

# **The University of Arizona Information Technology Strategic Plan 2007 - 2011**

The University of Arizona, a public, land-grant, research institution, is dedicated to preparing students for an increasingly diverse and technological world, and to improving the quality of life for the people of Arizona and the nation. The University provides distinguished undergraduate, graduate and professional education; excels in basic and applied research and creative achievement; and integrates these activities and achievements of regional, national and international significance into everyday life.

Broad strategic directions for information technology at the University of Arizona (UA) have been incorporated directly into the University's Five Year Strategic Plan. Given today's diverse technology needs and initiatives, it has become necessary to re-establish a separate Information Technology Strategic Plan and declare clear, cohesive strategies for the future.

The University of Arizona institutional planning is currently governed by the Five Year Strategic Plan for FY 2008-2012, reviewed by the Arizona Board of Regents on December 1, 2006. The four major strategic issues from the current plan are listed below for reference:

1. Build a world-class and diverse academic community at the forefront of discovery.
2. Increase student engagement, achievement, retention, and graduation rate.
3. Extend the concept of a land-grant University to position the University of Arizona, across all colleges and campuses, as a model for linking scholarship and creativity to societal and community needs.
4. Achieve a strong financial foundation.

The University of Arizona is complex in both its organization and its technology, requiring that competing information technology needs be carefully evaluated to ensure the optimal use of limited resources. In January 2007, the UA adopted a process to develop a campus-wide information technology strategic plan. The UA Information Technology Strategic Plan must support the University's Five Year Strategic Plan, but also stands to represent a comprehensive and dynamic blueprint that will serve as a foundation for future plans.

The goals for the University of Arizona IT Strategic Planning Process are to:

- Define the guiding principles for developing and managing information technology at the University of Arizona.
- Define the most important IT Strategic Initiatives that UA must address in the next five years in order to survive and thrive.
- Define a prioritized list of initiatives and operational improvements to address the opportunities and challenges.
- Determine effective ways to provide faculty, staff, and students with the latest technology tools for leadership in teaching, research, and career development.
- Develop strategies to equal or surpass our peer institutions in the use of technology for teaching, learning, research and overall effectiveness.

The development process for the IT Strategic Plan involved a series of discussions and input gathering sessions with a variety of campus stakeholders, particularly the Dean's Information Technology Council (DITC). Over time, the planning process must be a highly collaborative effort involving students, faculty, staff, university leadership, academic units, administrative units, and university partners. The resulting information technology strategic plan is a living document to be revisited annually to identify new initiatives or refine existing ones that the university needs to achieve its goals and objectives.

## **An Overview of Information Technology at the UA**

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The current computing environment at the University of Arizona is very diverse and distributed across campus. Managing and supporting technology is a significant endeavor with a campus-wide effort of nearly 700 University employees whose primary occupation is providing technology services. For reasons that are partly historical, partly cultural, and partly reflective of the sheer complexity of a modern research university, the UA's structure of its information technology is distributed across a wide variety of advisory committees, academic departments, and administrative units. There has been no common approach to decision-making or any common forum for making final comprehensive assessments of the IT strategy for the UA campus.

The UA possesses a first-class IT network infrastructure and staff. There are many examples of excellent IT service delivery and expert project management approaches to IT throughout the campus. The challenge is to weave these best practices into a transparent and comprehensive process for reaching campus-level IT funding decisions while ensuring some common set of minimal service standards for all units and departments.

## **Information Technology Markers of Excellence**

The ability to provide advanced information technology will help the UA achieve its teaching, research, and public service mission - to discover, educate, serve, and inspire. Enhancing the current information technology environment with seamless simplicity, robust and secure technology, and greatly expanded capability will strengthen the University's academic excellence, intellectual creativity, and spirit of community. To that end, we will move forward, as a campus, with the following basic objectives which directly impact the mission of the University of Arizona.

- Eliminate as much redundancy as is possible and sensible
- Look for solutions, programs and partnerships that are cost effective
- Find ways of utilizing all campus IT resources more efficiently and collaboratively
- Recognize security as a common element within everything we do

With these objectives in mind, the University of Arizona has identified the following Information Technology Markers of Excellence:

### **Learning, Teaching, and Research**

Learning and teaching are at the heart of the University of Arizona mission. In order for our students to become the well-educated workforce our community deserves, we must ensure they are fluent users of the information technology resources available to them. UA faculty and staff have a great opportunity to explore new modes of learning and to contribute to the development of how IT technologies can augment the learning experiences of our students. Research faculty should have access to supporting technical staff with modern and diverse skills to provide comprehensive assistance.

