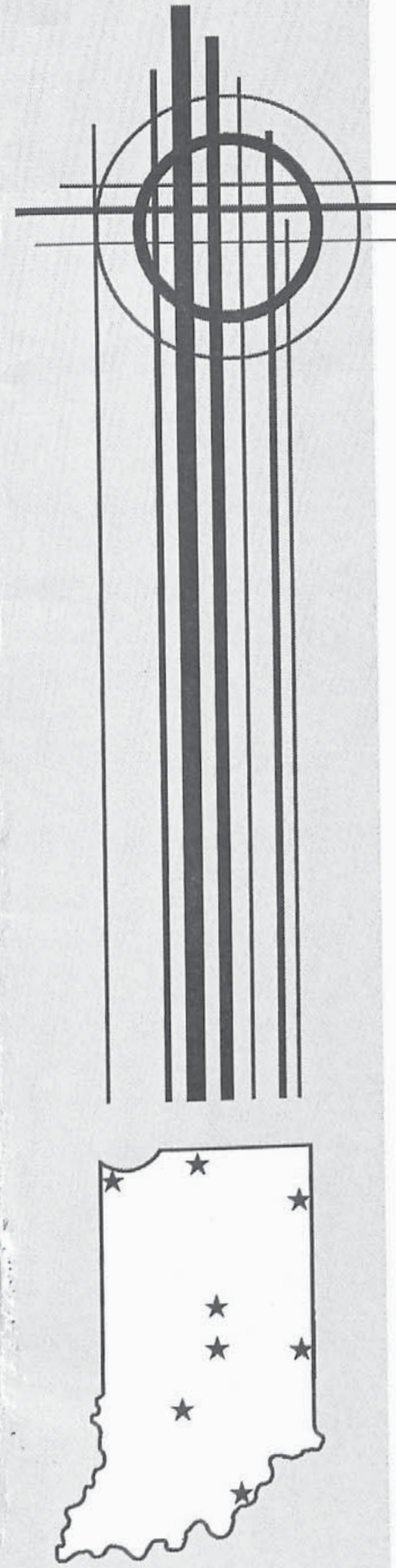
INDIANA UNIVERSITY

University Information
Technology Committee (UITC)



Midterm Assessment:

The Indiana University Information Technology Strategic Plan

December 30, 2001

Contents

Letter from Dennis B Gannon 2

Introduction 3

Midterm Assessment 7

Recommendation 1 7

Recommendation 2 8

Recommendation 3 10

Recommendation 4 12

Recommendation 5 16

Recommendation 6 19

Recommendation 7 25

Recommendation 8 29

Recommendation 9 31

Recommendation 10 35

Conclusion 39

Appendix: UITC and Taskforce Membership 40

January 17, 2002

Michael McRobbie, Vice President
Office of Information Technology
Franklin Hall 116
Indiana University

Dear Vice President McRobbie:

As Chair of the University Information Technology Committee, I am pleased to present to you the committee's Midterm Assessment of the IU Information Technology Strategic Plan.

The IT Strategic Plan was developed in 1998, with input from more than 100 faculty, staff and students who served on the University Information Technology Committee (UITC) and the four advisory Taskforces. Last year, you asked the UITC and Taskforces to assess progress toward the goals laid out in the IT Strategic Plan. Once again, more than 100 faculty, staff and students who serve on these groups devoted their time and attention to the important task of helping assure that Indiana University remains a leader in the application and use of information technology.

University Information Technology Services and the Office of the Vice President for Information Technology have spearheaded the implementation of this visionary and far-reaching strategic plan, and have made extraordinary strides to achieve the goals outlined in the IT Strategic Plan.

The report of this Midterm Assessment provides a summary of major accomplishments over the past three years, and identifies priorities for the remaining two years that are covered by the IT Plan. The accomplishments have been extraordinary, but as we observe in this report "the greatest challenge for the remaining two years of the IT Strategic Plan may be to sustain the progress achieved during the first three years, as the State's fiscal crisis threatens to put all these accomplishments in jeopardy."

The UITC strongly endorses the goals and priorities of the IT Strategic Plan, and we commend you and your staff for the excellent job that all have done in implementing the recommendations and actions of this plan.

In closing, I would also like to thank you for the help from Gerry Bernbom on the drafting and redrafting of this report. Gerry is a remarkably talented individual and IU is truly fortunate to have him in our family.

Sincerely,

Dennis B. Gannon, Chair
University Information Technology Committee

dg:ksw

Introduction

Background: The IT Strategic Plan

The Indiana University Information Technology Strategic Plan was developed in the winter and spring of 1998 by the University Information Technology Committee (UITC), with major input from the four Information Technology Taskforces. Additional input, with special attention to the regional campuses, was provided by the committee of campus computing directors. Further comments were solicited via the Web from faculty, students, and staff at large. In all, about 200 faculty, students and staff representing the IU campuses, large and small, participated in developing the IT Strategic Plan.

During the summer and fall of 1998, the IT Strategic Plan was presented to campus and university committees and councils, including the University Faculty Council and the Bloomington and IUPUI Faculty Councils, seeking comments on the Plan and advice as to its priorities. Nearly 150 presentations were made and consultations taken from June to December 1998. Following this period of extensive consultation, the Indiana University Information Technology Strategic Plan was formally approved by President Myles Brand and the Trustees, in December 1998, and the Office of the Vice President for Information Technology and CIO was given responsibility for its implementation.

The IT Strategic Plan has three major themes. First, that information technology can have a transformational effect on higher education: for research, for teaching and learning, for the university's information systems, and through the university's telecommunications systems and services. Second, that access to information, computing, and communications are the foundations for the transformational potential of information technology. And third, that lifecycle funding for information technology is essential and that technology can no longer be funded in an ad hoc manner or on a crisis basis. Building on these themes, the IT Strategic Plan consists of 10 major Recommendations and 68 more specific Actions. The IT Strategic Plan is a five-year plan, commencing in January 1999, and intended to guide IU's activities and initiatives in information technology until the end of 2003.

IT Advisory Committees: Midterm Assessment of the IT Plan

The university-wide committee structure for information technology used to develop the IT Strategic Plan remained in place after the completion and approval of the Plan. The UITC serves an advisory role to the Vice President for Information Technology and CIO (VPIT/CIO). The four Taskforces serve an advisory role to the four Associate Vice Presidents for Information Technology: Research and Academic Computing (RAC), Teaching and Learning Information Technology (TLIT), Telecommunications, and University Information Systems (UIS). Current membership of the UITC and Taskforces are listed in the Appendix to this report. (Also, see http://www.indiana.edu/~ovpit/strategic/appa.html for membership of the UITC and Taskforces as they were when the IT Plan was being developed.)

