Academic Plan for IUPUI
Report of the Committee on Information Technology and Telephone Systems
Executive Summary
June 8, 2007

Current Status

The committee reviewed centralized (university) and a sample of decentralized (school) information technology initiatives and services. University information technology strategies were initially established in *Architecture for the 21st Century: An Information Technology Strategic Plan (ITSP) for Indiana University*. Implementing the 10 broad recommendations and 68 specific actions of the ITSP began in 1998 with accomplishments reported annually.

To help gauge the status of decentralized technology, especially related to laboratories and research facilities, the committee considered the School of Science and School of Medicine experiences in the use of technology by faculty and students. The focus of this part of the review was on general applications of technology, including a wide range of non-computer laboratory needs, especially in Chemistry, Biology, Geology, Physics and Forensic Sciences.

The committee completed its work on May 31, 2007 and filed the appended report of its discussions, conclusions and recommendations.

Conclusions and Recommendations

1. Indiana University is a leader in designing, engineering, developing and operating networks. University Information Technology Services (UITS) network and infrastructure staff are aware of the promise and difficulties in transitions to a converged voice, data, and video network and have developed a strategy to advance IUPUI's capabilities substantially as technology evolves.

2. General purpose classrooms have been equipped with modern technology which is lifecycle funded, and the traditional mobile inventory have been largely phased out or decentralized. Schools fund their own program specific technology.

3. Student technology centers at IUPUI are supported through partnerships between schools and UITS. The University Library provides its own technology services to students and faculty. Several schools operate independent student technology centers or facilities for their students. These are funded by the decentralized student technology fee and therefore not supported by UITS. A mechanism should be developed for UITS to support these school-based centers directly while not decreasing program flexibility.

4. IUPUI has recently initiated a print charge policy that is working reasonably well in throttling the escalating cost of consumables.

5. The campus should review the RCM model and student fees to determine if schools that are dependent on non-computing instructional equipment and instrumentation can be adequately funded separately from the student technology fee. The uses of the student technology fee should be reviewed as they are insufficient to cover non-computer technology programmatic needs in addition to the standard information technology.

Implementation

University Information Technology Services accomplishments in the areas reviewed by the committee are reported annually. The most recent report is attached. The third and fifth recommendations (student technology center support and scientific equipment funding) are related to funding strategies. The first step in a successful implementation will be a thorough financial review, which is recommended by the committee.

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Submitted by Paul Carlin, Garland Elmore (Chair), David Ford,
Stephen Randall and Vince Sheehan
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Charge to the Committee

The following charge was given by Uday Sukhatme, Executive Vice Chancellor and Dean of the Faculties.

Review the assigned initiative in the action plan and to write a short report giving specific targeted recommendations for implementation. Information technology and telephone systems: These two areas can often provide savings. Explore the Voice over Internet Protocol possibility – used in many companies. Are faculty/staff getting adequate service for computer needs? Wireless stations should be in all main buildings and departments. Attention should be paid to ideas like: promoting a wireless campus, increasing the number of technology equipped classrooms, upgrading science laboratory equipment periodically, providing faculty with up-to-date computer facilities (periodic computer refreshment) and upgrading expensive equipment centrally shared by many faculty for research purposes.

Introduction

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To help gauge the status of decentralized technology, especially related to laboratories and research facilities, the committee considered the School of Science and School of Medicine experiences in the use of technology by faculty and students. Stephen Randall (Science) and Vince Sheehan (Medicine) were added as members of the committee. The focus of this part of the review was on general applications of technology, including a wide range of non-computer laboratory needs, especially in Chemistry, Biology, Geology, Physics and Forensic Sciences.

The following is a brief summary of selected services reviewed by the committee as well as its conclusions and recommendations.

Telecommunications Convergence

The review of telecommunication services and strategies was informed through interviews with Michael Lucas, the University Information Technology Services (UITS) director responsible for planning and developing strategies, infrastructure and operations in this area.

Background

UITS has for the past several years been analyzing advances in network infrastructure and opportunities that emerging technology might offer to Indiana University. As a part of that effort a team of engineers including voice, data, video and messaging specialists has assembled monthly for the last two years to discuss needs, to review new vendor offerings, to collaborate in the testing of these new vendor offerings and to share findings with and receive input from similar working units from other higher education institutions around the country.