### **Information Technology Infrastructure**

The UA is an engine of discovery and advancement for society. Our IT infrastructure must support this vital role in all ways possible. We need to enhance the university-wide information technology infrastructure and make it more accessible, dependable, secure, flexible and scalable to meet the teaching, learning, research, and organizational needs of the University of Arizona and the community.

### **Security and Access**

The open, unauthenticated, unconstrained environment present at the UA is no longer meeting the

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mission critical demands everyone is placing on it. We have much to do to make our environment more secure while maintaining the kind of access required of an open research-oriented university. Balancing security and access poses one of the greatest threats to our ability to achieve our IT strategic vision.

## **Collaborative Environment**

The lack of coordination between central and departmental IT areas, as well as, community and campus constituents must be overcome. The UA needs to be more user-centric and cooperative, featuring open and informative learning and working communities, shared knowledge and information, coordinated communication and decision-making channels, and interoperable and consultative processes.

## **Leadership, Funding and Governance**

The campus procedures for making IT-related decisions need to be reviewed and strengthened, and the allocation of technical responsibilities and budgets (between central and department, or college-related units) must be better coordinated. The UA will need to establish an information technology governance model to provide a clear framework for ongoing dialogue, collaboration and coordinated decision-making within the university.

In order for the UA to achieve its teaching, research, and public service missions, the UA plans to address our Information Technology Markers of Excellence with the goals outlined in the following sections.

## **Learning, Teaching, and Research**

Today's students have grown up with technology and bring very different expectations to the classroom. Teaching emphasis has moved away from memorizing facts towards finding, evaluating, and using information. Research and teaching are perceived as mutually enhancing one another, and teaching and learning extend beyond the classroom and into the campus and community. UA faculty and staff have a great opportunity to explore new modes of learning and to contribute to the development of how IT technologies can augment the learning experiences of our students.

Many faculty would use technology more often in the classroom and in research if there was better support and the equipment was available and reliable. To enhance the classroom experience, the university needs more staff to assist faculty in using technology and solve technical problems arising during class. The university must also have technical staff with diverse skills to provide more help to faculty in research labs.

The university needs to develop an information technology education, training and computer literacy program to improve the skills of students, faculty and staff in the use of computers, software, databases, and other technologies. This will enable students, faculty and staff to meet a wide variety of academic, work-related, and personal goals and create a basis for lifetime learning. As the reliance on student fees and alumni gifts increase, we need to keep our campus community satisfied with respect to information technology. Students are willing to support fee referenda for campus-based fees when the fees pay for benefits that they directly receive. The UA must better understand the needs of students who are considering a UA education, as well as engage current students in various stages of their educational career. Both students and faculty need incentives to incorporate technology into their teaching and learning and to participate in a distributed education environment.

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An important component of discovery and advancement of society is organized research, whether group or individual. Funding agencies, foundations, and corporate sponsors provide a major fraction of the support of the University. These entities, through reporting and auditing requirements, oversee some parts of information technology use at the UA. We need to streamline financial reporting systems to allow principal investigators to track expenditures and facilitate and enhance use of those systems in an efficient a way as possible.

## Goals

- Create an enterprise-level collaborative learning environment with new learning tools and learning spaces that supports multilevel collaborations among students, instructors, and other academic partners.
- As mobile computing becomes more viable, especially with students, explore how to best support an environment that moves closer to a one-computer-per-student model.
- Develop a comprehensive and clearly linked planning and budget process for the review, prioritization and funding of the projects focused on addressing teaching and learning needs. This should include identifying sufficient ongoing and diverse funding sources as well.
- Research and design new-style learning environments to accommodate active learning techniques for a diverse range of teaching strategies, pedagogical styles and class sizes. Provide as many of these new environments as is feasibly possible.
- Promote pedagogical methods that support and assess the effectiveness of active/interactive learning.
- Raise awareness of legal and ethical issues concerning sharing of intellectual property and other digital content among students, faculty, and staff.
- Meet the Distance Learning needs of students, Arizona residents, and others with expanded instructional support resources.
- Provide more effective training and support for faculty, and those supporting faculty, to leverage existing research- and inquiry-based learning tools and extend their use into learning spaces.
- Ensure opportunities and resources are available for the academic community to explore new and emerging technologies
- Publish an inventory of available campus and system-wide research environments, computing infrastructure, research tools, and applications.
- Provide better business tools for principal investigators.