In November 2000, with the midpoint of the five-year IT Strategic Plan period approaching, the UITC and Taskforces were convened and charged to conduct a midterm assessment, to consider the implementation of the IT Strategic Plan to date, its successes or shortcomings, and possible recommendations for mid-course correction. The Taskforces first prepared preliminary reports, each from the perspective of their group's focus. These reports were presented to the UITC and this overall Midterm Assessment report was drafted for discussion, revision and approval by the UITC, before being forwarded to the VPIT/CIO with recommendations for action.

Assessment Overview: Sustaining Progress

We would like to begin this midterm assessment with a brief statement of overall findings. It is the opinion of the UITC that extraordinary strides have been made by the Office of the Vice President for Information Technology (OVPIT), by University Information Technology Services (UITS), and by other agencies within the university to achieve the vision outlined in the IT Strategic Plan. In some cases, such as advanced networking, progress has exceeded expectations; in this and other areas, the university is recognized as a national leader; and in many areas, while much progress has been made, further challenges remain. This midterm assessment contains a number of recommendations for midcourse revision or shifting emphases, yet the briefest summary of our findings and our strongest recommendation to OVPIT and UITS would be: "Well done! Press on!"

Indeed, the greatest challenge for the remaining two years of the IT Strategic Plan may be to sustain the progress achieved during the first three years, as the State's fiscal crisis threatens to put all these accomplishments in jeopardy.

Progress toward the goals set in the various Recommendations and Actions of the Information Technology Strategic Plan has been supported through the internal reallocation of funds within UITS and OVPIT, and through State appropriations of technology funds in the1999-2001 biennium and again in the 2001-2003 biennium. Additional State support was appropriated for the Abilene Network Operations Center, the I-Light optical fiber infrastructure (which connects IUB and Purdue West Lafayette with Indianapolis and IUPUI), and the State GigaPoP. Moreover, in the 1999 and 2001 sessions of the Indiana Legislature, funds were appropriated and bonding authority given to construct a building on the IUPUI campus that will house classrooms, laboratories, departments, centers, and institutes that have IT as a significant part of their programs and curricula. These resources have made information technology a major force in promoting the excellence of learning, teaching and research at Indiana University.

The UITC fully appreciates the State's fiscal crisis, and we know that Indiana University is committed to cooperating with and assisting the State as we work through current economic difficulties. Spending reductions proposed by the Governor include reduced appropriations to higher education. These cuts will be very painful, particularly as they would affect planned investments in information technology. We know that IU will make every effort to protect the academic mission of the university, so that research, teaching, learning and service are not adversely affected. However, the UITC also believes that Indiana University already plays a leadership role in enhancing the State's economy by building upon our strengths in information technology, thereby fostering growth and opportunity for all Hoosiers in the New Economy.

Midterm Assessment

The organization of this midterm assessment follows the organization of the IT Strategic Plan, dealing with the 10 major Recommendations in order and, as needed, with reference to some of the 68 specific Actions contained within those Recommendations. This assessment briefly summarizes a few major accomplishments associated with each Recommendation, identifies what may be needed to sustain progress, and proposes any mid-course revisions that the UITC wishes to recommend to the VPIT/CIO. More complete reports of progress toward the goals outlined in the IT Strategic Plan may be found in the annual UITS Accomplishments Reports http://www.indiana.edu/~uits/cpo/accomplish/.

Recommendation 1

The University should build a solid foundation of IT infrastructure that will help and enable IU to achieve a position of leadership, and to assure that sound fiscal planning permits the maintenance of this infrastructure at state-of-the-art levels.

Summary of Accomplishments

A major accomplishment of the IT Strategic Plan has been the implementation of "lifecycle funding" for all desktop computers, operating systems, and common applications. In partnership with the schools and campuses, OVPIT has completed the modernization and set aside replacement funding for all faculty, staff, and student technology center computers throughout the university. During the initial phase of this project, more than 10,000 obsolete computers in 110 schools and service units were replaced at a cost of $11M. A $6M annual lifecycle fund has been established to keep more than 15,000 faculty and administrative desktop computers up to date. The impact of systematic renewal of desktop computers throughout the university goes far beyond personal productivity and satisfaction. A population of computers with common powers and constrained variation makes the IT environment throughout Indiana University much easier to support.

Agreements with major software vendors, including Microsoft, Symantec, Oracle, SPSS, and others, mean that all IU computer users have access to the most recent releases of popular desktop software. The most extensive of these agreements, the Microsoft Enterprise License Agreement, has distributed almost 250,000 copies of the Microsoft operating systems and personal

productivity suites such as Microsoft Office. These agreements have resulted in savings for faculty, staff, and especially students of almost $50M thus far. Moreover, a common base of software, like a common hardware platform, makes these applications much easier to support. Additionally, UITS and IU Purchasing have negotiated to leverage the mass purchase power of the University to realize the lowest workstation prices to accommodate the life-cycle funding objectives. Such negotiations have now led to the purchase of over 13,000 machines by IU schools and departments, saving more than $7M over standard educational pricing.

Sustaining Progress and Mid-course Revision

All the Actions in the IT Strategic Plan depend upon adequate resources, but funding is at the heart of Recommendation 1. Here, as much as anywhere in the Plan, sustained progress depends upon sustained funding for equipment life-cycle replacement.

Recommendation 2

The University should provide students, faculty and staff with reliable access to computing and network services, on the campuses and off. (In the language of an older technology, "No busy signals!".)

Summary of Accomplishments

The longstanding problem of inadequate modem capacity on the two core campuses was effectively solved in 1999. During 2000, service was constantly monitored for quality and maintained so that busy signals were encountered rarely and modem access is, as a normal operating condition, rapid and straightforward.

Sustaining Progress and Mid-course Revision

While the quantity of connections has drastically improved, the quality of those connections will need additional attention in the coming 12-24 months. The overall need is not only to access campus and Internet resources, but also to be able to work seamlessly regardless of location (on campus or off). As at-home network speeds rise in the coming years, so will the desire of the user community to have a complete set of services available regardless of location. That will extend beyond one's "permanent" home, to the roaming

capabilities required by today's careers and lifestyles. Whether members of the IU community are on campus, at home, or on the road, they need access to all the services available to them.

"Anytime, anywhere" access may become an issue of security. To maintain the integrity of IU's IT environment at the same time that access is made more broadly available is a significant challenge. UITS is encouraged to continue its exploration and implementation of new security technologies.

