

Administrative Review & Restructuring Information Technology Subcommittee Report

April 28, 2010

Subcommittee Members:

Roy Campbell, Sohaib and Sara Abbasi Professor of Computer Science, UIUC

Farokh Eslahi, Associate Provost & Chief Information Officer, UIS

Michael Hites, Associate Vice President of AITS, UA

Sally Jackson, Chief Information Officer and Associate Provost, UIUC

Ahmed Kassem, Vice Provost for Information Technology & Chief Information Officer, UIC

Rose Ann Laureto, Chief Information Officer, UICMC

Carol Livingstone, Associate Provost and Director of the Division of Management Information,
UIUC (Staff)

Dwight A. McBride, Dean of Liberal Arts & Sciences, UIC (Chair)

INTRODUCTION: CHARGE, CHALLENGE, AND APPROACH

The overall goal of the University of Illinois Administrative Review and Restructuring Committee is to find ways to reduce administrative costs and to redirect resources—to the degree possible—toward core missions of teaching, research, economic development, public service, and patient care. A subcommittee formed to examine expenditure on information technology (IT) has been searching for more cost-effective ways to provide IT services to the University. The subcommittee was instructed to approach this task with “a thoughtful focus on cost containment while maintaining or enhancing the level of administrative services,” and it was suggested that the subcommittee consider such means as “better organization of service delivery functions, process improvements, elimination of duplicative services, better articulation of responsibilities of service units, and improving decision making.” We have embraced all dimensions of this task, looking for significant and sustainable savings that can be achieved while fully protecting the academic missions.

The subcommittee examined current patterns of expenditure on IT across the institution, focusing not only on historical trends in spending, but also on deep structural issues such as the embedding of IT in research and academic programs. We compared the University of Illinois’ practices with those of other similar universities and medical centers and reflected at length on how the practices that have evolved at nearly all large research institutions are adapted to the competitive success of those institutions. We gathered many ideas for improvement of IT and for overall cost reduction, both from prior internal studies and from industry sources, and we developed a subset of these ideas that we judge to hold the greatest promise of saving significant amounts of money in a relatively short time while protecting the university’s mission. Significant in each of the emerging proposals is that the actions recommended will help everyone involved learn to reason differently about when and how to spend on IT. We learned, for example, that certain necessary and unavoidable IT expenses are not actually budgeted; it will be the task of the IT leadership on each campus to persuade academic decision-makers that it is *more* expensive, not less, to fund IT from cash surpluses.

Sources of Cost-Saving Concepts

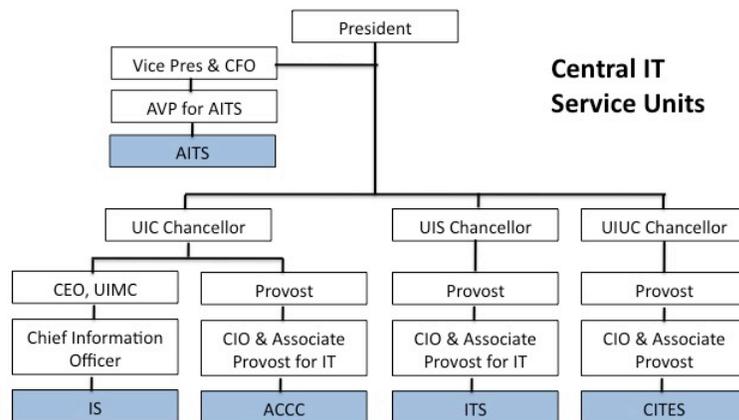
- *Gartner reports*
- *Educause reports*
- *Healthcare Information and Management Systems Society Leadership Survey*
- *Consultant reports for other universities*
- *Consultant reports for UI divisions*
- *Prior internal studies and*

To generate an initial list of cost-saving techniques, the subcommittee reviewed published and unpublished sources from higher education and from industry. To better understand the University-wide organization of IT, the subcommittee exchanged detailed information on how IT is organized at each campus or administrative division, and (more importantly) the subcommittee launched a deep data-centered study of where IT expenditures actually occur, how they are embedded in other spending, and how spending in one area affects costs in others.

Major assigned responsibilities for information systems and other information technology are concentrated in five organizations roughly representing the four major Charts of