## Actions Taking Place

- Participation in the national Campus Cyberinfrastructure Initiative
- Identification of innovative approaches and tools for educational delivery
- Arizona Universities Library Consortium
- Active development partner in the Arizona Universities Network (AZUN) project
- Educational campaign about entertainment infringement targeted to students in residential housing
- Installation of recently acquired SGI High Performance system

## Supportive Information Technology Infrastructure

The UA network must minimally keep up with and preferably exceed the speed demands of the university and community. In 2003, the UA set in place a 10-year Network Master Plan which serves as a strategic direction for infrastructure improvements for the University. Additional funding for the Network Master Plan though remains our next biggest challenge. The core of this funding must be focused on upgrading the campus network, the internal building networks and the quality of service components, which includes redundancy and stability.

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There is an ever-increasing need for accurate, integrated information not limited by existing functional boundaries. Our ability to address this need is restricted by systems that are aged and technologically out of date. Our administrative systems are surrounded by extensions, augmentations, and supplemental distributed systems maintained by individual departments and other operating units. There is no controversy at all over the need to replace our entire suite of administrative systems. With 5 major systems in urgent need of attention and uncontrollable dependencies being continuously added by departments, it is imperative that we identify a comprehensive roadmap for the improvement of the UA's administrative systems. The university should actively pursue cost-effective measures that minimize this burden.

As a Research I Institution, it is critical to the mission of the UA that we maintain a very high stature with regard to our peers. Research serves to interconnect the UA campus with our community and university partners. Research today has an increased emphasis on interdisciplinary research or on research collaborations with industry. Our reliance on high-throughput computing and the need for sophisticated visualization and simulation and modeling software has far surpassed our expectations. Additionally, grant funding agencies are scrutinizing the availability of a robust networking and computing infrastructure as a criterion in funding decisions. At the UA, there are several high performance computing resources, such as the High Performance Computing System, the state-of-the-art Scientific Visualization Lab and the Research Support Group. Our challenge remains to define where to make the investment of additional resources to support our researchers' demands.

## Goals

- Continue to fund and implement the Network Master Plan.
- Identify the most cost effective solutions for preparing our business operations and systems for the future. This could involve making foundational improvements to the applications in use today and/or pursuing open source initiatives like Kuali. Represent these solutions within the context of a defined roadmap for the integration and interoperability of the UA's business computing environment.
- Explore and pursue open source partnership opportunities where the University can gain a return over required investment, such as the Kuali and Sakai initiatives.
- Publish minimum standards for common computing environments, such as metadata standards for core research areas. This may involve participation in similar national efforts.
- Develop and publish a service catalog and inventory of available computing environments and standards.
- Develop a shared pool of resources with complementary skills that are dedicated to supporting a variety of constituents such as researchers.
- Provide standard online, real-time collaboration environments accessible from multiple departments, campuses, and private enterprise.
- Provide options for storing very large data sets that can be actively accessed by multiple groups.
- Provide backup and archive solutions.
- Consider the formalization of a recognized University data warehouse.
- Provide sufficient networking and computing resources to enable access to remote high-performance computing environments.
- Define minimum levels of service and connectivity for faculty and students across all fields of study.
- Develop a single campus logon for desktop computers for all students, faculty and staff.