The results of these efforts include these conclusions:

- The key to successfully converging network architectures is to first merge the operating units responsible for designing, developing and managing voice, data and video networks. This was done within UITS in late 2002 when IU networks were merged. Further organizational refinement under one associate vice president of the voice, data and video infrastructure was completed in 2007.

- The direction that an organization takes with regard to convergence depends on its starting point, including the status of existing legacy equipment and the ability of new technologies to integrate with that legacy equipment. Indiana University has invested in telephone switches designed for compatibility with data and is well prepared for convergence.

- A recent review by experts indicated that a solid business case could not yet be made to simply replace existing telephones at Indiana University with Internet Protocol (IP) telephones. To offer more advanced features than existing phone services, the move to a Voice over IP (VoIP) network should be driven by enhanced applications at the desktop.

- Mobility is an important consideration in planning converged networks with user populations moving from one area of the campus to another. A converged mobile solution is an essential part of the convergence strategy.

As voice services transition from operating on the traditional telephone infrastructure to becoming an application running on the IP data networks, the costs also transition. Voice services have traditionally been fully funded by cost recovery methods, with UITS billing each department for the services provided. Data services were previously centrally funded, but over the past few years part of data network funding has been shifted to cost recovery by attaching a cost neutral data network charge to the ownership of a telephone.

As voice transitions to the data network, additional functionality must be incorporated into the data network equipment, which increases the costs of equipment. At the same time, the functionality of voice equipment is decreasing while costs are also decreasing. UITS has been reviewing the total costs for each of the voice and data networks yearly, and for the past two years the voice charge to the departments has been lowered and the data costs have been increased accordingly by the same amount. The goal of this funding strategy is to keep the overall costs to the end user stable and to not increase the overall voice and data rates, even as overall functionality to the desktop and to the mobile devices is enhanced.

Direction

The traditional “fixed edge” or physical infrastructure limit of the enterprise network is giving way to the new “mobile edge.” This mobile edge extends beyond the enterprise network perimeter, wherever the user needs access, by relying on a combination of wire and wireless services. An example is the mobile laptop and PDA, with students, faculty and staff using these devices on campus, at home and while traveling. The Internet Protocol (IP) network extends the ability to communicate with others using voice, to and from mobile devices. Over the next few years much of the functionality in the laptop will migrate to the hand held communication device that faculty, students and staff carry with them.

Guided by the evolution of technology, UITS has focused on the goal of integrating the desktop with the existing telephone system in ways that will allow that integration to be migrated to mobile devices, as technology evolves. The following steps are being aggressively pursued to meet this goal.

- Indiana University has entered into a process with Nortel and Microsoft to integrate the IU Nortel telephone switches with the Microsoft Office Communication Server (OCS). This requires an upgrade of the existing Nortel switches in Bloomington and Indianapolis from the current SL100 version to a new CS2100 version. This CS2100 will be fully Voice over IP (VoIP) enabled. In addition, this process requires establishing the Microsoft OCS environment. Both of these efforts are underway and are projected to be completed in summer 2007. See the May 22, 2007 news release attached.

- Nortel is developing software that will integrate telephony functions into the Microsoft Desktop, via OCS. Indiana University will be the alpha site for testing the functionality of this integration and providing input to the final product. For example, from the Microsoft tools, such as Word and Excel, the user will have access to the telephony functions. The user will be able to initiate telephone calls, receive telephone calls and access logs of previous calls. UITS is working with vendors to ensure that solutions are provided across Windows and Macintosh platforms.

- The testing of new functionality is scheduled to begin in summer 2007, with continued testing into fall. A pilot group will be established to begin end user testing.

- Over the next six months to several years, UITS will be developing and testing the next generation of campus Wi-Fi (Wireless Fidelity, or standard 802.11 wireless) networking, which will be able to support the mobility requirements of devices using Voice over the Wi-Fi network. Cellular/Wi-Fi, or dual mode mobile devices, already exist and are expected to become ubiquitous by 2010. The ability to accommodate these devices in the campus network will depend on the ability to do the following:

    - The campus Wi-Fi network will need to be made "voice aware" so that telephone calls can be placed through it. The upgrade is expected to occur in late 2007 to early 2008.

    - The campus Wi-Fi network will need to be scaled up to meet the demands of mobile voice users. This should occur during 2008 and into 2009.