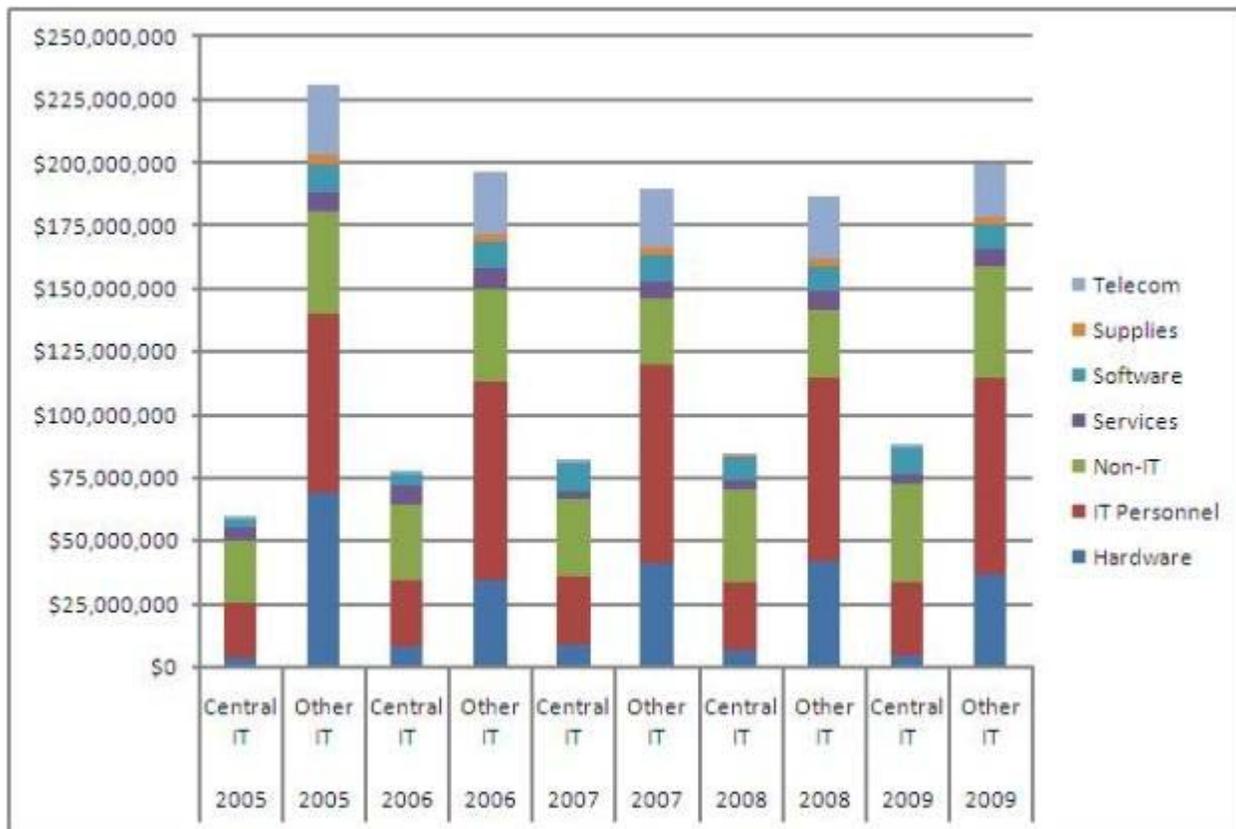
Accounts (UA, UIC, UIS, and UIUC). UIC has two major IT organizations because of the special and unique requirements of the Medical Center; Urbana-Champaign has significant IT spending concentrated in the National Center for Supercomputing Applications, but as this is not an administrative unit of the campus, it is not part of this set of five key organizations. The five IT organizations and their positions within the university organizational chart are shown in Figure 1. Each campus has a person serving in the role of chief information officer reporting to the Provost (or CEO in the case of the Medical Center), and the main campus IT organizations report to these CIO/Associate Provost roles. The portfolios of each of the campus CIOs vary somewhat; for example, the Medical Center CIO's portfolio includes operational responsibility for clinical/biomedical engineering and Health Information Management, while the campus CIOs also oversee tele-communications and AITS manages shared business information systems for all three campuses as well as the state-wide Library Information System and reports up through the Chief Financial Officer.

- ACCC Academic Computing and Communications Center at UIC
- AITS Administrative Information Technology Services
- CITES Campus Information Technologies and Educational Services
- IS Information Services, Medical Center
- ITS Information Technology Services



Achieving an accurate understanding of what the University of Illinois spends on information technology is a significant challenge, partly because the University's business systems are not sufficiently customized to allow for clear classification of expenditures and partly because most IT expenditures originate in budgets that are not always particularly associated with IT. In support of the subcommittee's work, Decision Support developed data resources based on plausible inferences from business records. IT personnel were identified by job classification codes, for example, and non-personnel expenditures (hardware, software, services, and supplies) were identified through analysis of transactional data. Special care was necessary to avoid double-counting of expenditures (since department-to-department payments for IT services are common, and the money appears to have been spent twice when totaled). The most defensible estimate available for total university-wide IT expenditure is roughly \$287 million for FY 2009,^[1] a figure that includes research as well as state-funded spending. This includes approximately \$88 Million spent by central IT organizations and \$199 Million spent directly or indirectly by

other operating units such as colleges and departments.^[2] Figure 2 shows a view of what we spend on IT and where the spending occurs.



Since about two-thirds of all IT expenditure occurs in operating units other than IT support organizations, the subcommittee recognized that the greatest potential for significant savings is in promoting better management of IT at every level of the institution—not just a one-time reorganization, but overall improvement in how all decision-makers think about IT. The surest way to move money from IT expenditure to direct support of mission is to create conditions in which academic unit heads can safely shift expenditure from IT operating expense to other investments in research and education—or to truly strategic investments in IT. Most fundamentally, *all* decision-makers -- everyone who has the authority to spend on IT or to influence spending on IT -- must learn to differentiate between IT expenditures that are truly strategic and spending that is nonstrategic, even though it may be necessary for doing business. We suggest the following as a common business vocabulary and propose to work this vocabulary into our plans for implementing the recommendations in this report:

- *Operational IT spending*: IT spending that may once have been strategic or tactical, but that is at present simply a necessary expense for running the business. These are expenditures that are embedded in ongoing operating budgets, taken for granted and not reviewed without some triggering event. All of our significant recommendations for savings come from this group.

- *Tactical IT investments*: planned expenditure on IT that can reduce the cost of any necessary business function through automation or process improvement. These must be justified in terms of their ability to improve overall business processes by spending on IT (instead of on manual paper processes, for example).
- *Strategic IT investments*: planned expenditure on IT that can distinguish the University's performance of its core missions (teaching, research, economic development, public service, and patient care). These must be justified in terms of their contribution to the core missions of the University.

An ideal expenditure reduction strategy for the University would (1) reduce operational spending in ways that have no negative impact on mission, (2) protect strategic IT investment, and (3) improve the yield from tactical IT investment. During the period of this review, the committee focused on the most promising among a larger set of ideas: ideas for cost reduction methods that can be confidently expected to produce large savings (with a potential yield of \$17-19 Million in savings, most not fully realized until FY 2013), urgent strategic investment priorities with a clear link to revenue (protecting three large revenue streams), and proven concepts for tactical investment (producing additional "soft" savings of \$4 Million per year or more). Many other less dramatic or less certain cost reduction methods and investment opportunities remain to be evaluated, and these can be considered in followup activities.