## Actions Taking Place

- Network Master Plan Implementation
- UA Wireless Design and Implementation (UA WiFi)

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- Arizona Tri-U Identity Federation Effort (ATIF)
- Membership in CENIC (Corporation for Education Network Initiative in California) and hence National Lambda Rail
- Member of Internet 2
- Shared physical infrastructure and decision-making at the Phoenix Biomedical campus
- Tri-U shared business continuity/disaster recovery system, LDRPS
- High Performance Computing Advisory Board and Taskforce
- Upgrade of the PSOS data storage structure and self-service delivery capability
- SIS Legacy Extension project
- Continue development participation in the Quali open source initiative for workflow and the Quali Research Administration (KRA) module

## Security and Access

Securing the University network, computer systems and data is a challenge given the uniqueness of our size and environment. Add to that the amount of valuable information available - personal, medical, and financial - and the University becomes a huge target. There is a dramatic increase in the level of activity focused on the end user to steal identity, compromise machines and propagate viruses. The complexity of these threats coupled with current and upcoming federal and state legislation require that we strengthen our security posture specifically with respect to the interface between campus and the external world. The recent security incident at the UA has driven security to the very top of our priority list. Protecting the campus network and information assets continues to be a challenge and we strive for more proactive approaches.

The university must improve security on our campus by increasing awareness within the community, developing and implementing security guidelines, and taking physical actions to secure the data network against external and internal threats. We will heighten awareness in the campus community by assigning an Information Technology Security Officer (ITSO), who reports directly to the CIO and also serves as a liaison between our non-technical users and our technology experts. The ITSO will be charged with raising the visibility and importance of network protection, and improving education on issues of computer security, privacy, professional ethics and information technology responsibility.

We have come to a point at the UA where we must move from the open environment our community has come to expect to a more secure and monitored environment that more effectively secures our campus in a consistent standardized manner without limiting our academic and research freedoms. Given the limited centralized network and systems staff dedicated to security, our future direction must include implementing security related processes and procedures throughout campus. These processes and procedures need to promote and enforce responsible computer and data use amongst all campus affiliates. This will require setting University policy, standards, guidelines and best practices that must be enforced and everyone must follow. We must continually educate ourselves of our responsibility and hold all members of our campus community accountable to help minimize the University's exposure to the ever growing number of threats.

### Goals

- Formally institute the Information Security Policy.
- Define and implement an overall plan focused very specifically on security vulnerabilities.
- Establish inventory (database) of all campus networked devices, applications and data.
- Provide adequate authority to enforce IT policies and standards.
- Create an IT audit/consulting organization that is responsible for the auditing policies, reviewing security plans, and providing advice and assistance to individual groups.
- Offer periodic campus-wide training sessions and workshops for different focus groups, including faculty, staff, and students.

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- Explore solutions for fast, secure storage (that includes professionally managed backups) to all interested students.
- Insure that 80% of faculty and staff have affordable, professionally managed and regularly scheduled backup solutions.
- Publish minimum infrastructure standards for all wired and wireless networks and environmental standards for housing servers and data.
- Develop training and certification programs with relevant security requirements and guidelines.
- Raise awareness of legal and ethical issues concerning sharing of intellectual property and other digital content among students, faculty, and staff.

## Actions Taking Place

- Formally instituting the Information Security Policy
- Preparing to conduct a university-wide inventory of technology and information assets
- Hiring an Information Security Officer
- Developing a comprehensive Security Plan to address
- Arizona Tri-U Identity Federation Effort (ATIF)
- Tri-U shared business continuity/disaster recovery system, LDRPS
- Educational campaign about entertainment infringement targeted to students in residential housing

## Collaborative Environment

The university can nurture a collaborative environment by improving and formalizing communications between all information technology areas. Consistent and continual communication is key to a healthy, productive environment and will foster a spirit of trust and cooperation across campus. The University must seek input from all areas of the institution to ensure buy-in and support of strategic technology decisions and initiatives. Exploring solutions for better cost efficiencies and defining better ways to utilize our resources will require a great deal of cooperation among many units. The same is true for our relationships and partnerships with local and national organizations.

On the Tri-University front, UA and ASU share expertise in supercomputing and are exploring the possibility of sharing the physical resources to provide better match of system characteristics with researcher needs. Recently, a tri-university initiative was launched to develop an Arizona Tri-University Identity Management Federation (ATIF). The goal is to establish a plan for forming the federation and produce a roadmap for each university to meet the goals of ATIF. Such a federation will make research and academic collaboration easier among the universities and will give them the ability to enter into other university and governmental identity management federations, nationally and internationally. Our ongoing commitment to the joint establishment, design and maintenance of the Phoenix Biomedical campus between the UA and ASU, and now NAU has reinforced the need for partnering with our peer institutions to provide information technology services to our community and the state.