Also in this area of remote access, the UITC endorses the plans regarding the ultimate migration of service from a model of University-as-provider to one that features University-as-facilitator between users and communication vendors. We note the fledgling activities in Bloomington with Smithville Telephone for DSL service as a good start. But the recommendation is to increase the priority of these endeavors and expedite the provision of services more broadly in Bloomington, around Indianapolis, and to each of the other six IU campus regions.

By the start of 2002, broad offerings for high-speed access (DSL and cable modems) should be available in regions around many of the IU campuses, so that faculty, students, and staff might take advantage of these services. As resources are freed from use for traditional dial-in modems, they should be re-invested into the infrastructure for high-quality peering connections to these enterprises that will now become the primary interface between IU affiliates and resources provided by the University.

The UITC endorses the UITS/OVPIT plan to seek to leverage the power of the 114,000-member strong IU community in the marketplace, and in fact suggests continuing to broaden that leverage to other areas such as cellular services and perhaps even long-distance rates and other IT-related acquisitions made by members of the IU community.

Regarding on-campus access, the UITC believes there should be priority in developing selected offerings of gigabit-Ethernet to workstations (not just buildings or floors), to provide high-speed pathways to advanced research activities. While realizing that IU may not be ready to deploy a gig-E to the desktop environment through the institution, UITS/OVPIT should develop policies and plans to deliver it selectively to users who can make productive use of that advanced connectivity.

Recommendation 3

Appropriate incentives and support should be established so that faculty and staff are encouraged in the creative use and application of information technology for teaching, research, and service.

The Actions associated with this Recommendation cover a broad and diverse range of issues: fellowships and development grants for faculty (action 7), IT support for faculty and staff (actions 8, 10), space for IT staff to be accessible to users (action 9), and issues involving promotion and tenure (action 6).

Summary of Accomplishments

When developing the IT Strategic Plan, the UITC recognized that there could be various incentives for faculty involvement in the use of technology for teaching and learning. Some, like promotion and tenure, are outside the scope of UITS or any IT organization, and should properly be addressed by faculty policy committees in each school. Ongoing dialogue on the issues of faculty rewards and incentives, related to the use of IT in teaching and learning, is needed among academic affairs offices, faculty leaders, and leaders in information technology.

Other incentives identified in the Plan included fellowships and development grants for faculty. The Ameritech Fellows Program was established by UITS to fund faculty to apply information technology to teaching and learning. Twenty fellowships have been awarded and the program is clearly a big success. In addition, the High Performance Network Application Program of faculty development grants has been established to help faculty exploit the capabilities of high performance networking in teaching and research. Twenty projects have been funded through this program.

To address the needs of IT support for faculty and training of IT support staff, UITS negotiated a university-wide licensing agreement with National Education Training Group, Inc. (NETg), for access to course titles ranging from basic IT skills for beginners to advanced training and specialized courses for IT staff. More than 600 NETg courses are available, either on the web or on CD. More than 5,000 users have registered to take about 350 different NETg courses online, and more than 25,000 NETg courseware CDs have been distributed.

Steps have been taken to address the goal of locating technical and support staff in office locations that are accessible to faculty, students and staff, and are conducive to productive work, in order to help the University leverage its investment in information technology and in UITS. Work is already under way on the IUPUI campus to create the new Communications Technology Complex (CTC), which will be home for network operations centers for global and national high-speed networks such as the Internet2 Abilene network, cutting-edge research in pervasive computing, and the delivery of IT support services to IUPUI's students, faculty, and staff. Planning has also begun for the Computation and Information Building (CIB) on the Bloomington campus. The CIB will be home to supercomputing, massive data storage, and enterprise information systems, and will bring IT resources, staff, and expertise to a central campus location to deliver IT support to IUB's students, faculty, and staff.

Sustaining Progress and Mid-course Revision

Because faculty participation is essential to the transformation of teaching and learning through information technology, the UITC encourages UITS/ OVPIT to explore partnership opportunities with other campus units to lower barriers to faculty engagement and increase direct incentives, for example:

- by making applications easier to learn (through the use of templates and incremental models, that are self-paced, flexible learning opportunities such as NETg, but improved and optimized for teaching and learning software applications).
- by encouraging the teaching and learning centers (TLTL at IUB, CTL at IUPUI, etc.) to hold more faculty workshops at non-traditional times: outside business/teaching days, in evenings, and on weekends.
- by offering TLIT services in multiple modes, including "house calls" by consultants, who could go to faculty offices to consult with faculty, or as collaborative partners who could work with faculty on extended projects.
- by supplementing services of the teaching and learning centers with other types of pedagogical support, including evaluators to help faculty critique effectiveness of their use of IT (in conjunction with classroom assessment goals).

- by developing TLIT internships for undergraduate or graduate students who would get pedagogical training and work with individual faculty members throughout a semester, not just to "run the slide projector" so to speak, but to actually help the faculty member experiment with a new approach to using IT, with the goal of letting faculty members see if the method works or not, in the context of their own course structure.
- by helping faculty "buy time" – working with units to encourage faculty to receive course-releases during school year to devote time to IT, perhaps in exchange for equipment support services from UITS.

Finally, the NETg initiative should be evaluated to see how it might be applied as a model for other standalone software tutorials that could provide anytime anywhere training in teaching and learning applications. Small, stand-alone modules might help faculty learn what they needed to know about how to use a particular application in a classroom setting if a consultant were not available.

Recommendation 4

Indiana University should assume a position of worldwide leadership in the use of information technology to facilitate and enhance teaching and learning.

The Actions associated with this Recommendation cover a number of interrelated issues, among them: digital media and web development (actions 12, 13, 14); web-based course services and infrastructure (actions 18, 19); classroom technology (actions 21, 22); and assessment (action 25). Progress toward other goals outlined in this Recommendation (e.g., faculty support and development services, action 11) will also help address issues of faculty engagement detailed above, in discussion of Recommendation 3.

Summary of Accomplishments

As a result of the IT Plan, additional staff and upgraded technologies have been made available to provide a higher level of support to faculty at the Teaching and Learning Technology Lab (TLTL) at IUB, and the Center for Teaching and Learning (CTL) at IUPUI. These centers are heavily used and highly rated in all surveys, and illustrate the potential of strong partnerships between the offices of academic affairs and UITS. Resources have also been designated to establish or expand teaching and learning centers at the IU campuses of East, Kokomo, Northwest, Southeast, and South Bend. These

centers promote teaching excellence by responding to local faculty needs, and encouraging faculty members to think carefully about how they design their courses first, and subsequently implement technology in their courses within that pedagogical framework.