SUMMARY OF ALL RECOMMENDATIONS

<i>I</i>	<i>Recommended Actions to Achieve Recurring Cost Savings</i>	<i>Estimated Savings/Yr</i>	<i>Where Visible</i>	<i>Page</i>
A	Reduce software maintenance expense by providing Banner modifications locally.	\$500,000	AITS	8
B	Reduce application portfolio size where possible.	\$2,000,000	Central IT units	9
C	Consolidate data centers and decommission small server rooms.	\$4,380,000	Colleges, other units	10
D	Consolidate email and calendaring services.	\$360,000	Central IT & Colleges	11
E	Choose a method for reducing power consumption for personal computers.	\$450,000	Utility bill	12
F	Support desktop technology more efficiently through selective standardization.	\$4,000,000	Colleges, other units	13
G	Shift from Centrex voice service to converged voice and data communications.	\$5,000,000	Phone bills to units	14
H	Expand reliance on cloud computing and other rapid-response outsourcing.	\$2,000,000	Central IT, other units	15

<i>II</i>	<i>Recommended Actions to Protect Strategic Investment.</i>	<i>Revenue at Stake</i>	<i>Where Visible</i>	<i>Page</i>
A	Position the University to compete for major sponsored projects.	\$721,000,000 (research)	Campuses	18
B	Invest in Electronic Medical Records.	\$662,000,000 (total projected revenue 2010)	Medical Center	19
C	Diversify the online learning environment.	\$730,000,000 (tuition)	Campuses, colleges	21

<i>III</i>	<i>Recommended Actions to Improve the Yield from Tactical IT Investment.</i>	<i>Who Spends</i>	<i>Who Benefits</i>	<i>Page</i>
A	Use enterprise administrative IT to improve business process.	AITS	Campuses	23
B	Convert inefficient paper-based processes to electronic workflows.	Central IT units	Campus units	24

SECTION I: RECOMMENDATIONS FOR COST REDUCTION

The eight initiatives recommended in this section are aimed at reducing expenditure on necessary but non-strategic functions. In most cases, they not only offer potential for significant cost savings to the academic units, but also offer authentic improvement to the working environment.

Some initiatives involve consolidating functions from one organizational level to another, which has the effect of freeing resources at the more local level. Others involve changing service models (shift from Centrex to Voice over Internet) or operating procedures (performing Banner modifications locally) in ways that reduce expenditure by central IT providers. In these cases, the savings will accrue to the colleges, departments, and other operating units of the campuses, for example through reduced telephone bills.

Estimates of potential savings for these recommended actions are preliminary, intended only to size the potential in each idea. All savings take some time to ramp up, but it is likely that these initiatives, if launched now, could accumulate savings of about \$17-19 Million by FY 2013. All will require additional analysis and development of detailed implementation plans.

Each action is described more fully in the following series of proposals.

Recommendation I.A: Reduce Software Maintenance Expense by Providing Banner Modifications Locally.

During the UI-Integrate project, there was a need for custom modifications to the baseline Banner system in order to address U of I policies that were not supported by Banner. These modifications were created and are maintained by SunGard, the vendor of Banner. For FY11, the estimated maintenance cost for the core Banner product is \$689,844 and an additional \$661,743 to support the modifications. AITS reviewed all of the modifications with university business units and SunGard to determine the feasibility of handling the maintenance locally by U of I employees.

Since the implementation of Banner, AITS has acquired a significant amount of experience with the system and its architecture, putting us in solid position to perform the necessary upgrades to the Banner modifications.

Taking over the maintenance for these modifications will require dedicated AITS resources, possibly reducing the amount of time available for other projects. However, based on SunGard's new product strategy and distributed release schedule, the impact should be minimal.

For FY10, AITS took over support of 6 modifications, saving \$72,650.

Specific Actions

- Support of all but 4 of the remaining Banner modifications.
- Continue involvement with SunGard's Community Source initiative, which strives to include custom modifications to the baseline Banner product. The University has already had 2 modifications accepted for baseline, and has at least 5 others that are under review. As these modifications are moved to baseline, the resources required for maintaining the modifications decreases.
- In general, review our hardware and software maintenance contracts to determine if increasing the risk to the university is worth decreasing the hardware and software support payments to the vendors in order to reduce expenses.
- Requests for additional modifications should be carefully reviewed and existing functionality considered before making new modifications.

Estimated Savings & Where Savings Will Be Visible

- The contract savings will be \$628,838, which is offset by the internal labor estimated at one to two FTE(s). Net savings is anticipated to be \$500,000.
- AITS resources will be required to do the analysis and maintenance for the SunGard modifications, reducing the resources available for other projects. However, by handling all of the work internally, we eliminate the need for vendor interaction when issues arise, resulting in increased efficiency.
- We would now assume the risk in performing the modifications in house.

Recommendation I.B: Reduce Application Portfolio Size Where Possible.

The university supports hundreds of software applications related to all aspects of administration and academics. History shows that new applications are bought or built at a greater pace than they are consolidated or retired. As requests for new functionality or applications continue to grow, it is imperative to manage the process for growth and to consolidate when appropriate.

During the lifecycle of an application, the application is eventually no longer cost effective to maintain, no longer meets the business needs of the users, or produces too much risk into the enterprise. The application portfolio must be reviewed on an on-going basis to ensure effective use of current products. By actively managing the application portfolio and sharing information about which applications are being used, the University can minimize complexity and maximize the value of each application by encouraging the use of existing applications to meet departmental needs.

Specific Actions

- Review the application portfolio of each campus and set a specific target for the quantity of applications to be removed or consolidated.
- In conjunction with the Office of Business and Financial Affairs, maintain a process for controlling, monitoring and simplifying the purchase of new applications. This process would minimize duplication and help ensure that the infrastructure for storage, backups and other technologies is in place to support new tools, thereby reducing the total cost of ownership.
- Utilize existing applications and elevate their foot print whenever possible. In addition, utilize tools from existing vendors to increase the value of each vendor relationship.

Estimated Savings & Where Savings Will Be Visible

- Because customer demands are increasing, portfolio management is needed for cost avoidance. Unless the University stops increasing the quantity of software services and applications, savings from portfolio management simply offset escalating demands.
- As an example, if it is assumed that approximately 25% of AITS's budget goes to supporting 232 applications, then the per-application cost is about \$20,000. Additionally, if there are approximately 1000 applications throughout the University at a cost of about \$20M, this also provides an estimate of about \$20,000 per application. A 10% reduction could yield as much as \$2M in savings.
- An accurate count of applications and support costs would be needed to estimate the true savings. Additionally, savings from other initiatives, such as cloud computing, should not be double counted here.