Another intriguing collaborative effort ongoing nationally among universities is the Open Source movement to write administrative software specifically for higher education. UA has established itself as a partner in the Kuali project, which is developing an open source university financial system and a related open source research administration system. Both ASU and UA have joined the Sakai open source initiative to write a course management system. Other universities have been exploring the possibility of collaborating to create open source student systems (for admissions, financial aid, registration, and other business processes).

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## Goals

- Develop a trusting and sharing university environment that fosters mutual respect and understanding.
- Continue data networking collaborations between the UA and ASU.
- Continue the development of a federated identity management project (ATIF) between the 3 state universities.
- Develop and implement a model for shared research computing resources at UA and explore partnership opportunities with ASU and NAU.
- Continue the joint design and management of the Phoenix Biomedical Campus.
- Explore other tri-University collaboration opportunities.
- Expand partnerships and programs throughout the state such as telemedicine and statewide networking.
- Increase and leverage funding in the Technology Refresh Bank to increase collaboration and reduce duplication among support providers.

## Actions Taking Place

- Current discussions taking place about departmental working relationships and collaboration
- Arizona Tri-U Identity Federation Effort (ATIF)
- Aggregation of Internet traffic through Sterling Network Services in Phoenix
- ASU/UA joint membership in CENIC (Corporation for Education Network Initiative in California), and hence National Lambda Rail
- Shared physical infrastructure and decision-making at the Phoenix Biomedical campus
- Kuali Project - university financial system and research administration system - with Indiana University, Cornell University, Michigan State University, San Joaquin Delta Community College, University of California - Davis, University of California - Irvine, University of California - Santa Barbara and the University of Hawaii
- Sakai open source initiative to write a course management system with ASU and UA
- Tri-U shared business continuity/disaster recovery system, LDRPS
- Arizona Universities Library Consortium
- Arizona Universities Network (AZUN)

## Leadership, Funding and Governance

Information technology affects all individuals and units on campus. The Chief Information Officer is responsible for high-level strategic goals with other University leadership and strives to align IT decisions with institutional objectives. Tactical decisions about information technology should be made in the total context of the university's strategic business needs. The UA needs an IT governance structure that is collaborative, advisory, consultative, comprised of both central and distributed representation and one that includes all areas of the university community. There needs to be better coordination of and more clearly defined roles and responsibilities for IT resources at the UA. This involves establishing an appropriate balance between central units and distributed units and the equitable distribution of IT resources.

There are often competing needs of the central organization to maintain standards, foster interoperability, and promote overall system stability. The need for financial prudence heightens our need to identify new support models for better cost efficiencies and resource utilization not only within the central support units but across the University. The UA needs a sustainable, dedicated funding model for IT on campus and expects that funding decisions and costs be based on working operational models. An appropriate information technology funding model establishes regular and sustainable funding for mission-critical systems and services and for continuous maintenance and periodic upgrades of technology. An essential

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step in developing a funding model is to identify a sustainable funding stream to maintain and continuously improve the university's technology so we are able to benefit from modern technology.

**Goals**

- Define and publish a model identifying the minimum levels of annual permanent funding required to support core services including remediation, daily operational and lifecycle costs.
- Develop an incremental budgeting approach to central administrative systems.
- Develop an understanding of the costs per FTE for information technology.
- Develop a better understanding of IT funding models and outline the process for budgeting, funding IT investments and IT spending.
- Create a clearly delineated IT governance structure for direction setting, advisement, feedback, and decision making.
- Provide a consistent foundation for maximizing the university's IT resources.
- Define clear roles and responsibilities with respect to instructional computing, research computing, and campus IT services.
- Establish consistent guidelines and best practices for all IT activities on campus.
- Articulate the principles that should guide our actions and decisions related to governance, funding and structure.
- Define a methodology for calculating the Value-on-Investment (VOI) and/or Return-on-Investment (ROI) of strategic IT initiatives.

**Actions Taking Place**

- Information Technology Security Officer (ITSO) Job Search
- Working to establish Interim Chief Information Officer (CIO)
- Dean's Information Technology Council (DITC) is increasingly participating in global IT considerations
- Student Technology Fee for wireless network implementation
- Cross-Departmental Human Resources Application Architecture (HRAA) team has developed a future vision of the UA Employee Information System

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