IU has developed its first comprehensive, multi-classroom technology plan for general-purpose classrooms. This five-year plan, finalized in May 2000, calls for installation and support of technology in classrooms, and coordination of the design and renovation of classrooms to enable the use of that technology. The plan calls for more installed technology and less reliance on mobile equipment. Implementation is coordinated among UITS, Instructional Support Services, the University Architect's Office, and campus physical plant offices. Individual campus plans will be reviewed and updated annually.

Oncourse, the online learning environment, has grown to become one of the university's most used information systems. Launched first in 1999 at the core campuses, the user base has increased dramatically each semester. Student usage has increased by over 8,000 each semester, beginning with 723 in Spring 1999 to more than 50,000 in Fall 2001. Faculty use increased from 92 in Spring 1999 to almost 3,000 in Fall 2001. There are few if any institutions that can compare to the tremendous success of the Oncourse initiative when it comes to encouraging use of online learning systems. In the 2001 UITS User Survey, Oncourse showed a 91.2% satisfaction rate at IUPUI and 92.3% at IUB. The Oncourse development processes have been streamlined for improved implementation of faculty, student and staff suggestions. New and enhanced versions of Oncourse are now released three times a year, scheduled around the Fall, Spring and Summer semesters, and through this process, significant improvements have been incorporated into the Oncourse online teaching and learning environment. The University-wide Teaching and Learning Systems Steering Committee reviews suggestions for enhancements/additions originating from four sources: focus groups coordinated by the Manager of Online Learning, faculty forums sponsored by the CTL at IUPUI and the TLTL at IUB, the online suggestion box built into the Oncourse interface, and informal discussions with faculty. The Steering Committee makes recommendations about priorities, which are then incorporated into new versions of Oncourse.

Sustaining Progress and Mid-course Revision

There are still barriers that need to be addressed, so that all faculty can be involved in integrating technology into the educational process.

- While some network and equipment access barriers still exist, these are rapidly diminishing thanks to the successful implementation of life-cycle funding and other infrastructure and support initiatives.
- In some cases, the expense of acquiring and supporting specialty software limits the ability of faculty in small departments with limited budgets from teaching with the software they would like to.
- Faculty awareness has not kept pace with IT implementation. For those who know about available technology and make the effort, it works fairly well. But the willingness of faculty to take risks and experiment with new approaches to teaching and learning is in large part dependent on their own teaching philosophies and their perceptions of the pedagogical validity of the choices available.
- Even with the excellent support facilities at the teaching and learning centers for initial training, the time it takes to develop new instructional materials means that many faculty simply do not have enough time to use IT to enhance their own teaching.

Faculty time constraints are still an obstacle to increasing their involvement. The risks that faculty face in experimenting with pedagogy and trying something new could be eased in various ways:

- Offering tried-and-true models of other IU faculty can inspire confidence, putting these on the teaching and learning centers' web pages, but also linking them to the web pages of the Dean of Faculties offices, etc.
- Offering incremental pathways, small steps (interventions) in the use of IT that faculty members could fit easily into their existing pedagogical plans.
- Strengthening consulting support for face-to-face help, in planning and in-class implementation could make a difference.

Oncourse has been successful in providing a standard level of online learning environment services to faculty and students, but continued and accelerated development of Oncourse is needed to meet new requirements and add functionality, based on needs that are not presently being met by the system

(e.g., faculty requirements in some of the professional schools). A five-year plan for Oncourse, completed in January 2000, established a steering committee to advise UITS on future development. In addition to improved and added functionality, it recommends the development of a robust server environment to ensure redundancy and quicker response to problems. Ongoing responsibility for Oncourse development and operation is a joint effort of the TLIT and UIS divisions of UITS.

With respect to classroom technology, the UITC encourages UITS to continue to work with the various campus Classroom Committees to anticipate future needs to increase the variety and accessibility of learning environments. In practical terms the most pressing current problem is access. The faculty responses to the UITS User Survey suggest that faculty who use technology-equipped classrooms are satisfied with the facilities and services that are available in those classrooms. However some faculty report that technology classrooms are difficult to schedule and faculty may be reluctant to utilize them if they need them only occasionally or have difficulty reserving them.

In order to facilitate and enhance teaching and learning, the Digital Media and Web Development Services (DMWDS) plan was developed in Spring 2000 to create a single interface or front door to the University's most highly-skilled practitioners in instructional design, multimedia and digital development, as well as provide enhanced second-tier support for data management and Web technical services. Project support will include design services, media creation and programming services, software evaluation and testing services, Web hosting and technical services, distribution and access services, and project management services. This initiative is expected to have a major impact on the University's ability to develop and deliver multimedia and Web content. UITS will soon begin the first phase of launching this new service. Whereas other programs focus on individual faculty members, this initiative will focus on the needs of academic units through a program of grants offered to schools and departments in the form of services offered through DMWDS. The grants will reflect the true value of services rendered and establish DMWDS using a fee-for-service model. The Associate Dean for TLIT will work with Deans of the Faculties to define priorities and criteria for the awarding of DMWDS service grants to schools and departments. Projects expected to be considered include an initial number of "gateway" courses identified as having the most important impact on undergraduates.

During the second phase DMWDS will work closely with the Local Support Provider (LSP) programs to define and offer services to better enable LSPs to assist faculty and staff performing their own digital media work and Web development. Later, DMWDS will offer services with full cost recovery or with instructional material development subsidized with other funding, as available.

The IT Plan (action 25) states, "Faculty who participate in university-funded programs which support innovative applications of technology in teaching and learning should have access to the expertise and support resources needed to carry out an assessment of their project." The UITC recommend that this should not be limited to only faculty who receive funding, but to any faculty member who can be encouraged to include assessment. Establishing an assessment review committee to provide guidance in planning for assessment is a reasonable first step, and the UITC strongly recommends that the bulk of this committee should be made up of faculty members who understand the teaching and learning goals and faculty perspectives for different types of classes on the different campuses, including those with disciplinary expertise. Giving faculty easy access to a list of questions from the AAHE Flashlight inventory linked to the course management tools may be a good first step. However, effective assessment is more complex than comparing of pre- and post-course questionnaires within single courses, and more sophisticated analytical tools will be needed.

Recommendation 5

In support of research, UITS should provide broad support for basic collaboration technologies and begin implementing more advanced technologies. UITS should provide advanced data storage and management services to researchers. The University should continue its commitment to high performance computing and computation, so as to contribute to and benefit from initiatives to develop a national computational grid.

