiative.

The Arizona We Want: The initiatives, activities and growing success of The Arizona We Want are closely related to its technical capacity and its active use of the web. Success comes in a large part because of the Center’s technical expertise and the increasing functionality and sophistication of its electronic communications system.

The TRIF Regents Innovation Fund is enabling the Center to staff and enhance the development of technically advanced, state of the art websites with bilingual features supporting the delivery and reform of education programs and services throughout the state and beyond, and connecting citizens and policy makers in constructing and implementing a citizens’ agenda for Arizona.

BEAT THE ODDS
I N S T I T U T E

In 2007, Frances Sperling was named the Principal of Thompson Ranch Elementary School in El Mirage. The Dysart Unified District school had hit bottom and was on the verge of being take over by the state after “failing to meet academic standards.” Among the strategies Fran used to turn around her school was to work with Beat the Odds Institute mentor, Jeff Sprout. They focused on data analysis and data-based decisions, developing clear bottom line/goals, and improving staff quality through collaboration and coaching. In 2009 the school moved to “performing plus”, and in 2011 Thompson Peak Received the most prestigious school recognition in Arizona: an A+ School of Excellence award. “Working with Beat the Odds provided an inspirational outlook on school improvement and helped build a foundation of success,” Sperling said.

discovery

System Summary: TRIF Metrics and Financials

innovation

exploration

opportunity

creativity

integrity

ARIZONA UNIVERSITY SYSTEM
TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF)

FINANCIAL SUMMARY	FY 2007 ACTUAL	FY 2008 ACTUAL	FY 2009 ACTUAL	FY 2010 ACTUAL	FY 2011 ACTUAL	FY 2011 BUDGET
REVENUE						
Carryforward	\$ 32,465,192	\$ 26,345,536	\$ 22,861,168	\$ 12,572,905	\$ 10,137,392	\$ 10,137,292
TRIF Revenue	71,992,360	71,482,244	59,463,418	52,603,418	53,867,935	52,999,981
TOTAL	\$ 104,457,552	\$ 97,827,780	\$ 82,324,586	\$ 65,176,323	\$ 64,005,327	\$ 63,137,273
EXPENDITURES						
OPERATING BUDGET						
Personal services	\$ 28,331,875	\$ 29,784,071	\$ 29,316,188	\$ 22,646,434	\$ 19,338,443	\$ 24,410,343
Employee Related Expenses (ERE)	7,838,610	8,508,401	8,706,613	7,149,801	6,170,926	7,675,672
All Other Operating	23,199,744	25,496,094	20,204,529	14,678,099	17,946,235	13,358,699
Grants/Projects	1,812,640	1,702,337	1,271,151	864,820	482,551	1,222,253
OPERATING BUDGET	\$ 61,182,869	\$ 65,490,903	\$ 59,498,481	\$ 45,339,154	\$ 43,938,155	\$ 46,666,967
CAPITAL BUDGET						
Building Renovation	\$ 209,107	\$ 347,337	\$ 147,127	\$ 690,091	\$ 163,280	\$ 2,705,500
Debt Service	8,333,939	4,990,248	6,447,274	5,291,886	7,740,810	5,050,000
ASU Polytechnic/West COPs	3,650,200	3,721,800	3,718,800	3,717,800	3,718,900	3,718,600
AZ Biomedical Campus					3,939,000	5,000,000
NAU Conference Center	4,071,491	162,830				
CAPITAL BUDGET	\$ 16,264,737	\$ 9,222,215	\$ 10,313,201	\$ 9,699,777	\$ 15,561,990	\$ 16,474,100
TOTAL	\$ 77,447,606	\$ 74,713,118	\$ 69,811,682	\$ 55,038,931	\$ 59,500,145	\$ 63,141,067
SUMMARY BY INITIATIVE						
Access/Workforce Development/e-learning	\$ 21,415,578	\$ 23,459,012	\$ 19,584,040	\$ 16,560,078	\$ 6,024,690	\$ 6,575,332
Biosciences/Bioresearch	34,530,399	32,014,984	28,569,932	22,587,211	10,635,138	10,976,498
Biomedical and Health Sciences	1,199,372	2,345,392	2,728,263		17,238,600	17,475,322
Sustainability and Renewable Energy	5,440,997	7,168,311	7,639,264	7,186,397	4,792,809	5,216,787
Education and Infrastructure	10,408,324	4,949,959	6,330,618	5,538,752	7,409,483	7,641,966
Optical Sciences	3,187,607	3,340,957	3,642,702	2,264,489	2,451,532	2,444,377
Advanced Material and Flexible systems				163,500	491,000	600,000
Regents Innovation Fund	1,265,329	1,434,503	1,316,863	738,504	452,920	1,175,000
Arizona University Network					5,322,937	6,165,339
Advancing Science					2,599,141	2,782,692
Economic Development and Partnership					2,081,895	2,087,754
TOTAL	\$ 77,447,606	\$ 74,713,118	\$ 69,811,682	\$ 55,038,931	\$ 59,500,145	\$ 63,141,067

opportunity
innovation discovery
exploration

ASU

integrity creativity



ARIZONA STATE UNIVERSITY

ARIZONA STATE UNIVERSITY
TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF)