Recommendation I.C: Consolidate Data Centers and Decommission Small Server Rooms.

Each campus has one or more large, high quality data centers, but there are also a large number of smaller spaces used for computing operations, especially at UIUC. The IT Subcommittee recommends that the current inventory of high quality data center space be maintained, but that the smaller spaces be decommissioned and the functions supported within them consolidated into the most appropriate of the large centers. The Subcommittee further recommends that the three campuses and UA develop business rules for locating computing operations in one another's space, both for improved business continuity and for better cost containment.

Specific Actions

- Maintain a limited inventory of data centers managed professionally on behalf of each campus, differentiated by purpose (e.g., critical administrative systems versus high-performance research computing) and geographically separated (to maximize business continuity).
- Instead of building new data center facilities, allow campuses to "rent" space from one another in facilities suitable to the intended business purpose.
- Decommission any smaller computing operations spaces whose functions can be consolidated into one of these data centers.

Estimated Savings & Where Savings Will Be Visible

- Savings in the \$12,000-\$17,000 range can be realized from decommissioning of the smallest spaces (such as departmental server rooms), and savings rise as larger spaces are decommissioned. Savings on power are included, but will not be visible to individual unit heads.
- Decommissioning all unneeded spaces will save a total of at least \$4.38 Million per year by FY15, including unit-level operating cost and power, most of which will be attributable to space decommissioning at UIUC.

Source of cost estimates: *Data Center Consolidation Committee Final Report* (UIUC, February 12, 2010) and subsequent analysis by CIO staff at UIUC.

Recommendation I.D: Consolidated Email and Calendaring Services.

We have a good opportunity to re-think how we deliver common IT services such as email and calendaring. Currently we have multiple email and calendaring platforms hosted by central IT departments as well as colleges and/or business units. With good planning, all mail systems can be migrated into one environment for faculty and staff with minimal user interruption. Running a secure and highly-available email system such as MS Exchange can be expensive in terms of staffing, hardware, license, storage and other resources, however in the long run there should be cost savings as well as many other advantages in having a common communication and collaboration environment on each campus, and possibly across the university. Regarding student email, currently our students may see little value in the campus provided email accounts and prefer to use the email services they already have. Were the University to discontinue hosted student email and move this service to another provider, it would reduce the amount of hardware, staff time, and data center space dedicated to multiple email platforms. Each campus should be able to realize some savings and at the same time provide a better service to the faculty and staff. Due to the unique HIPAA requirements, the clinical enterprise's email environment, which is already standardized and centralized, should not be merged with the general faculty and staff's email environment.

Specific Actions

- Consolidate all academic faculty and staff email systems run by departments and colleges at UIC (ACCC) & UIUC (CITES) unless there is a valid business case for having a separate system.
- For the clinical enterprise to ensure compliance with HIPAA regulations, physical security, and encryption of protected health information (PHI), consolidate within the existing secure exchange environment. Email forwarding must be eliminated for faculty/staff to prevent redirection of PHI to unknown services and accounts.
- Discontinue email service for the students. Instead of providing a university or campus mailbox, offer the students an email forwarding service that will pass along messages to their preferred email account. The students will still have a name@illinois, or name@uis/uic/uiuc address, but the address will simply forward incoming messages to their Gmail, Yahoo, etc. mailboxes. This will also come with the added advantage for development and alumni relations that students—once alumni—can retain their forwarding service.
- Conduct a comprehensive cost-benefit analysis to determine the viability of a system-wide or cloud-based email and calendaring solution.

Estimated Savings & Where Savings Will Be Visible

We are not able to accurately estimate the current cost of running multiple email systems. The campus-wide savings from consolidating Exchange services accrue from closing down departmental services and eventually reducing staff. UIUC estimates an annual saving of

\$310K by eliminating student email service and consolidating employee email. The savings for UIS will be approximately \$50K annually.

Recommendation 1.E: Choose a Method for reducing Power Consumption for Personal Computers.

Based on the power consumption for the typical PC and an average (Urbana and Chicago) estimated cost of \$0.08/kWh, the cost savings will be approximately \$30 per PC per year if desktop computers are shutdown between 6 p.m. through 7 a.m. during the week and off on weekends.

It is estimated that office equipment accounts for 16% of an office's energy use, and if every U.S. computer and monitor were turned off at night, the nation could shut down eight large power stations and avoid emitting 7 million tons of CO₂ every year. We should use several methods to reduce energy costs for desktop PCs throughout the University.

Specific Actions

- Choose a cost-effective option for shutdown:
 - Manually shut down machines at the end of the day and manually turn them back on the next workday. The main benefit of manual shut down by the user is the ease of implementation, but it relies heavily on end user compliance, and it has no provisions for emergency management of machines, that is, it is impossible to wake them up remotely.
 - Use the Windows 7 and Mac OS X operating systems or an existing vendor-supplied solution to manage shutdown, wake up, and reporting for machines.
- Develop an RFP to determine if the cost-benefit of a vended product is worth the investment. If the university selects a single remote management product, IT professionals throughout the University could use standard procedures for managing power consumption and software upgrades, but they would not need to have the same configuration of PC.
- Continue to replace inefficient desktop PCs with efficient thin clients and mini PCs when possible.
- Continue to purchase the most efficient products during replacement cycles and enforce energy efficiency through purchasing policy.
- Publish best practices for energy conservation and provide training where necessary.

Estimated Savings & Where Savings Will Be Visible

- Assuming there are approximate 15,000 PCs that are not managed optimally throughout the University, the savings would be about \$450k annually.
- Savings will be visible in utility bills, currently paid centrally on each campus.

Recommendation I.F: Support Desktop Support Technology More Efficiently through Selective Standardization.

The University of Illinois has a permanent workforce of over 25,000. Most of these employees require desktop computing, including technical staff support. We cannot accurately estimate how much the university spends yearly on desktop computing, but we know that there are significant opportunities for saving. Analyses of desktop computing support in many contexts have made clear that the path to lower cost is to standardize the workstation configuration as much as possible and to spread the cost of technical support (including staff and infrastructure) over as many workstations as possible. These strategies drive down the cost of support by lowering the ratio of support personnel to employees supported.