The Actions associated with this Recommendation address several services and initiatives for IT support of research, including: high performance computing and grid computing (actions 29, 31); computation- and information-intensive applications (actions 30, 33); massive data storage (action 32, also action 43 under recommendation 6); collaboration and communication (actions 27, 28).

Summary of Accomplishments

UITS now operates three supercomputers as resources for Indiana University: an IBM RS/6000 SP, a Sun Enterprise 10000, and a Linux cluster of Compaq PCs. The IBM SP system was upgraded in Fall 2001 and is now the largest university-owned supercomputer in the US. Also in Fall 2001, IU received a $1.8M grant from the National Science Foundation (NSF) to create a new and innovative facility called AVIDD for processing data generated by large scientific instruments. It will be a major new tool for teaching and research. AVIDD will initially be distributed across three IU campuses – Gary (IU Northwest), Bloomington (IUB) and Indianapolis (IUPUI) and will be integrated with very high network bandwidth using the University's new optical fiber infrastructure (I-Light).

These resources are used by IU researchers for a variety of projects. Approximately 6 percent of faculty and graduate students on the Bloomington campus use high performance computing (HPC) resources provided by UITS. At IUPUI approximately 10 percent of the faculty and graduate students use the UITS HPC systems. Together, they keep these systems running at up to 70 percent of their theoretical maximum capacity, and 72 percent of the jobs they submit make use of the parallel processing capabilities of these machines. A list of publications that result from research at IUB and IUPUI that uses UITS high performance computing facilities can be found at: http://www.indiana.edu/~rac/hpc/papers.html.

IU continues to be very active in grid computing. IU researchers and UITS are a part of the group that was awarded a major NSF grant to create a computational grid for high energy physics, called the Grid Physics Network (GriPhyN). IU researchers and UITS are also part of another major NSF award to build the International Virtual Data Grid Laboratory (iVDGL), with IU playing the lead role in developing the International Grid Operations Center (iGOC).

Site licensing of research software continues to be a great success. The Enterprise License Agreement for the statistical software package SPSS has been very popular. More than 3,500 copies of SPSS have been distributed to students, faculty, and staff on all IU campuses, and the agreement was recently expanded to include the Macintosh version. In Spring 2001, a similar university-wide license was negotiated with ISI for their programs ProCite, ReferenceManager, and EndNote. These applications will be of great value

for students and scholars in all the arts and sciences as well as in the professional schools. Overall, site licenses save the University well in excess of $100,000 annually, as compared to actual past expenditures.

In Spring 2000, an IBM 3494 tape library with 14 terabytes of available storage was installed at IUPUI, providing massive data storage local to IUPUI researchers. With this installation, IU became the first university to implement a remote High Performance Storage System (HPSS) data mover distributed over a wide-area network. This system builds on the capabilities of HPSS data movers and the IBM and STK tape libraries that are in the computer machine room at IUB. Use of the massive data storage services increased significantly in the past year. There are now more than 600 users of the HPSS-based massive data storage system, and almost 50 terabytes of storage in use (including mirror storage for selected datasets). As of year's end, there were almost 20,000 users of the recently implemented common file system (CFS) storage service, which is based on the Distributed Computing Environment Distributed File System (DCE DFS). Top users of the HPSS and the distributed file system (DFS) data storage services are researchers from a variety of departments including Astronomy, Economics, Geology, Informatics, Library and Information Science, Physics, Theater and Drama, and the IU Digital Library Program.

Sustaining Progress and Mid-course Revision

There are a number of real and perceived obstacles to usage of UITS supercomputers, especially by faculty not located at IUB. These systems are available to support research at all IU campuses, but are perceived to be 'remote' (Bloomington-based) to users at other campuses. While no one actually sits in front of a supercomputer to program it, the perception of remoteness has been problematic. For example, there is a general lack of awareness that supercomputing facilities are available to the faculty at IUPUI, and as a result many large scale computational tasks are conducted using dedicated research laboratory facilities. To improve faculty awareness, regular seminars and training workshops in the use of high performance computing should be held for faculty and research groups who may benefit from using IU's supercomputers (similar to the workshops that have been offered on massive data storage). Also, procedures for getting user accounts to use the HPSS massive data storage system need improvement. Research users at IUB can use a web based account management system to request a massive data

storage account, but the system doesn't work for users with an IUPUI network account. This must be corrected.

Network speed to the desktop is the other major issue to be addressed for optimal use of IU's massive data storage system. The slowest link for most potential users is the final connection to the workstation. Most users have a 10 Mbps Ethernet connection. At that speed it would take a minimum of 13.3 minutes to transfer a single 1 gigabyte file via FTP. Heavy users of HPSS may require a minimum connection of 100 Mbps Ethernet while some will require up to a gigabit Ethernet connection.

The Indiana Genomics Initiative (InGen) is a major undertaking of the IU School of Medicine, with funding from the Lilly Endowment, that will require substantial research computing support from UITS in areas ranging from high-performance computing, to massive data storage, to advanced visualization technologies.

Recommendation 6

University-wide prioritization, coordination, oversight and planning are required in the implementation and development of institutional information systems. In order for these systems to work together in a seamless manner and accommodate an ever-increasing number of users, UIS should implement common interfaces and a common information delivery environment that facilitate their integrated use. A new Student Information System should be a top University priority.

Actions associated with this Recommendation focus on the implementation of major, university-wide enterprise information systems including a new Student Information System (SIS), Human Resources Management System (HRMS), and Library Automation System (action 36). Other actions focus on IT architectures and infrastructure for these new information systems (actions 38, 43, 44, 45); development of a common user interface and improved access to information (actions 37, 39); data administration (action 40); and disaster recovery (action 42).

Summary of Accomplishments

Since the inception of the IT Strategic Plan, information systems have been completed and put into production for:

- Facilities Management (FIMS): tracking and inventory of facilities.

- Course Management (Oncourse): a Web-based course management tool, currently in use by 3,000 faculty and more than 50,000 students at all campuses.
- Library (SIRSI): a joint team of UITS staff and IU Libraries staff completed implementation of the SIRSI Unicorn Library Management System and web-based catalog (IUCAT) on December 31, 2000. This project was completed on time and slightly under budget. This project was funded jointly through the IT Strategic Plan, funds remaining from the earlier Ameritech Library project, and the library automation fund.
- IU Information Environment (IUIE): a new Web-based information environment was implemented and is being populated with new data as each new information system moves into production.
- Admissions: the Student Information System (SIS) project has already implemented the entire module; phase I in October 2000 and phase II in October 2001. This will be followed by the remaining Student Records, Student Financials and Financial Aid modules over the next three years. PeopleSoft is the vendor used for both the SIS and the new Human Resources Management System (HRMS).
- Timekeeping (HRMS): a system to track time of hourly employees is now in use for several departments. It will eventually be used for all hourly and bi-weekly staff.
- Oracle version of the FIS: the Financial Information System (FIS) was converted from the legacy Sybase database to Oracle.
- Electronic Research Project Administration (ERA): researchers can track their project proposals with this new system.