FINANCIAL SUMMARY	FY 2007 ACTUAL	FY 2008 ACTUAL	FY 2009 ACTUAL	FY 2010 ACTUAL	FY 2011 ACTUAL	FY 2011 BUDGET
REVENUE						
Carryforward	\$ 11,111,300	\$ 5,872,900	\$ 5,601,400	\$ 2,071,400	\$ 803,700	\$ 803,700
TRIF Revenue	27,041,400	27,886,700	23,422,500	21,240,400	21,733,922	21,437,600
TOTAL	\$ 38,152,700	\$ 33,759,600	\$ 29,023,900	\$ 23,311,800	\$ 22,537,622	\$ 22,241,300
EXPENDITURES						
OPERATING BUDGET						
Personal services	\$ 13,276,700	\$ 11,615,800	\$ 11,597,000	\$ 8,235,700	\$ 6,174,100	\$ 7,066,700
Employee Related Expenses (ERE)	3,368,900	3,008,600	3,143,500	2,650,800	1,950,800	2,293,700
All Other Operating	11,166,300	8,892,500	7,346,100	6,728,700	6,359,700	5,460,600
OPERATING BUDGET	\$ 27,811,900	\$ 23,516,900	\$ 22,086,600	\$ 17,615,200	\$ 14,484,600	\$ 14,821,000
CAPITAL BUDGET						
Building Renovation	\$ 40,100	\$ 133,300	\$ 147,100	\$ -	\$ 31,800	\$ 2,705,500
Debt Service	777,600	777,600	1,000,000	1,175,000	3,512,100	1,000,000
ASU Polytechnic/West COPS	3,650,200	3,721,800	3,718,800	3,717,800	3,718,900	3,718,600
CAPITAL BUDGET	\$ 4,467,900	\$ 4,632,700	\$ 4,865,900	\$ 4,892,800	\$ 7,262,800	\$ 7,424,100
TOTAL	\$ 32,279,800	\$ 28,149,600	\$ 26,952,500	\$ 22,508,100	\$ 21,747,400	\$ 22,245,100
SUMMARY BY INITIATIVE						
Biodesign Institute (BDI/CBPI)	\$ 27,734,500	\$ 22,354,500	\$ 20,505,500	\$ -	\$ -	\$ -
Biomedical Informatics (BMI)	551,200	446,400	2,221,000	-	-	-
Planning for Phx Biomedical Campus	133,200	616,800	-	-	-	-
Solar Energy	-	152,000	248,700	-	-	-
ASU-UA Joint Biomedical Research Fund	210,700	858,100	258,500	-	-	-
Bio and Health	-	-	-	16,538,400	16,423,300	16,510,400
Advanced Materials and Flexible Systems	-	-	-	163,500	491,000	600,000
Sustainability and Renewable Energy	-	-	-	2,088,400	1,114,200	1,416,100
ASU Polytechnic COPS	2,046,100	2,082,800	2,084,200	2,083,800	2,081,700	2,081,600
ASU West COPS	1,604,100	1,639,000	1,634,600	1,634,000	1,637,200	1,637,000
TOTAL	\$ 32,279,800	\$ 28,149,600	\$ 26,952,500	\$ 22,508,100	\$ 21,747,400	\$ 22,245,100

BIO AND HEALTH*

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total				\$16,538,400	\$16,423,300	\$16,510,400
RETURN ON INVESTMENT						
Sponsored Projects	53.85	89.88	52.8	65.20	46.09	65.00
Royalty Income	0.48	1.05	0.36	0.09	0.14	0.00
Foundation Funding	0.57	10.72	8.4	15.60	0.00	0.50
Total	54.9	101.65	61.56	80.89	46.23	65.50
TECHNOLOGY TRANSFER						
Invention Disclosures	158	148	153	187	170	151
Patent Applications	140	83	184	232	158	162
Patents Issued	15	12	23	44	17	21
Start-up Companies	7	0	6	4	10	4
Licensing and Options Agreements	22	43	25	46	29	34
WORKFORCE CONTRIBUTIONS						
Post-docs	56	110	70	50	46	93
Post-docs Entering Workforce	26	53	11	25	14	13
Graduate Students	324	404	230	152	103	278
Graduate Students Entering Workforce	95	136	43	38	21	47
Undergraduate Students	157	645	204	113	77	225
PARTNERSHIPS and COLLABORATIONS						
Non-Government Sponsored Projects	25	37	47	41	21	39
Subcontracts Issued	35	22	31	14	24	8

* For the years FY07-09, metrics were calculated using a summation of the following TRIF initiative categories tracked previously: Biodesign Institute and Capacity Building, Biomedical Informatics, and the Joint ASU-UA Biomedical Research Fund. Detailed metrics for each of those categories can be found in Appendix 1.

SUSTAINABILITY*

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total				\$2,088,400	\$1,114,200	\$1,416,100
RETURN ON INVESTMENT						
Sponsored Projects	N/A	N/A	7.30	26.90	30.69	40.00
Royalty Income	N/A	N/A	0.07	0.85	0.004	0.30
Foundation Funding	N/A	N/A	0.07	0.88	0.00	2.50
Total	N/A	N/A	7.43	28.63	30.694	42.80
WORKFORCE CONTRIBUTIONS						
Post-docs	N/A	0	11	15	3	35
Post-docs Entering Workforce	N/A	0	7	1	1	18
Graduate Students	N/A	0	32	83	86	142
Graduate Students Entering Workforce	N/A	0	22	20	19	60
Undergraduate Students	N/A	0	23	11	112	87
PARTNERSHIPS and COLLABORATIONS						
Non-Government Sponsored Projects	N/A	N/A	N/A	12	8	33
Subcontracts Issued	N/A	N/A	N/A	0	1	27

*For FY07-09, metrics for the Sustainability category were composed solely of the Solar Energy Initiative at ASU. Detailed metrics for the Solar Energy Initiative can be found in Appendix 2.