    - Integration of the mobile device with the existing telephony switches, the Microsoft environment, and the existing carrier networks will begin in 2008 and continue for several years.

    - Seamless handoff between existing cellular and the campus Wi-Fi networks should begin in late 2008 and continue into 2010.

These tentative dates have been established based on current projections of technology developments. The progress of these technology deployments depend on the development of standards. These standards are developed by national and international committees, with participation from many of the major telecommunications vendors. Different approaches to the development of standards can delay the final release. This, in turn, delays the development of products and the delivery of functionality. With that in mind, the projected dates may be optimistic, but the UITS staff will continue to work with vendors to develop products that will increase the ability for IU faculty, staff and students to communicate as seamlessly as evolving technology will allow.

Instructional Technology

The committee reviewed recent trends and the status of classroom technology, student technology centers and non-computer technology needs such as laboratory equipment and instruments.

Classroom Technology

The IU Information Technology Strategic Plan included two actions which specifically addressed classroom technology:

> ***ACTION 21****: Beginning immediately, all planning and renovation of classrooms and other teaching spaces should evaluate and incorporate information technology needs. The costs of information technology identified in prior planning efforts as well as future efforts should be fully base funded to provide for acquiring and installing equipment, as well as for maintenance, repair, lifecycle replacement, and support.*

***ACTION 22**: UITS, in partnership with the appropriate campus offices and committees, should continue to provide leadership in campus planning for classroom technology, leadership in classroom technology design, and coordination of classroom technology use.*

In 1998 UITS began working with campus registrars, learning environment committees, physical plant, Campus Facilities Services, and the regional campuses to evaluate the technology in general purpose classrooms. The assessment revealed that only 12% of the 617 general purpose classrooms at Indiana University were equipped with any permanently installed technology. At IUPUI, 7 of 149 general purpose classrooms were equipped with fixed technology; none were supported by lifecycle replacement funding. Substantial progress has been made in the last eight years. Effective August 2007, 147 general purpose classrooms will have installed, lifecycle-funded presentation technology at IUPUI. University-wide, 693 classrooms will have fixed, lifecycle-funded technology. See the attached "Indiana University Classrooms before Action 21 to August 2007" which summarizes progress made.

Two years into the implementation of Actions 21 and 22 state technology funding was cut. Subsequently, an evaluation of classroom technology was conducted along with a review of statistics which identified technology components used most often by faculty. This process resulted in streamlined, redefined technology designs for classrooms. Three classroom types were defined: Basic, Enhanced and Advanced. The technology included in each type is shown in the attached summary, "Classroom Technology Room Types."

Inherent to equipping IUPUI's general-purpose classrooms with technology was the objective to move away from expensive, inefficient reliance on hourly staff who were moving mobile equipment from room to room. With the completion of ITSP Action 21 at IUPUI, UITS mobile classroom technology inventory was reassigned to the schools to support specific programmatic needs.

Student Technology Centers

UITS receives a portion of the IUPUI student technology fee (STF) to maintain and support some of the campus's student computer labs known as student technology centers (STCs). As a result of decentralization at IUPUI, the scale and scope of UITS services provided are different from those at IUB, where UITS supports 68 STCs. At IUPUI, 7 STCs are open to the general student population, 2 of which are completely supported and maintained by UITS with IT 131 open 24/7. The other 5 STCs are owned and managed by schools and supported by UITS which provides student consulting for a minimum of 22 hours per week. See "STF Allocated to IU Campuses and the IUPUI's Deans' Responses to Technology Question" in 2005-2006 Annual Report.

Print management is deployed at both IUB and IUPUI. At IUPUI a per page print fee was implemented at the start of the fall 2006 semester. The charge for each black and white printed page (one side) is $.04. The School of Medicine also charges $.04 to print and $.07 per page for photocopies. The School of Liberal Arts does not charge for printing. IUPUI Campus Card Services administers the printing service. See http://stc.iupui.edu/print_services.php .

Non-computer Technology Needs—One School's Experience (Science)

The following discussion is meant to present general applicable principles, while admittedly has relied heavily on the experiences of one school.