With the exception of the Medical Center, where the desktop is completely standardized, historically, individual operating units (not central IT) have had responsibility for managing the desktop environment. Most do not have separate budgets for equipment purchase and maintenance. This means that desktop equipment is often bought using one-time savings from funds budgeted for other purposes. Some economies of scale have been achieved in each division of the university through various forms of consolidation and through creative arrangements like UIC's FaCT program for purchasing and maintaining PCs for faculty. We believe that more savings can be achieved by similar programs designed for other employee groups.

Specific Actions

- Regular replacement of employee workstations should be planned and budgeted, not done *ad hoc*. Regular replacement schedules make support less labor-intensive.
- UA and campus employees whose primary job responsibilities involve interacting with Banner systems may be supported by AITS under a standard service contract. This has security advantages as well as cost advantages.
- Administrative and support personnel who are not heavy users of Banner systems should have back office support at the highest level of aggregation possible and technical support dispatched from geographically distributed service locations.
- Workstation support for faculty and selected administrative personnel should be far more individualized, based on analysis of individual need and preference. Low-cost standardized configurations should be among the options available (as in the FaCT program).

Estimates of Savings & Where Savings Will Be Visible

- Consolidated purchasing of workstation equipment (and elimination of 3-year maintenance contracts) has great potential for savings. To illustrate, an average reduction of \$100 (in purchase price and/or maintenance contract) would yield \$1,125,000 per year in savings on 45,000 machines on 4-year replacement. A small portion of these savings would be needed to replace broken machines.
- Reducing complexity (especially through any form of desktop virtualization) will reduce the number of staff needed to manage desktops. We do not know our current support ratios, but if we were able to reduce the technical workforce by just 50 positions university-wide, the annual savings would exceed \$3,000,000.
- Overall, the potential savings university-wide appear to exceed \$4,000,000 annually.

Recommendation 1.G: Shift from Centrex Voice Service to Converged Voice and Data Communications.

For the past two decades, all three campuses have provided traditional Centrex phone service via a contract with AT&T. During that time, data networks have become even more essential than phones to the business of the university, and all three campuses have made significant investment in robust, reliable networks. We are now able to take advantage of the data networks to carry voice traffic at costs far lower than the cost of Centrex service, using Voice over Internet Protocol or VoIP.

All three of the University's campuses contract with AT&T for Centrex telephone service, at a total yearly cost of about \$5M. Most of this cost can be eliminated as the campuses shift to VoIP. UIC and UIS have already begun shifting lines from Centrex to Cisco VoIP technology. By reducing Centrex volume, both campuses have been able to invest initial savings in upgrading the data network to enable complete conversion to VoIP. By FY 2013, UIC can cut off Centrex service entirely, with savings to the campus of approximately \$2,000,000 yearly thereafter. UIS has achieved yearly savings of \$156,000 yearly and will return these to the campus beginning in FY 2011. UIUC has completed a 5-year network upgrade and is planning to shift from Centrex to VoIP as part of a unified messaging strategy that involves consolidated email and calendaring, converged voice and data, and other messaging services. After an initial investment, this strategy is expected to generate yearly savings of \$3,000,000 or more. UA offices do not operate their own voice and data networks; they share in the costs of the campuses, and they will share in the savings from VoIP.

Specific Actions

- All three campuses should complete the transition to VoIP, choosing technology solutions that reduce overall cost of communication services.
- Reliance on Centrex lines should be reduced incrementally where possible, operating VoIP and Centrex services in parallel during a ramp-down period; since Centrex lines are charged by volume, incremental decreases in the number of Centrex lines is an immediate cost saving.

Estimates of Savings & Where Savings Will be Visible

- Savings come from ending payments to an external vendor for Centrex services and from consolidating voice and data communications onto a single network. Net of what must be reinvested in the VoIP service, more than \$5M per year can be saved.
- Savings will be passed on to the campus operating units through reduced monthly bills for communication services, starting in FY 2011 for UIS and in FY 2013 for UIC and UIUC.

Recommendation I.H: Expand Reliance on Cloud Computing and Other Rapid-Response Outsourcing.

A recent report from the Educause Center for Applied Research (Goldstein, Philip J.) “Demystifying the Cloud: Implications for IT Funding in Higher Education,” ECAR Research Bulletin 4, 2010, available from <http://www.educause.edu/ecar>) described three aspects of cloud computing that they believe drive its economic advantage for cloud consumers. They view the cloud model of computing as:

- Creating an illusion of infinite computing resources available on demand. This eliminates the need for users to buy capacity far in advance.
- Eliminating the need for an upfront commitment, thereby allowing users to start small and then increase resources only when their needs change.
- Providing the ability to pay for computing resources on a short-term basis, as needed, and then release them.

The term cloud computing is used widely to describe services that are hosted outside of the enterprise. The cloud is a matter of perspective, in that a department might consider a campus service as a cloud service while the university would consider outsourcing to an application service provider as a cloud service. Examples of cloud services include Google Mail and Apps, the Amazon Elastic Compute Cloud and Salesforce.com.

In addition to reducing direct costs, cloud computing should be used when it can reduce dependencies on uninterrupted power, increase reliability, assure disaster recovery, reduce labor costs, create standard integration between departments and administrative services, or provide a better quality of service.

The university is not set up to use cloud services on a grand scale. IT groups throughout the University have outsourced a small quantity of services as hosted applications of software-as-a-service. The university should ready itself to so that cloud computing is more viable option for cost reduction as cloud services become cheaper and more mature.

Specific Actions

- Address the prerequisites for using cloud computing by working with general counsel, purchasing and IT departments to create policies to make it easy for faculty and administrators to use cloud services. Aspects such as intellectual property, security, FOIA, subpoenas, misuse of services and disciplinary procedures should be understood and have policies to promote effective widespread use of cloud services.
- Develop policies that can be applied to evaluating ROI for cloud services.
- Work to increase standardization through best practices so that more IT units are ready to use commodity cloud services.