Steering committees have been established to oversee implementation of the various new enterprise information systems. These groups are meeting regularly and are working effectively. See http://www.indiana.edu/~hrsis/personnel.html#committees for details of the HRMS/SIS steering committee structure and membership.

The OneStart portal was implemented in the summer of 2001 to address the need for a common user interface. Faculty, students and staff will be able to access all their most frequented used applications from a single entry point

and take advantage of a single logon. Cooperative efforts are underway with the campuses to ensure the portal will meet their needs.

Infrastructure has been put into place to support the new information systems with the goal of retiring the mainframe at the end of the five-year implementation period.

Sustaining Progress and Mid-course Revision

Major changes in business processes and operational units to take advantage of new technology were recommended by Arthur Anderson consultants as needing to precede the new information systems. This has not yet happened, although we are moving ahead with implementation. The proposed Student Enrollment Services (SES) area, under the leadership of the new AVP for Academic Affairs, is struggling with funding issues. This new area is critical to the support of the SIS, as the various modules are moved into production.

Funding is of more general concern for the SIS project and the entire Peoplesoft effort, especially if available levels of funding result in reduced system capabilities or limited project scope. The UITC recommends ongoing review and monitoring of the SIS and Peoplesoft projects, so that system capabilities are regularly reported on to academic deans, department chairs and faculty. This will help assure that schools and departments have information in a timely manner that they may need to adapt their own departmental procedures and information systems to work with the new SIS. To the extent that we can anticipate these matters, IU should begin to plan for a post-implementation period within which additional features can be added to the system, as needed. It may well be that the need for any further development will remain unknown for a period of time, but IU should be positioned to act as the unknown is transformed into the known. The UITC recommends that overall UIS priorities should be reviewed by the UIS Taskforce in the upcoming semester to ensure that the most important initiatives are accomplished within the IT Strategic Plan's timeline.

Information management and access is a complex and changing situation at IU. The Data Stewards and Committee on Institutional Data (CID) have provided effective leadership in this area over the past ten years. However, it appears that the new SIS and HRMS enterprise systems and their information access components may engender additional complexities onto our information access requirements. A review of the data access policy is under-

way. Outcomes could affect the IU Information Environment (IUIE), as this area could easily require additional resources if the university were to require additional controls for specific roles or detailed information.

The following areas need greater attention and, upon review, may need additional resources.

- Storage management. The explosion of storage requirements associated with the HRMS and SIS enterprise system implementations is not unique to IU but was not fully understood at the beginning. The initial plan called for 3.5 terabytes of storage to accommodate the implementation needs. This was about over twice the storage that was allocated to the legacy environment. We have already allocated 3.5 terabytes of storage in the first two years, and the indication is that we might eventually need 20-30 terabytes. Other CIC institutions have experienced this same growth. The massive data storage initiative provides the foundation for backup solutions but does not address database storage needs, which requires dedicated disk. This is not just a need for more disk, but significantly adds to the complexity of the administration. Fortunately, the current application of Storage Area Network (SAN) technology will allow for this type of growth without significantly adding to system administration staff. However, there is a significant investment to build a SAN environment and one that was not planned for, given the immaturity of the SAN technology in 1998.
- Database instances. Another area is in the general management of PeopleSoft database instances, installation, development, test, training, staging, production, etc. The transition between releases and the management of those items will require significantly more instances to manage then originally planned. Storage is not the only need. Processor and memory requirements are also needed to support these new instances.
- e-Business. As part of the recently established e-Business process at IU, UITS resources will be dedicated to providing infrastructure, consulting and development support to units wishing to exploit e-Business opportunities. The focus will be on projecting these through the OneStart portal as the service delivery vehicle.
- Fiscal & Procurement Systems. IU is evaluating a consortial arrangement among several Big10 schools plus UC Davis to migrate the FIS to the Java platform. This would include a rework of the TOPS Purchasing/Accounts payable system that was a part of the original strategic plan.

- Departmental Information Systems. A strategy for the coordination and development of departmental information systems is needed.

The implementation of the SIS and the continuing development of the HRMS have highlighted the widespread distribution of independent departmental information systems throughout the University. These systems serve vital functions within their respective units, functions that are specific to those units and thus not available via enterprise systems like the SIS or the HRMS. At the same time, there are many functions carried out by these departmental systems that may be the same or similar among multiple academic units across the campuses. Cost savings and gains in efficiency may be possible through the development of a customizable departmental information system that would contain the basic functionality common to most of these units. This common framework could be developed with embedded integration to both the SIS and the HRMS, reducing the need for every academic unit to reinvent the same wheel. IU and UITS should develop and prototype such a core system as a pilot project. If proven feasible, a production system of this type should be developed and offered to all academic units. It is expected that any required customization would be undertaken by the respective academic unit.

- IU Information Environment. The IUIE will become widely used by many departments on all campuses needing to run reports from the institutional data warehouse. Information on timelines for data availability and access information needs to be made available.

- OneStart Portal. The OneStart Portal will continue to be enhanced with new services from the reengineered institutional information systems as they are brought online. The ability to authenticate once and then access all authorized services is still outstanding. Also of importance will be coordination of OneStart with access to Oncourse, the SIS, digital library services, and other student-oriented information resources.

- Oncourse. As noted above (Recommendation 4), ongoing development of Oncourse, to better meet school and department needs, will continue to be a priority in the years ahead.

- Document Management. Another key area is document imaging and document management. This activity is now being pursued by UITS as an institutional initiative, but funding has not been provided. All of the other

CIC institutions have invested in these technologies. This is a critical new technology area for IU that offers significant operational improvements for a wide variety of administrative and faculty activities.

- Student Portfolios. Related to document management, the emerging but still incipient development of student portfolios needs attention because of issues related to mass storage, systems management and integration, and faculty development. In particular, the development of a portfolio with the flexibility to accommodate student self-management with controlled linkages to Registrar records systems will require careful attention. The potential for portfolios to become a major form of certification of student learning needs to be anticipated.