The definition of "technology" in the various schools, but particularly the science-based schools (e.g. Science, Engineering, Nursing etc.), is not limited to computers and software. There is a wide range of instrumental technology needs. A 10 to 15 year lifespan for many "durable goods" must be maintained in the teaching facilities. For instance; in the School of Science, equipment such as a dedicated teaching NMR, digital balances, microscopes, ultracentrifuges, digital oscilloscopes, cleaning and safety equipment, the maintenance of BioTechnology teaching facilities, as well as the high cost of "high tech" consumables are essential for pedagogical purposes.

Various types of technologies are used to advance undergraduate education in qualitative ways. For instance, using peripheral devices; computers in many departments are used to support automated data collection, and for advanced

analysis. Students will encounter these methods and equipment in the workplace and so must acquire classroom experience in their application.

Technology is integral to curriculum in the sciences and being on the leading edge of technology is always going to be expensive. The current RCM funding model (based on credit hours) does not discriminate among differential costs of education delivery particularly in laboratory-based courses.

The School of Science example:

- *Maintenance of 9 computer labs/clusters* (approx 100+ computers, 3-5 year lifecycle), contributions to the set up of the Math Assistance Center (University College), staffing of clusters and Biology (e.g. BioPac) and Physics computer supported teaching labs. Support staff (equivalent of 1 full time person supported, other 5 full and three part timers supported by school budget). STF-Supported.

- *Competitive items:* Technology Fee income has been used to support the following competitive proposals. Examples: OpScan grade scanner, 45 mobile cluster computers (PC's, Mac laptops), digital microscopes (Biology), network/security in teaching labs, servers, Internet-based courses, software development, Chemistry lab equipment to interface with computers, FTIR, IR spectrometer, liquid chromatography, digital melting point apparatus, thermometers, environment monitoring network (Geology), microplate reader (Biology), testing tools (Psychology), portable XRF scanner (Geology). Portable streaming media (CSCI), math cluster development, CD duplication system, access grid nodes, backup system (CSCI) Forensic Sciences. STF- Supported.

- *Long term projects supported:* Biology Biotechnology Teaching Laboratory, Anatomy and Physiology Lab BioPac System, Chemistry Digital Technologies projects (conversion to digital lab equipment; e.g. hardware, software, liquid chromatography etc.), Geology outdoor teaching lab and environmental monitoring network (e.g. Arbor project by White River), Physics Junior/Senior and Introductory lab upgrade (digital), Psychology undergraduate test laboratory, projector installations in teaching labs (not general classrooms.) STF-Supported.

- *Other:* Includes consumables, lifecycle replacement (221 computers), general lab equipment (pipetors, pH meters, spectrophotometers, etc.), microscopes (Biology) over 200, lifecycle approximately 15 years, 13 replaced per year = $20,000/year. *(not STF, not UIT),* Supported by Department and School Funds.

Other Sources of Support in the School of Science:

Student Lab Fees: Does not support most equipment or teaching personnel, and only currently pays for approximately 50% of consumables. The school's petition to increase lab fees to support 100% of consumables will be enabled over the next two years. Specific equipment costs have been borne by the school or individual departments. Often research equipment has been used for teaching purposes.

State allocation minus assessment continues its negative slide as it has in a number of schools (however, the schools with laboratory facilities have been increasing negatively impacted in techno-educational quality delivery).

Inherent Constraints in current funding mode (specific to Science):

Decrease of Technology Funds available for equipment (as the school is forced to use to support staff for computer lab support)
Large technology needs by Science (in addition to computer clusters)
Large number of lab courses requiring advanced state-of-the art technology
Large number of school dedicated classrooms (labs) and clusters not supported by UITS

Conclusions and Recommendations

1. Indiana University is a leader in designing, engineering, developing and operating networks. UITS operates Abilene, the most advanced research and education network in the United States, as well as several other national and international networks. UITS network and infrastructure staff are aware of the promise and difficulties in transitions to a converged voice, data and video network and have developed a strategy to advance IUPUI's capabilities substantially over the next several years as technology evolves.

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Appendices

- Classroom Types (Chart)
- IU Classrooms – before Action 21 and as of August 2006 (Chart)
- A news release dated May 22, 2007 entitled "IU and Microsoft to bridge communications systems" http://newsinfo.iu.edu/news/pCage/normal/5719.html
- Indiana University Information Technology Strategic Plan (ITSP) http://www.indiana.edu/~ovpit/strategic/
- The 2006 – 2007 ITSP Accomplishments Report http://www.indiana.edu/~uits/cpo/accomp/AR07.pdf