Estimated Savings & Where Savings Will Be Visible

- Savings are unknown. Over \$20M per year is spent on software services, which would yield about \$2M with a 10% reduction.

- Moving to the cloud reduces cost elsewhere, such as power and maintenance. Since these costs are recovered throughout the organization, any chargeback models should not discourage the use of cloud computing.

▪ **SECTION II: RECOMMENDATIONS FOR PROTECTING STRATEGIC INVESTMENT**

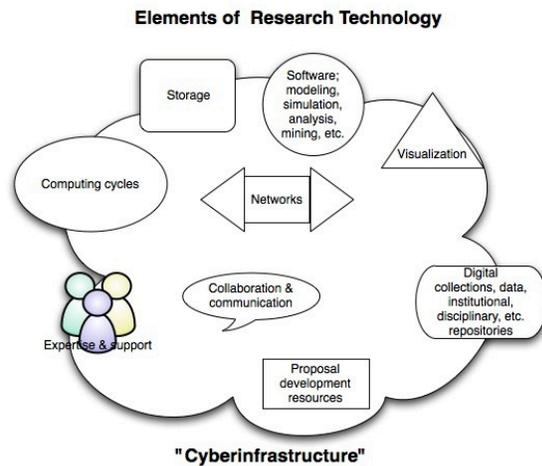
The three recommendations in this section all point to the essential and strategic role information technology plays in the core mission activities of the University. In many businesses, IT is a business enabler, but not a strategic asset. For universities, IT is enabling revolutions in science and engineering and transformation of the educational environment. In healthcare, IT is not only reshaping the patient experience, but is also critical to controlling both the cost and quality of care.

Dozens of specific initiatives might have been mentioned in this section. We chose three representative areas of investment corresponding to major institutional revenue streams. Each of these investment areas has its own process for setting levels of funding. The Subcommittee is not making new recommendations for funding, but simply documenting that even as the University becomes markedly more efficient in delivering IT services, there are circumstances under which its total investment in IT may continue to rise.

Recommendation II.A: Position the University to Compete for Major Sponsored Projects.

Research supports faculty excellence and doctoral and masters programs. It is a central business activity of the University, with an associated revenue stream in excess of \$700 million per year that is funded primarily through competitively awarded grants and contracts. Although some competitions require matching contributions from the institution, most require research facilities.

“Cyberinfrastructure” (networking, computing resources, specialized applications, datasets and data management infrastructure, and advanced technical support) is necessary to compete successfully and to execute projects once contracts have been awarded.



Information technology is a vital concern to research universities¹, and its impact on the quality of the environment for research requires a steady stream of investment. Funding agencies expect this and allow for recovery of facilities overhead based on how much an institution can prove that it has spent. Critical infrastructure investments that will affect our near-term ability to compete for sponsored research awards include at least the following:

- State-of-the-art communication networks. Research universities do not just connect to the commercial internet; they participate in creating and operating special Research & Education networks that co-evolve with the needs of researchers. An inadequate network disqualifies a campus from some forms of research.
- Institutional stewardship of research data². Data stewardship means keeping data for as long as it may be needed and controlling access to it based on some sort of policy; we are all accustomed to doing this task for business data, but not for research data. Stewardship of research data involves professionally managed storage and archiving (metadata, collection management, and finding aids). Funding agencies are beginning to require researchers to present plans for long-term data availability.
- Space and personnel to enable consolidation of research computing resources. When a campus does not provide space for research computing, researchers who win grants with computational components must provide their own space. This is wasteful of scientific resources and extremely expensive for the campus as a whole.

¹ Preparing for the Revolution: Information Technology and the Future of the Research University, National Academies Press, 2002.

² Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age, National Academies Press, 2009.

- Specialty applications. These range from tools for collecting, analyzing, and visualizing data to quasi-administrative applications used in supporting collaboration.

Recommendation II.B: Invest in Electronic Medical Records.

On February 17, 2009, President Obama signed the Health Information Technology for Economic and Clinical Health (HITECH) Act, as part of the American Recovery and Reinvestment Act (ARRA). The main goal of the HITECH Act is to encourage the adoption and “Meaningful Use” (MU) of electronic health records (EHRs) through Medicare and Medicaid incentive payments to hospitals and eligible providers. The federal regulations regarding MU are intended to enable the transformation of the health system to improve health care quality, efficiency, equity, and safety through the use of health information technology (HIT), while providing the foundation for continued, measurable improvement in our nation’s health.

Medicare and Medicaid EHR Incentive Programs are broken into three stages:

Stage 1 (2011) – Electronic capture of health information in a coded format; tracking key clinical conditions and communicating outcomes for care coordinating; implementing clinical decision support.

Stage 2(2013) – Expands on stage 1. Encourages the use of health IT to enhance computerized provider order entry; transitions in care; electronic transmission of diagnostic test results; and, research.

Stage 3 (2015) – Expands on stage 2. Promotes improvements to quality and safety; focuses on clinical decision support at a national level by encouraging patient access and involvement; and, improved population health data.

HITECH funding utilizes both a “carrot” and “stick” approach. There are two incentive programs; one is hospital based and one physician based (defined as eligible providers). Incentive payments for MU begin in 2011, but penalties for non-compliance begin in 2015. Payments for hospitals are calculated based on a stated algorithm associated with the number of inpatient discharges per institution and Medicare share. The potential value to the University of Illinois Medical Center (UIMC), as projected by University HealthSystem Consortium (UHC), is projected at \$10.7M for both Medicare and Medicaid incentive payments. An additional \$11M could be available to the College of Medicine if the regulations change in May to include our outpatient facility. This would include \$2.1 for FHQC as they are already classified as EP and \$1.7 for Rockford, bringing the potential total for the University of Illinois to \$21M. It is imperative that the organization undertake new technology, cultural and behavioral changes to achieve MU requirements in order to avoid incurring any penalties.