ADVANCED MATERIALS AND FLEXIBLE SYSTEMS

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total				\$163,500	\$491,000	\$600,000
RETURN ON INVESTMENT						
Sponsored Projects	N/A	N/A	N/A	22.50	9.89	20.00
Royalty Income	N/A	N/A	N/A	0.05	0.00	0.05
Foundation Funding	N/A	N/A	N/A	0.00	0.00	0.04
Total	N/A	N/A	N/A	22.55	9.89	20.09
WORKFORCE CONTRIBUTIONS						
Post-docs	N/A	N/A	N/A	1	2	23
Post-docs Entering Workforce	N/A	N/A	N/A	0	1	14
Graduate Students	N/A	N/A	N/A	15	15	4
Graduate Students Entering Workforce	N/A	N/A	N/A	0	6	4
Undergraduate Students	N/A	N/A	N/A	2	8	6
PARTNERSHIPS AND COLLABORATIONS						
Non-Government Sponsored Projects	N/A	N/A	N/A	14	3	6
Subcontracts Issued	N/A	N/A	N/A	2	2	5



innovation

exploration

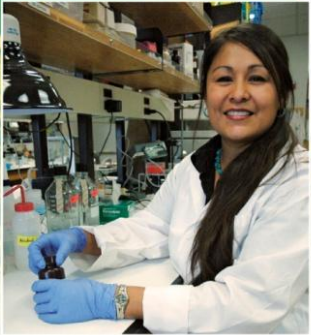
discovery

NAU

creativity

integrity

opportunity



**NORTHERN ARIZONA
UNIVERSITY**

NORTHERN ARIZONA UNIVERSITY
TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF)

FINANCIAL SUMMARY	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2011
	ACTUAL	ACTUAL	ACTUAL	ACTUAL	ACTUAL	BUDGET
REVENUE						
Carryforward	\$ 13,264,390	\$ 10,185,985	\$ 10,403,784	\$ 8,488,685	\$ 6,372,206	\$ 6,372,205
TRIF Revenue	14,612,967	15,159,929	12,257,111	10,912,973	11,188,641	11,004,529
TOTAL	\$ 27,877,357	\$ 25,345,914	\$ 22,660,895	\$ 19,401,658	\$ 17,560,847	\$ 17,376,734
EXPENDITURES						
OPERATING BUDGET						
Personal services	\$ 6,413,799	\$ 6,369,866	\$ 6,358,863	\$ 6,412,432	\$ 5,710,409	\$ 6,828,000
Employee Related Expenses (ERE)	1,820,063	1,983,389	2,017,378	2,128,502	1,884,293	2,140,000
All Other Operating	3,558,889	5,178,681	3,792,045	2,903,611	3,107,797	2,358,734
OPERATING BUDGET	\$ 11,792,751	\$ 13,531,936	\$ 12,168,286	\$ 11,444,545	\$ 10,702,499	\$ 11,326,734
CAPITAL BUDGET						
Building Renovation	\$ -	\$ 500,000	\$ -	\$ 684,907	\$ -	\$ -
Debt Service	3,091,339	796,179	2,003,924	900,000	1,228,710	1,050,000
Conf Center/New Construction Support	4,071,491	162,830	-	-	-	-
AZ Biomedical Campus	-	-	-	-	3,939,000	5,000,000
CAPITAL BUDGET	\$ 7,162,830	\$ 1,459,009	\$ 2,003,924	\$ 1,584,907	\$ 5,167,710	\$ 6,050,000
TOTAL	\$ 18,955,581	\$ 14,990,945	\$ 14,172,210	\$ 13,029,452	\$ 15,870,208	\$ 17,376,734
SUMMARY BY INITIATIVE						
Advancing Science	\$ 2,884,219	\$ 2,449,664	\$ 2,189,598	\$ 2,278,960	\$ 2,599,141	\$ 2,782,692
Access and Workforce Development	8,021,668	9,039,819	6,859,055	6,451,369	5,866,235	6,340,949
Arizona University Network	5,729,281	768,528	2,492,682	1,794,307	5,322,937	6,165,339
Economic Development and Partnerships	2,320,413	2,732,934	2,630,875	2,504,816	2,081,895	2,087,754
TOTAL	\$ 18,955,581	\$ 14,990,945	\$ 14,172,210	\$ 13,029,452	\$ 15,870,208	\$ 17,376,734

ADVANCING SCIENCE

Healthy Forests, ERDENE and GBI

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total	\$2.88	\$2.45	\$2.19	\$2.28	\$2.60	\$2.78
RETURN ON INVESTMENT						
ROI	5.1:1	5.1:1	8.2:1	4.8:1	5.6:1	4.0:1
Leveraged funding (\$M)	\$14.90	\$15.20	\$15.60	\$7.45	\$14.30	\$10.90
Qualitative Returns Including Pres	286	3137	126	81	204	
TECHNOLOGY TRANSFER						
Products Generated and in Market	5	4	0	0	4	12
Business Spinoffs	4	2	0	1	0	11
Patent Applications Generated	2	5	4	1	4	6
Patents Received	N/A	N/A	N/A	N/A	1	
Workshops Delivered or Conferences	21	42	2	4	15	20
Business Expansions	5	8	0	3	0	
Business Start ups	1	0	0	0	0	
WORKFORCE CONTRIBUTIONS						
Graduate/Postdoc in Pipeline	58	128	61	36	96	100
MS/PhD Increases	0	0	0	3	5	
Undergrad Students in Pipeline	78	325	83	52	137	195
High End Baccalaureates	3	21	22	9	7	
Baccalaureates Produced in Related Certificated Granted	15	N/A	10	2	1	
Continuing Ed Professionals	41	10	25	5	31	
	0	0	0	9	2	
	42	142	29	9	68	162
CURRICULUM INNOVATIONS						
New Programs (fulltime students)	2	2	0	0	6	
Revised Courses	6	7	4	4	10	
New Courses (fulltime students)	5	3	2	0	6	
New Courses - Professionals	4	0	0	0	4	
PARTNERSHIPS and COLLABORATIONS						
Community College 2+2 Programs	6	5	2	0	3	
Tri-University (ASU, NAU, UofA)	2	8	12	3	9	
Industry/Private Sector Collaboration	59	86	8	4	15	
Community-based (incl. Tribes)	78	45	8	5	17	
Regional, National, International	75	75	12	17	29	
New Research Collaborations	13	10	10	4	9	
ECONOMIC DEVELOPMENT						
Incubation/Formation of Biotech	0	0	0	1	0	