- Portal calendar. The enterprise portal for Indiana University (OneStart) requires a personal calendar service for students, faculty, staff, and alumni. This calendar should provide the ability to pull together appointments from academic calendars (class schedules, exam schedules, homework assignments), work calendars (meetings, workshops, deadlines, vacation days), events calendars (theater events, athletic events, group activities), and personal calendars (personal appointments and social events).

- Handheld Devices. UITS should investigate the delivery of courseware and student services via handheld devices.

- Infrastructure. There a number of projects such as OneStart, improved Accounts Payable, Timekeeping, and others that have added significantly to demands for computing and storage infrastructure. UITS is undertaking a much better capacity planning process now that we have clearer understanding of needs. However, it is clear that the IT Strategic Plan funding at full levels will not support all of these items at currently planned levels, and reduced state support will only aggravate the shortages.

- Disaster Recovery. A disaster recovery plan that describes emergency response procedures is nearing completion, but disaster recovery planning needs to continue and be kept current in order to ensure business continuity in the event of a major disaster.

Recommendation 7

The University should accelerate planning for a converged telecommunications infrastructure. The University and campuses must ensure that there is appropriate funding for telecommunications services and infrastructure in the base. Specific attention must be given to improving the state of the inter-campus networks, planning for and deployment of adequate commodity Internet connectivity, a University-wide base level of campus telecommunications connectivity, advanced networking infrastructure and applications, wireless networks and support for multimedia and streaming media.

The Actions associated with this Recommendation address the development and implementation of an array of telecommunication services and initiatives, including: network convergence (action 46); intercampus networks and commodity Internet (actions 48, 49); advanced applications and networking (action 50); wireless (action 51); and multimedia and streaming media (actions 52, 53).

Summary of Accomplishments

Overall, we are encouraged and impressed with the progress made to date on implementation of the IT Strategic Plan in the area of telecommunications. While one would expect that the first portion of any undertaking of this nature would involve a great deal of infrastructure work not necessarily resulting in highly visible achievements, the implementation effort thus far has achieved some very remarkable and visible successes.

The UITC specifically desires to highlight the following successes:

- Off-Campus Access (no busy signals) – installation of sufficient quantities of modems to end the decade-long struggle to gain access to campus resources and the Internet without encountering a never-ending busy signal;
- On-Campus Access – the growth of the campus networks has been impressive, as has the modernization of the network in the Residence Halls at IUB, all the while maintaining excellent overall performance with enhancements to the backbone structures of the network; the expansion of the IU network, and its connections to both commodity Internet and Internet2 have also been impressive;

- Advanced Networking – establishing IU as a "hub" for national and international advanced research networking.

Generally, the "order of attack" selected by the Telecommunications Division of UITS has been laudable. As stated above, the UITC realizes that a great deal of work thus far, on many action items, has been focused on "below the ground" activities. That said, there are some areas that could stand more attention and focus in the coming year(s), to produce results that are visible to the user community. Remote access, wireless access, multimedia and streaming media are all areas where priority must be given to achieving visible results in the next 6-18 months. The UITC concurs with the approach taken thus far by UITS in regard to convergence – careful assessment and preparation but no pre-emptive jumps into this developing technology. Priority should remain high on aggressive testing and trialing of the new technologies, as should communication of the results to interested IU user community members.

The UITC recommends maintaining the priority on developing IU as a center for advanced networking. The credibility and prestige that this provides to IU in the advanced networking community is great, and pays tremendous dividends to the institution and the community of scholars on the campuses. IU should continue to seek out opportunities to leverage its Network Operations Center, bringing more global network connections into existence and continuing to support and foster the growth of advanced network environments.

Sustaining Progress and Mid-course Revision

Telecommunications technology can have a major impact on the design and planning for new buildings and facilities upgrades to existing buildings. Building planning is a fairly long-horizon activity, and is not as flexible as the IT environment. However, building designers, when made aware of possible impacts of technology, can be flexible in their efforts so that despite the lack of technology predictability, our new buildings can provide a technology-friendly environment for whatever technology exists at the time of use. To coordinate network design with construction and remodeling of university buildings, UITS/OVPIT should work closely with the Facilities Planning function of the University.

Priority should be given to the continued monitoring of demand for commodity Internet bandwidth and the reasonable provision of such, while also realizing that use policy is a necessary element. The UITC lauds the efforts at IUB to separate the Halls of Residence network use from campus use, and recommends that similar models be used as residences develop on the IUPUI campus. Continued efforts to include student residents in the planning and use of their Internet resources should follow the excellent start made by UITS as it assumed responsibilities for Halls IT services in 2000.

As IU becomes a larger provider of networked information resources, and not just a growing content consumer, attention in this area should focus on ways to leverage technology to improve performance of access to IU resources from the Internet.

The I-Light optical fiber infrastructure, connecting IU and Purdue campuses at Bloomington, Indianapolis, and West Lafayette will not only benefit IU internally, by making available huge quantities of bandwidth linking the campuses (and more closely linking IU with Purdue). The UITC believes that this will be a resource that can be leveraged to provide a variety of related benefits. UITS/OVPIT must make it a priority to complete the I-Light project by the end of 2001, and to focus greater attention into leveraging the benefit beyond simply connecting IUB and IUPUI and Purdue with a network that will allow for seamless communication environments across the middle part of the State. Efforts must accelerate to connect this infrastructure with the one being developed in the State of Illinois (via the University of Illinois – Champaign/Urbana). UITS/OVPIT must also explore how to leverage this resource to provide the basis for growth of the State of Indiana's telecommunication infrastructure, and expansion of related network services such as faster connections to both the commodity Internet and Internet2.

The UITC is pleased with the progress UITS has made in technology assessment; the UITC is also mindful of the implications for developing policy, the risk of short life-cycle of investments, and the rapid changes taking place in networking technology. Nevertheless, the UITC recommends that UITS/OVPIT must make more visible progress with deployment of wireless services. IU's core campuses in Bloomington and Indianapolis are already acknowledged as 'most wired' in the national arena. The goal should be for IU to achieve similar ranking for its expansion of the network beyond the wire-constrained walls of the institution. UITS/OVPIT must walk carefully

the line between rapid deployment of services and prudent exercise of investment in a broad infrastructure for wireless. The focus thus far on basic services, such as e-mail and web access, is prudent. What is needed now is more in the way of visible deliverables. That said, the UITC strongly urges UITS/OVPIT to expand the wireless initiative beyond basic needs and look for ways to encompass special applications. These include the ability to integrate the use of hand-held personal data appliances (PDA's) into the wireless initiative.