Implementation of the technology changes for all three Stages entails a four year program with an estimated capital cost of \$6M, an additional \$4M in operating expenses, and over the next four years, given what we know, 33 healthcare/clinical Information Services subject matter experts will be required. That is 1/3 of the current IS budgeted staff. In addition, we are predicting that clinical application staffing will have to increase over the next four years. This is consistent with other healthcare institutions, as the HIMSS leadership survey dated March 1, 2010 indicates 66% of all facilities expect a growth in staff over the next year. The program will require the acquisition of software, hardware, and resources for staff augmentation and subject matter expertise not available within the

Medical Center. Specific MU requirements for Stages 2 and 3, and the final definition of EPs, have not been published so the total costs and staffing is subject to change.

Achieving MU is an enterprise wide imperative, not just an IS Department initiative. For the last 6-9 months, the UIMC IS Department has actively been learning the MU requirements, working to define the technology, funding and staffing requirements, and educating Executive Leadership and key subject matter experts throughout the organization. To achieve Stage 1 MU requirements, 23 projects have been identified with estimated capital costs of \$3.5M. The 23 projects represent not only major IT investment and work effort but also require significant cultural and behavioral changes for the Medical Center and it's clinicians. These projects are aimed at meeting the incentive requirements for MU and support the positioning of UIMC as a leader in the healthcare community and adoption of best practices to improve quality, safety, efficiency, reduce health disparities, improve care coordination, and improve the health of the public population while also engaging patient and families and ensuring security and protection of personal health records. Driving behavioral and cultural changes will require enterprise wide communication and education for clinicians and strong leadership.

This is one of the largest government driven changes to healthcare in recent U.S. history and provides significant opportunities, challenges and risks for UIMC. UIMC Executive Leadership and the College of Medicine Administration are supportive of meeting the goals outlined by the government to improve healthcare overall and to ensure maximum available incentives are received and to avoid financial penalties in the future.

Recommendation II.C: Diversify the Online Learning Environment.

Each campus operates one or more Learning Management Systems whose purpose is to support the creation and delivery of online course components, either for distance learning or for enhancement of on-campus courses. These systems are quite costly to operate, and the Subcommittee considered whether consolidating them to the system level would achieve significant economy of scale. While savings on the operation of the systems themselves *might* be possible from consolidation, the immediate costs of change (especially cost in faculty time) would be great enough to require many years to recoup. Much greater long-term opportunity for cost avoidance and reduction may be possible with a deeper change of direction, away from standardization of the online environment to a new support model that exploits the emerging market for software as a service. The potential for overall savings within this model is in allowing individual faculty to choose just the tools needed to effectively teach a particular body of content to a particular cohort of students, instead of trying to serve all needs with one huge and complex system.

Specific Actions

- For the next few years, UIC, UIS, and UIUC should continue central IT support for their existing enterprise-class LMSs. There should be no investment in consolidating these into a single system-wide service.
- Each campus should evaluate cost per course at the present level of volume and use this as a benchmark in exploring lower-cost options for supporting online teaching and learning. Our best current estimate is that these systems cost about \$150-200 per course when they have topped out all possible economies of scale.
- The campuses should introduce additional services to address demands for more personalized environments, including open source alternatives and externally hosted services. Contracts, pricing, and billing for these options may be prenegotiated by any campus on behalf of the system, using Webstore as a shared distribution mechanism.
- Each campus should review the total campuswide portfolio of “virtual classroom” applications and make appropriate reductions through eliminating duplications and software that no longer has sufficient use to justify its cost.

Costs and Benefits

- Short-term savings, if any, would come from decommissioning of duplicate and obsolete services operated either in central or departmental IT units. We do not know how many such services exist or what they cost to operate.
- Long-term savings, if any, would come from reducing the average per-course cost by scaling down the central LMS and offering a wider array of less expensive options to handle large amounts of faculty demand.

SECTION III: RECOMMENDATIONS FOR IMPROVING THE YIELD FROM TACTICAL INVESTMENT IN BUSINESS PROCESS IMPROVEMENT

Two broad concepts are included as recommendations in this section, to illustrate the important principle that increased spending on IT may lead to significant decreases in other administrative costs. These two cases also make clear that automating business processes can go beyond cost-cutting to authentic improvement to the working environment.

Typically, cost savings from business process improvements are realized in greater staff productivity. The savings are real, but they are "soft" in the sense that they usually cannot be directly monetized. Improving interfaces to Banner, for example, may greatly reduce the hours required to perform large numbers of transactions, but these savings are not easily tracked all the way to the institutional bottom line. Sometimes they lead to staff reduction in administrative offices, but sometimes they lead instead to improved service to students, other employees, or the public.

Tactical investment in enterprise administrative IT is estimated to be producing soft savings of about \$4 Million per year.

Recommendation III.A: Use Enterprise Administrative IT to Improve Business Processes.

The administrative Information Technology Priorities Committee (ITPC) receives, reviews, approves and prioritizes enterprise administrative IT projects for the university. These projects use IT staff within University Administration, as well as subject matter experts throughout the University to increase efficiency of business processes.

Improving business processes, increasing use of information in decision making and cutting enterprise costs are the top three higher education IT priorities in Gartner's 2010 CIO survey. The University depends on IT to increase efficiency and reduce overall costs.

Without improvements, manual and inefficient business processes will consume valuable departmental resources better utilized for mission-focused activities. Service improvements are realized by using information technology to accelerate processes, improve data integrity, increase access to information and meet compliance mandates

Specific Actions

- Continue to develop governance structures that allow the University to take advantage of the existing administrative ITPC and address the projects that have the highest value to the University and the greatest ROI.
- Enhance the governance model to include a wider array of input throughout the University and include other IT governance processes.
- Use administrative IT projects as a means to help departments reduce their expenses over time.

Estimated Savings & Where Savings Will Be Visible

- Although each ITPC project includes an ROI calculation with expenses and estimated savings, it is unclear how much of the estimated savings actually gets recovered.
- Due to unfunded mandates, compliance and customer expectations, efficiency gains are often cost avoidance rather than cost reduction.
- By using ITPC governance process, 104 projects between FY08 and FY10 have been completed or are in progress, saving or avoiding approximately \$10-\$15M annually.
- Estimated annual savings is about \$4M each year, unfortunately the vast majority of these savings are distributed throughout the organization, making cost recovery difficult.
- Whether savings can be monetized or not, we recommend tactical investment that eliminates low-value work and allows staff to shift to higher-value tasks.