ACCESS/WORKFORCE DEVELOPMENT/E-LEARNING

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total	\$8.02	\$9.04	\$6.86	\$6.45	\$5.87	\$6.34
QUALITATIVE RETURNS (Incl. Presentations)	8	15	9	8	15	10
WORKFORCE CONTRIBUTIONS						
New Teachers	910	1,019	1,058	979	789	750
Nurses/Health Care Professionals	585	640	680	715	766	600
Business/Non-Profit Managers	657	725	816	924	978	500
CURRICULUM INNOVATIONS						
Degree/Certificate Programs	41	41	41	41	41	48
Web/Hybrid Courses Developed	80	76	74	99	65	80
Revised Courses	206	225	166	65	254	40
Faculty Participating in Web Courses	325	210	397	201	450	350
Student Enrollment in On-line Courses	20,526	31,568	35,637	39,025	17,642	14,000
PARTNERSHIPS and COLLABORATIONS						
Community College	19	20	20	20	21	17
Tri-University	3	3	3	3	3	3
K-12	127	126	125	125	112	140
Business/Government	82	87	90	102	86	61

ARIZONA UNIVERSITY NETWORK (AZUN)

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Actual	FY 11 Proj
EXPENDITURES						
Total	\$2.32	\$2.73	\$2.63	\$2.51	\$2.08	\$2.09
WORKFORCE CONTRIBUTIONS						
Teachers	209	293	428	488	595	
Nurses	92					
Fire Science/Emergency Svcs Mgmt	In Progress	32	25	55	36	
Law Enforcement	16	153	201	272	346	
CURRICULUM INNOVATIONS						
Degree/Certificate Programs	9	8	8	8	8	
New/Revised Courses	13	9	16	27	11	
Alternative Course Delivery (High Capacity/Short Format)			323	374	417	
GROWTH INDICATORS						
Students Cross-Registering per Year	379	527	279	224		
Course Enrollments System-Wide	64,939	80,892	95,933	123,575		
Courses Delivered System-Wide	2,362	3,610	3,500	4,072		
Programs Delivered System-Wide	89	113	115	121		
New Enrollments System-Wide	15,416	15,593	15,011	27,642		

innovation

exploration

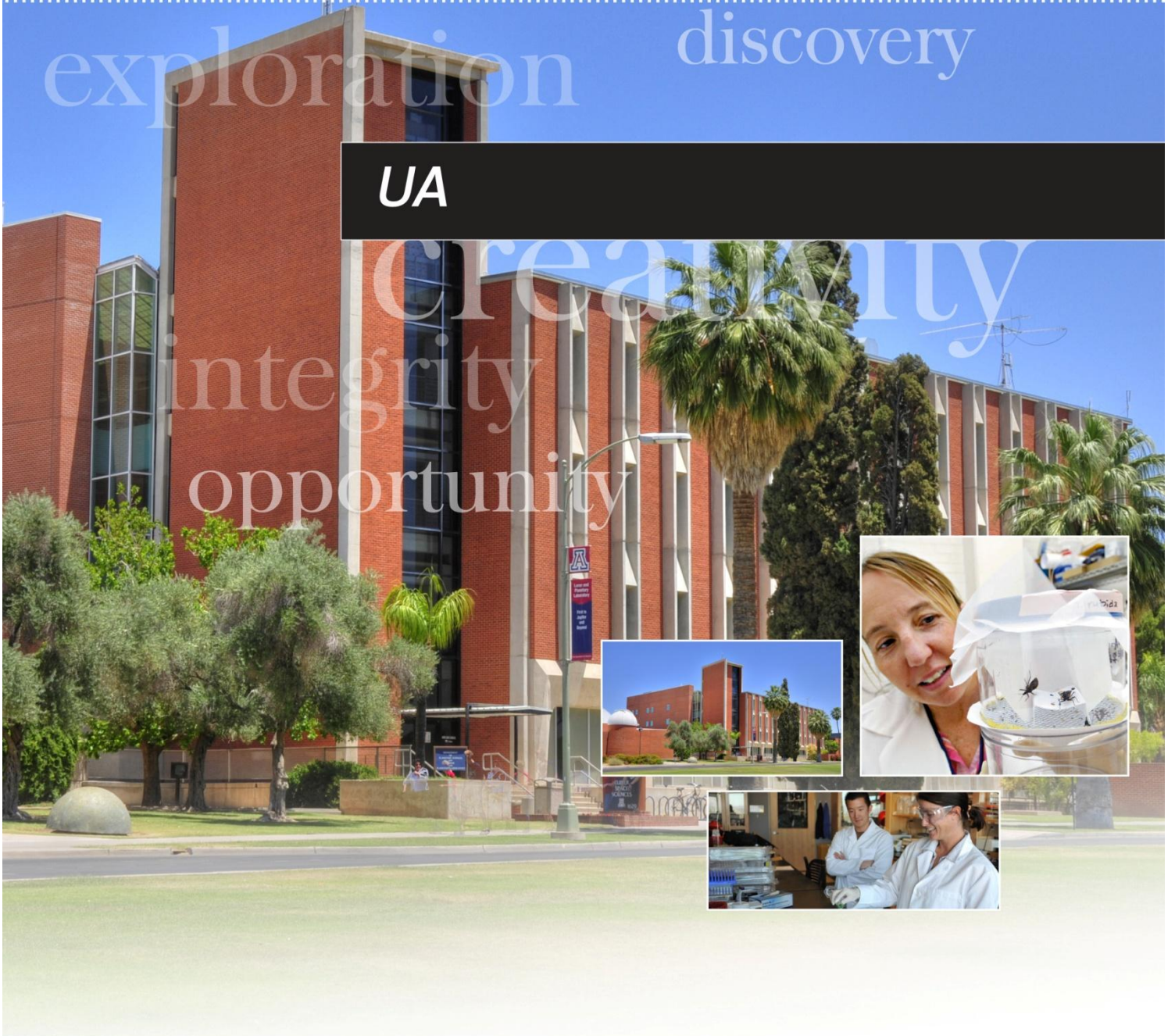
discovery

UA

creativity

integrity

opportunity



THE UNIVERSITY OF ARIZONA
TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF)

FINANCIAL SUMMARY	FY 2007 ACTUAL	FY 2008 ACTUAL	FY 2009 ACTUAL	FY 2010 ACTUAL	FY 2011 ACTUAL	FY 2011 BUDGET
REVENUE						
Carryforward	\$ 6,812,073	\$ 9,005,784	\$ 5,854,007	\$ 1,268,778	\$ 2,546,090	\$ 2,546,090
TRIF Revenue	25,351,822	26,384,855	22,275,873	19,612,791	19,926,029	19,598,143
TOTAL	\$ 32,163,895	\$ 35,390,639	\$ 28,129,880	\$ 20,881,569	\$ 22,472,119	\$ 22,144,233
EXPENDITURES						
OPERATING BUDGET						
Personal Services	\$ 8,486,483	\$ 11,666,431	\$ 11,209,729	\$ 7,843,188	\$ 7,387,816	\$ 10,411,143
Employee Related Expenses (ERE)	2,606,677	3,476,967	3,499,028	2,321,356	2,316,188	3,214,972
All Other Operating	8,410,706	11,262,728	8,904,805	4,948,865	8,470,064	5,518,118
OPERATING BUDGET	\$ 19,503,866	\$ 26,406,126	\$ 23,613,562	\$ 15,113,409	\$ 18,174,068	\$ 19,144,233
CAPITAL BUDGET						
Building Renovation	\$ 169,007	\$ (285,963)	\$ 27	\$ 5,184	\$ 131,482	\$ -
Debt Service	4,465,000	3,416,469	3,443,350	3,216,886	3,000,000	3,000,000
CAPITAL BUDGET	\$ 4,634,007	\$ 3,130,506	\$ 3,443,377	\$ 3,222,070	\$ 3,131,482	\$ 3,000,000
TOTAL	\$ 24,137,873	\$ 29,536,632	\$ 27,056,939	\$ 18,335,479	\$ 21,305,550	\$ 22,144,233
SUMMARY BY INITIATIVE						
Bioresearch Program	\$ 5,878,772	\$ 9,000,889	\$ 7,610,195	\$ 5,727,855	\$ 6,916,238	\$ 7,257,898
Optical Sciences and Technology Program	3,187,607	3,340,957	3,642,702	2,264,489	2,451,532	2,444,377
Water and Environmental Sustainability Program	3,473,905	5,001,366	4,267,031	2,654,067	3,151,323	3,202,074
Education and Infrastructure Program	8,160,936	9,100,061	8,776,787	6,540,537	7,409,483	7,641,966
ASU-UA Joint Biomedical Research Fund	187,472	1,040,892	248,763	-	-	-
Expansion of Phoenix Biomedical Campus	2,009,192	920,628	596,831	47,317	815,299	964,921
Planning for Phoenix Biomedical Campus	211,146	447,332	91,522	-	-	-
ASU-UA Solar Energy Initiative	-	224,876	1,388,172	486,029	527,286	598,613
Higher Education in Rural Southern Arizona	-	-	315,800	588,540	34,388	34,383
Venture Fund	1,028,843	459,631	119,136	26,645	-	-
TOTAL	\$ 24,137,873	\$ 29,536,632	\$ 27,056,939	\$ 18,335,479	\$ 21,305,550	\$ 22,144,233

BIORESEARCH

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total	\$ 5,878,772	\$ 9,000,889	\$ 7,610,195	\$ 5,727,855	\$ 7,257,898	\$ 6,916,238
RETURN ON INVESTMENT (\$ million)						
Sponsored Awards	\$ 36.30	\$ 45.90	\$ 66.70	\$ 58.20	\$ 35.30	\$ 63.40
Gifts & Other Sources	\$ 1.40	\$ 1.30	\$ 1.60	\$ 1.90	\$ 1.50	\$ 2.10
TECHNOLOGY TRANSFER and COLLABORATIONS						
Invention Disclosures	30	23	26	28	28	31
Licenses and Options	4	4	11	8	8	23
New Startup Companies	1	0	3	0	2	1
WORKFORCE CONTRIBUTIONS						
Undergraduate Trainees	338	348	355	371	261	414
Graduate Trainees	300	380	347	335	318	404
Postdoctoral Trainees	148	161	156	135	158	137
New Faculty Hires	10	8	8	5	6	6
Clinical Scholars Circle Members ¹	44	52	90	90	150	0
Affiliate Clinical and Research Institution Partners in ACTREC ¹	3	32	25	30	47	0
OUTREACH and EDUCATION						
Teachers/Educators Trained	289	730	750	362	200	468
K-12 Students Benefitting & Participating	45,342	40,007	42,036	29,227	30,000	61,040
Workshops, Seminars, & Conferences Supported ²	12	47	46	167	19	156

¹ ACTREC shifted direction in FY11 to incorporate changes proposed in the FY12-16 business plan.