Recommendation III.B: Convert Inefficient Paper-Based Processes to Electronic Workflows.

Printing results in several types of costs: paper, ink printing equipment, storage of printed documents, mailing or distribution costs, disposal costs (shredding and recycling, clerical staff time, space allocation for physical file storage). In addition, there are productivity costs due to the time it takes to move paper from one office to another. Campus mail takes at least a day, so employees often “walk over” forms that need to be processed quickly. The amount of paper and toner used by the university is difficult to estimate, given the lack of detail in the Banner system; we estimate it at least \$200,000 per year. All the paper produced either needs to be stored – resulting in costs for filing cabinets and space – or recycled. Each year, the university spends more than \$150,000 on paper recycling; while some of that is recovered by sale of the materials, most of the paper being recycled was generated here on campus and, perhaps, should never have been printed.

Archiving is a particularly thorny issue to deal with as a state university with legal and policy implications with regard to the storage of a variety of essential data. While several actions have been taken at the university over the past decade in this area, there is more to be done. This is an area that may provide much low-hanging fruit ripe for the picking.

Some major systems and processes remain heavily paper-based:

- Report of Non-university activities
- Promotion and tenure documents
- Reimbursements (where pdf's or copies are not permitted)
- Student Scholarship applications
- Annual reports from departments to colleges
- Annual faculty and staff reviews
- Faculty and staff search application processes
- Graduate admissions applications
- Senate and college level committee elections
- Sabbatical leave applications

Specific Actions

- Give higher priority to projects that reduce paper. Examples would be the RNUA project, the electronic transcript project, etc.
- Develop a robust workflow engine that could be used to route information for approval.
- Remind users of the costs of printing and encourage them to think before printing.
- Clarify the rules for archiving materials. Establish document disposal authorizations for common sets of documents held by most departments.
- Make sure administrative units know about the document management systems available to them.
- Provide and maintain server space centrally for administrative units that migrate to paperless storage and management of files.

CONCLUSION: HOW TO BUILD ON THIS REPORT

This Subcommittee includes all of the members of the University Technology Management Team, to whom the five central IT support units report. As we have pointed out, though, roughly two-thirds of IT-related activity does not formally report to these leaders. Not included in the subcommittee are representatives of the many IT professionals who work in non-central units, some of whom are exercising great leadership from within the academic units (as Assistant and Associate Deans). While the UTMT members can accomplish much through their own direct action (that is, through their reporting units), much else depends on cooperating with other IT leaders at multiple levels to consolidate services, assist in decommissioning facilities, and so on. Each campus CIO must work closely with these colleagues to actually get anything done.

One way to build on this report is to extend to all IT professionals, and to the academic leadership, the analytic tools developed for our study. We learned much about the difficulty of extracting business intelligence from our business data, and Decision Support contributed very important new tools for gaining insight into our patterns of expenditure and our opportunities for efficiency. In the months ahead, we plan to continue working to refine these new tools so that they may become part of our ongoing management methods. Making IT expenditure much more transparent to all decision-makers, and adopting a common business vocabulary around strategic, tactical, and operational spending, can have lasting beneficial impact on decisions at all levels. UIUC has a pilot project underway to test the usefulness of the Decision Support tools for IT planning in a small number of colleges.

As noted in various places throughout this report, we were able to develop only the most promising of the concepts we considered within the timeline given for our initial report. Many concepts are still on the table, and when we are able to enlist additional colleagues to assist in analyzing data, researching options, and building implementation plans, we can return to a next wave of initiatives. Our first priority must be to successfully launch the initiatives that have high probability of returning significant savings, but once those are launched, we should continue developing a pipeline of additional projects. Our final recommendation, therefore, is that UTMT add cost-effectiveness of IT services as a standing item on its agenda, forming workgroups as needed to evaluate the potential in a wide range of additional ideas for better management of IT resources.

[1] Comparative data from other institutions shows this level of spending to be quite normal—indeed, a little below average as compared with similar institutions. In the most recent data available for the Educause Core Data Service, the average IT expenditure for individual doctoral-level institutions was about \$274 Million (compared to our system-wide total of \$287 Million). Per-student expenditure on IT is \$1507 at UIUC compared with an average among doctoral institutions of \$1640 and \$799 at UIS compared with an average among MA institutions of \$884; central IT spending at UI represents 3.35% of all campus spending compared with an average for other doctoral institutions of 4%.

Unfortunately, the Educause Core Data Service does not report comparative data on total IT expenditure as a proportion of total campus expenditure. UIC did not participate in the Core Data Survey in 2008, and UIS data on central IT spending as a proportion of all campus spending are not available. Expenses that are shared among the three campuses (e.g., for services provided by AITS) are pro-rated among the campuses for purposes of this survey.

[\[2\]](#) Educause Core Data show that highly distributed IT expenditure is normal for research universities, a point discussed later.

Selected Background Materials

1. Prior Internal Reports

"Academic and Administrative Computing Subcommittee Report," University of Illinois, June 2003.

UIMC consultant's report.

IT@Illinois: Relevant reports gathered at <http://it.illinois.edu/content/resource-use-activities>.

2. Self-Study and Consultant-Assisted Reports from Peer Universities

North Carolina's Bain Report: "University of North Carolina Cost Diagnostic: Final Report," June 2009. Retrieved from http://universityrelations.unc.edu/budget/documents/2009/UNC%20Efficiency%20and%20Effectiveness%20Options_FINAL.pdf.

shall we include Berkeley's as well?

University of California-San Diego's 2009 self-study report: "Campus IT Services Tiger Team Report"

3. Information Technology Professional Organization Reports

Educause Center for Applied Research, many relevant reports gathered at <http://www.educause.edu/ecar>.

Educause Core Data Service, comparative survey data available at <http://net.educause.edu/coredata/>.

Healthcare Information and Management Systems Society

4. Independent Industry Research

Gartner Hype Cycle for Education 2009

Gartner Research: IT Key Metrics Data 2009

Gartner Research: Spend Less, Get More: 25 IT Cost Containment Techniques