² In FY10 & FY11, BIO5 participated significantly in the Tucson Festival of Books Science Pavilion

OPTICAL SCIENCES and TECHNOLOGY

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total	\$ 3,187,607	\$ 3,340,957	\$ 3,642,702	\$ 2,264,489	\$ 2,444,377	\$ 2,451,532
RETURN ON INVESTMENT (\$ million)						
Sponsored Awards	\$ 21.75	\$ 31.04	\$ 36.50	\$ 54.47	\$ 25.50	\$ 57.43
Gifts & Other Sources	\$ 0.04	\$ 0.22	\$ 0.27	\$ 0.22	\$ 0.24	\$ 0.23
Patent Royalty Income						
TECHNOLOGY TRANSFER and COLLABORATIONS						
Invention Disclosures	27	30	34	39	33	33
Patent Applications	21	45	49	58	32	49
New Startup Companies	0	1	2	3	1	2
WORKFORCE CONTRIBUTIONS						
New Faculty Hires	3	1	4	1	2	4
Growth in Optics-Related Undergraduate Enrollment	(40)	(5)	(3)	20	4	(29)
Growth in Optics-Related Graduate Enrollment	15	(4)	22	23	4	47
Growth in Optics-Related Distance Learning Enrollment	(8)	(34)	(11)	(24)	2	2
OUTREACH and EDUCATION						
Workshops, Seminars, & Conferences Supported	17	8	6	7	6	5

WATER and ENVIRONMENTAL SUSTAINABILITY

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total	\$ 3,473,905	\$ 5,001,366	\$ 4,267,031	\$ 2,654,067	\$ 3,202,074	\$ 3,151,323
RETURN ON INVESTMENT (\$ million)						
Sponsored Awards	\$ 10.51	\$ 14.70	\$ 20.00	\$ 30.30	\$ 13.80	\$ 15.60
Gifts & Other Sources	\$ 0.09	\$ 4.65	\$ 3.84	\$ 0.21	\$ 0.10	\$ 0.10
TECHNOLOGY TRANSFER and COLLABORATIONS						
Licenses and Options	1	0	0	1	0	1
Patent Applications	3	1	1	1	1	2
WORKFORCE CONTRIBUTIONS						
Number of Graduate Students Enrolled	28	33	39	48	48	13
Undergraduate Trainees	52	64	74	16	56	21
Graduate Trainees	68	98	77	48	59	68
Postdoctoral Trainees	8	6	5	4	5	4
New Faculty Hires	9	3	3	1	2	1
CURRICULUM INNOVATIONS and STUDENTS SERVED						
Number of Newly Revised Courses Offered	1	1	2	1	1	1
OUTREACH and EDUCATION						
Teachers/Educators Trained	1,130	740	1,755	1,166	1,070	1,251
K-12 Students Benefitting & Participating	36,182	32,120	34,454	33,867	33,900	41,855
Communities Assisted	7	9	12	26	10	15
Workshops, Seminars, & Conferences Supported	5	13	15	43	11	19

EDUCATION and INFRASTRUCTURE

PERFORMANCE MEASURE	FY 07 Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total	\$ 8,160,936	\$ 9,100,061	\$ 8,776,787	\$ 6,540,537	\$ 7,641,966	\$ 7,409,483
RETURN ON INVESTMENT (\$ million)						
Sponsored Awards	\$ 4.03	\$ 2.52	\$ 4.13	\$ 14.17	\$ 2.66	\$ 6.04
Gifts & Other Sources	\$ 0.75	\$ 1.07	\$ 1.15	\$ 1.34	\$ 1.02	\$ 0.98
Patent Royalty Income	\$ 1.22	\$ 0.69	\$ 0.69	\$ 0.72	\$ 2.11	\$ 0.98
TECHNOLOGY TRANSFER and COLLABORATIONS						
Invention Disclosures	105	103	127	131	145	150
Licenses & Options	30	38	43	64	45	80
Patent Applications	133	122	125	136	125	148
New Start-up Companies	3	5	7	6	7	8
Economic Impact Studies	2	0	0	1	1	0
WORKFORCE CONTRIBUTIONS						
Number of Graduate Students Enrolled ¹	191	241	253	364	320	666
Number of Graduate Degrees Awarded	29	56	56	66	57	80
Teachers Certified in Undergraduate Level Math & Science	24	25	27	24	30	30
Teachers Certified in Master's Level Math & Science	24	14	14	15	25	15
Teachers Certified in Agriculture	11	13	17	17	20	10
Certificates granted for AAA	0	85	12	20	128	496
CURRICULUM INNOVATIONS and STUDENTS SERVED						
Number of Newly Revised Courses Offered ²	48	14	36	70	16	58
Number of Online Courses Offered	16	19	61	66	3	71
OUTREACH and EDUCATION						
K-12 Students Benefitting & Participating	2,950	2,600	2,600	2,600	22,000	3,040
Workshops, Seminars, & Conferences Supported	4	-	-	21	-	54
Users of Extension & Workplace Resources ³	31,415	225,503*	5,470,117	298,751	400,000	234,868
Enrollments in Web & Hybrid Courses	104,715	2,154	4,624	3,322	2,904	2,697
DATA AND RESEARCH ACCESS & NETWORK						
Building Networks Brought to Standards	1	1	1	1	0	1
Supercomputer Usage	90%	78%	94%	96%	85-90%	87%
Percentile-ranked access to advanced networks	75th	50th	50th	75th or better	75th or better	75th or better

¹Although not part of the original metrics, the business plan was amended last year to include funding of undergraduate program

²FY10 actuals include courses in development or scheduled for Fall 2010 or Spring and Summer 2011

³Due to data limitations, "hits" are being reflected in this number for some program categories

UA - ASU SOLAR ENERGY

PERFORMANCE MEASURE	FY 07¹ Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total		\$ 224,876	\$ 1,388,172	\$ 486,029	\$ 598,613	\$ 527,286
RETURN ON INVESTMENT (\$ million)						
Sponsored Awards		\$ 2.18	\$ 2.50	\$ 16.14	\$ 5.80	\$ 7.79
Gifts & Other Sources		\$ 0.05	\$ 0.64	\$ 0.25	\$ 1.00	-
TECHNOLOGY TRANSFER and COLLABORATIONS						
Invention Disclosures		0	6	1	12	4
Licenses & Options		2	1	2	2	1
Patent Applications		0	2	2	6	3
New Start-up Companies		0	2	0	3	1
WORKFORCE CONTRIBUTIONS						
Number of Graduate Students in Solar Energy		2	20	22	30	43
Number of Undergraduates in Solar Energy		20	27	31	26	24
Number of Post Doctoral Associates		0	2	2	6	4
CURRICULUM INNOVATIONS and STUDENTS SERVED						
Number of Newly Revised Courses Offered		0	2	2	300	6
Number of New Online Courses Offered		1	0	1	10	1
OUTREACH and EDUCATION						
Workshops, Seminars, & Conferences Supported		5	4	3	4	5

¹The UA-ASU Solar Energy Initiative was funded starting in FY08

HIGHER EDUCATION in RURAL SOUTHERN ARIZONA (HERSA)

PERFORMANCE MEASURE	FY 07¹ Actual	FY 08 Actual	FY 09 Actual	FY 10 Actual	FY 11 Proj	FY 11 Actual
Expenditures						
Total			\$ 315,800	\$ 588,540	\$ 34,383	\$ 34,388
RETURN ON INVESTMENT						
Sponsored Awards		0	\$ 124,925	\$ 722,063	\$ 150,000	\$ 440,389
Gifts & Other Sources		0	\$ 52,009	\$ 3,211	\$ 200,000	\$ 4,200
WORKFORCE CONTRIBUTIONS						
Number graduate students enrolled within initiatives		0	130	222	8	227 ¹
Number graduate degrees awarded		0	0	0	4	4
Number undergraduate degrees awarded		0	0	1	30	20
Number undergraduate enrolled		0	44	418	50	469 ³
Total student credit hours produced		0	107	2025	300	1541
Number certificates granted for Higher Ed		0	0	11	30	374
Number new certificates offered		0	1	2	2	0
CURRICULUM INNOVATIONS and STUDENTS SERVED						
Number of newly revised courses offered		0	2	24	6	26 ²
Number new online courses offered		0	18	33	15	11 ²
OUTREACH and EDUCATION						
Teachers/Educators Trained		0	14	207	24	66
Number enrollments in web & hybrid courses		0	169	659	120	427 ²

¹ The HERSA Initiative was funded starting in FY08

innovation

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discovery

ABOR System Office

CREATIVITY

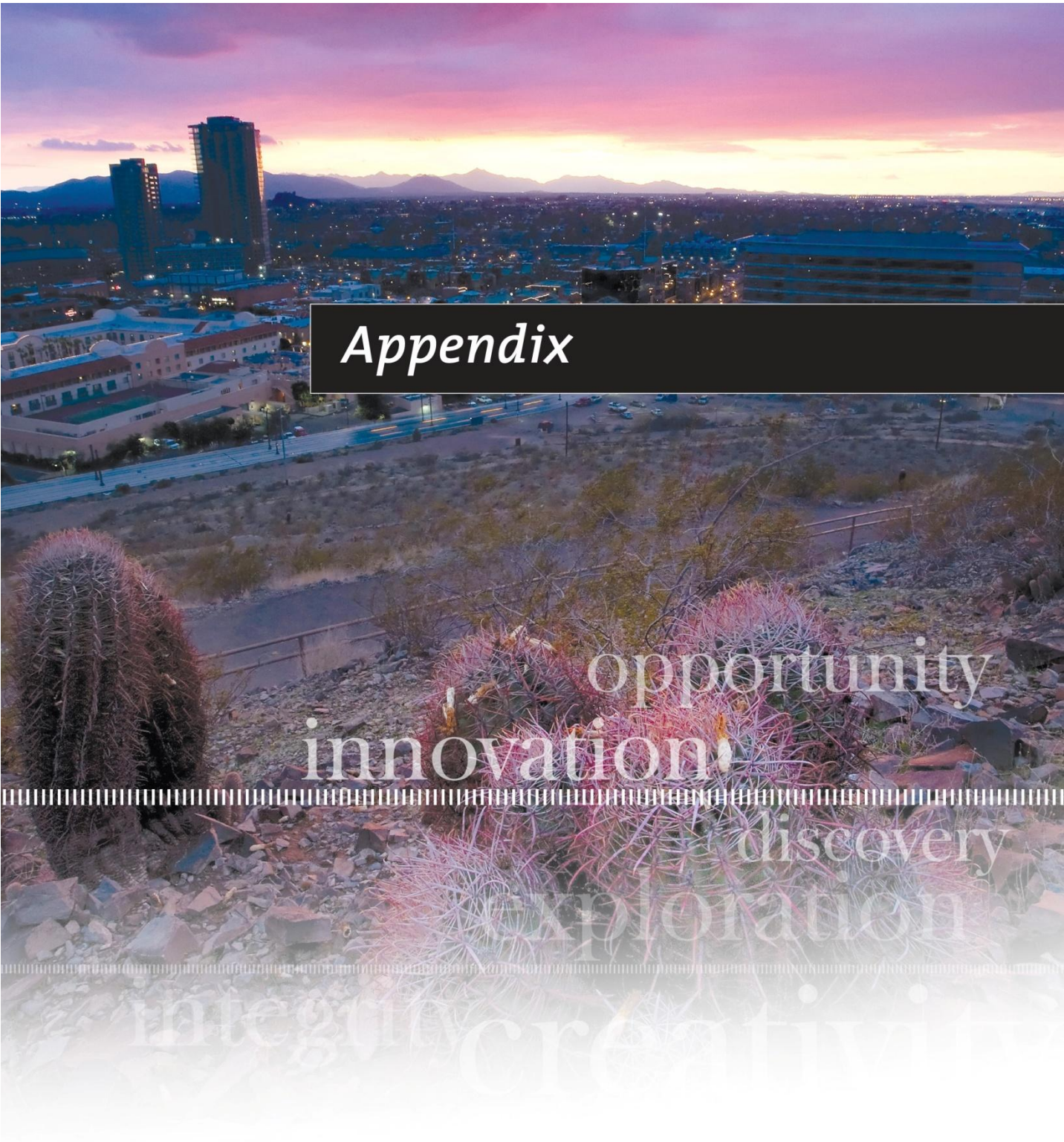
integrity

opportunity

ABOR SYSTEM OFFICE

TECHNOLOGY AND RESEARCH INITIATIVE FUND (TRIF)

FINANCIAL SUMMARY	FY 2007 ACTUAL	FY 2008 ACTUAL	FY 2009 ACTUAL	FY 2010 ACTUAL	FY 2011 ACTUAL	FY 2011 BUDGET
REVENUE						
Carryforward	\$ 1,277,429	\$ 1,280,867	\$ 1,001,977	\$ 744,042	\$ 415,291	\$ 415,291
TRIF Revenue	4,916,171	2,050,760	1,507,934	837,254	1,019,343	959,709
TOTAL	\$ 6,193,600	\$ 3,331,627	\$ 2,509,911	\$ 1,581,296	\$ 1,434,634	\$ 1,375,000
EXPENDITURES						
OPERATING BUDGET						
Personal services	\$ 154,893	\$ 131,974	\$ 150,596	\$ 155,114	\$ 66,118	\$ 104,500
Employee Related Expenses (ERE)	42,970	39,445	46,707	49,144	19,645	27,000
All Other Operating	63,849	162,185	161,579	96,927	8,674	21,247
OPERATING BUDGET	\$ 261,712	\$ 333,604	\$ 358,882	\$ 301,185	\$ 94,437	\$ 152,747
GRANTS/PROJECTS						
Regents Innovation Fund	\$ 1,119,236	\$ 1,207,048	\$ 1,046,879	\$ 522,453	\$ 370,459	\$ 1,035,000
ARRO Grantt	443,404	495,289	224,272	342,367	112,092	187,253
TRIF Strategic Investments (TSI)	250,000	-	-	-	-	-
GRANTS/PROJECTS	\$ 1,812,640	\$ 1,702,337	\$ 1,271,151	\$ 864,820	\$ 482,551	\$ 1,222,253
TOTAL	\$ 2,074,352	\$ 2,035,941	\$ 1,630,033	\$ 1,166,005	\$ 576,988	\$ 1,375,000
SUMMARY BY INITIATIVE						
Regents Innovation Fund ⁺	\$ 1,265,329	\$ 1,434,503	\$ 1,316,863	\$ 738,504	\$ 452,920	\$ 1,175,000
ARRO Grants	559,023	601,438	313,170	427,501	124,068	200,000
TRIF Strategic Investments	250,000	-	-	-	-	-
TOTAL	\$ 2,074,352	\$ 2,035,941	\$ 1,630,033	\$ 1,166,005	\$ 576,988	\$ 1,375,000



Appendix

opportunity
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APPENDIX

Arizona Board of Regents Policy 3-412

Policy Number: 3-412	Policy Name: Administration of Technology and Research Initiative Fund
Policy Revision Dates: 3/01	Page 1

3-412 Administration of Technology and Research Initiative Fund

A. Authority

As authorized by Proposition 301 approved by the voters in November 2000, the Board shall establish and administer a technology and research initiative fund (TRIF), beginning July 1, 2001. The TRIF will consist of sales tax revenues generated through Proposition 301 and other private or public sources of funding which are received by the Board for purposes which are consistent with the proposed uses described herein.

B. Funding Criteria

The TRIF will be used to support projects and initiatives that meet one or more of the following criteria:

1. Promote university research, development and technology transfer related to the knowledge based global economy;
2. Expand access to baccalaureate or post-baccalaureate education for time-bound and place-bound students;
3. Implement final recommendations from the Governor's Task Force on Higher Education and/or the Arizona Partnership for the New Economy.
4. Develop programs that will prepare students to contribute in high technology industries located in Arizona.

C. Calendar and Guidelines

The Board shall establish an annual calendar for the allocation of Proposition 301 funding, including guidelines for the submission and evaluation of proposals, and final decisions by the Board. The calendar will incorporate a process to receive and consider input from the Arizona Partnership for the New Economy (APNE) or a successor agency as may be designated by the Governor.

D. Formats for Submission of Proposals

1. Funding requests shall be submitted by the university Presidents, or prepared by the Central Office on behalf of the Board, in a format to be approved by the Executive Director, to include the following elements: A description of the proposed need, purpose and goals for each proposed project or activity, an explanation as to the ways in which the project promotes the purposes of the legislation, and/or an explanation of the relationship of the proposed project or activity

Policy Number: 3-412	Policy Name: Administration of Technology and Research Initiative Fund
Policy Revision Dates: 3/01	Page 2

to the foundation or clusters which are part of the state's overall economic development program;

2. The requested duration of the proposed project or activity;
3. Proposed detailed performance measures, desired outcomes, and proposed methodology for evaluating progress in attaining the desired outcomes; and
4. A detailed budget for each proposed project or activity, including the identification of funds which are intended to be either continuing, multi-year, or one time only.

E. Special Factors

The Board shall take into account several additional factors in determining its allocations from this fund:

1. Priority shall be given to proposals that involve collaboration between and among the universities and/or collaboration with private industry or public sector agencies.
2. The Board may authorize awards for an annual or multi-year basis, but in no event will the Board make an award on a multi-year basis without incorporating specific requirements regarding periodic review and assessment or progress in implementing the proposed project or activity and in attaining the desired outcomes.
3. Funding may be used to pay salaries only for persons directly involved in projects or activities funded under this program that would otherwise not be funded through general fund appropriations.
4. The Board may allocate up to 20% of annual funding for capital projects relating to new economy initiatives, including the payment of debt service; capital projects must be clearly identified with each university's submission of proposals.
5. The Board will honor the legislative intent as described in Proposition 301 that a portion of the revenues in the fund shall be allocated on an annual basis to pay Certificates of Participation costs for lease-purchase of buildings and associated infrastructure at ASU East and West campuses.

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