The issue of unified messaging – the convergence of electronic, voice, and ultimately video mail – is not directly addressed in the IT Strategic Plan, but is related to the issues raised in Recommendation 7 regarding planning for a converged telecommunications infrastructure. UITS has performed well in provision of e-mail infrastructures and the development of more broadly accessible e-mail services via the Web. And investigations have begun into the convergence of voice mail systems with e-mail systems, in a foundation for unified messaging. The UITC recommends that emphasis should be placed on continued advancement of this technology, as user needs for convergence of messaging services into a unified environment will only increase over the next five years. Critical components will be to ensure life-cycle funding for the infrastructure, and to establish and make available to university constituents, as they demand it, the technology needed to provide for a single messaging architecture, whether the user device be a telephone (wired or cellular), a computer (wired or wireless), or a personal digital assistant (cradled or wireless).

No area more displays the fact that work has been building 'underground' than distributed media services – the use of multimedia services and the deployment of streaming media services. The UITC is aware and appreciative of efforts to expand the overall network infrastructure to handle these high-bandwidth-need services, the modernization of the existing (and successful) VIC environment, and the exploration and assessment of new technologies. However, results need to materialize in ways visible to the user community, sooner rather than later. Digital media services, such as streaming media and collaborative tools, are rapidly becoming available as commodities in the market. It is no longer acceptable that these tools, available more and more as common items on shelves in stores, are only available within the University as advanced pilots and trials. They must become commonplace in a supportable and highly functional fashion in the coming academic year. Again, this is not intended as a harsh criticism of the work done to date. Those involved in

providing the infrastructure services have done an excellent job in formulating tactics, assessing technologies, and ramping up the critical human resources needed to make visible progress. The UITC wants to set the priority high so that in 2001-2002, visible progress in deployment of these services and their support can be achieved.

Recommendation 8

IU must provide the information technology tools, infrastructure, and support services so that students may effectively engage in learning and research, appropriate to their various academic disciplines and areas of study. IT support for students should include technology support centers and a computing environment that is seamless across boundaries of campus, home, residence hall, and community.

The Actions associated with this Recommendation address IT support services for students, including: Student Technology Center and Support Center services (action 54); access in student residence halls (actions 55, 56, 57); and student ownership of computers (action 58).

UITS provides support for all aspects of IT on the Bloomington and Indianapolis campuses and provides some measure of IT support to all campuses of IU. Substantive support efforts range from the general support offered by the UITS Support Center and the KnowledgeBase, to support for the use of database applications and geographic information systems, to support for Departmental Support Providers.

Summary of Accomplishments

Front-line support services on the two core campuses have been extended to improve student access to IT help. Hours at the IUB Support Center now match those at the IUPUI Support Center, Monday-Thursday, 8am-9pm, with both Centers having extended evening and weekend support hours. Four new professional staff members were hired at the core campuses to enable this extended support, providing longer evening and weekend hours. Provisions were also made for late-night support by training Student Technology Center staff to respond to user calls that "roll over" from the Support Center telephones.

Responsibility for IT in the Residence Halls at IUB was transferred from Residential Programs and Services to UITS in March, 1999. Major strides were made in the Residential Technology Centers and the Residential IT

Support services. Hardware was replaced in all of the Residential Technology Centers and the standard Student Technology Center desktop image and printing services were deployed on these machines. New Residential Technology Centers were established in common areas or relocated in areas close to Academic Support Centers. Networks were upgraded in all dormitories, and new services were deployed for fall network installation and in-room consulting. Residential IT Support services are tightly integrated into the services of UITS, such as the Support Center, the Knowledge Base, and the Education Program. These changes resulted in enormous improvements in user satisfaction, reported in the 2001 User Survey.

Our students of the information age have come to expect the flexibility of getting IT access and support when and where they need it, demands that place serious burdens on network capacity and support services. In response, UITS has developed creative and effective partnerships to create a dynamic and seamless IT environment for students. UITS and IU Purchasing actively work with computer hardware and software vendors to achieve the highest value for IU in purchases of computers, applications, and operating systems. Terms and conditions, prices and features negotiated by IU for institutional purchases of hardware are offered to all members of the IU community – students, faculty, and staff – for their personal purchase and use. These considerations, along with the various university-wide licenses for operating systems and applications bring considerable savings to every student who attends IU. The strategy of creating incentives, rather than requirements, for student ownership of hardware and software appears to have been effective, giving IU the opportunity to evaluate how to invest in student technology access in the future.

Distributed education will be creating a variety of large and small specialized facilities around the different campuses. Plans for facilities such as the "information commons" and wireless experiments in the libraries, will help create a healthy variety of social spaces for the use of IT that will become increasingly integrated into student lives

Sustaining Progress and Mid-course Revision

A new Enterprise-wide Support Management system was acquired in Summer 2001 to provide seamless integration of user support information, communication, workflow, change management, and incident tracking, for

all IU campuses. This system will allow user support information and task management between units within UITS, between IT organizations on the various campuses, and between the departmental Local Support Providers and UITS. The first phase of implementation is expected in January 2002. This system will provide improved support services to all IU faculty, staff, and students.

Recommendation 9

The University should build upon and expand its digital library program, and develop the digital library infrastructure needed to support research, teaching and learning.

The Actions associated with this Recommendation address the development and implementation of an array of digital library services and initiatives, including: digital library infrastructure (action 60); access to electronic resources and electronic reserves (actions 61, 62); life-cycle funding for existing digital library services (action 63); digital archives and electronic records (actions 64, 65); and digital library research (action 59).

Summary of Accomplishments

The IU Digital Library Program is a collaborative effort of the Indiana University Libraries, OVPIT, and the University research faculty with leadership from the School of Library and Information Science. The IU Digital Library Program has undertaken or completed a number of digital collection projects, including:

- Digital Stardust-Hoagy Carmichael Online: This is a digital library collection containing significant portions of Indiana University's collection of materials – sound recordings, photographs, sheet music, and correspondence – pertaining to the life and career of songwriter Hoagland "Hoagy" Carmichael (1899-1981). This two-year project was funded in part by the Institute of Museum and Library Services (IMLS) and was completed in September 2000. (www.dlib.indiana.edu/collections/hoagy/)
- Digital Photography Collection of the Gary Works: IU has undertaken a project to digitize and present on the Web the US Steel Photograph Collection, a series of 1,900 photographs documenting construction of the Gary Works steel mill and the corporate town of Gary, Indiana. The

project is a collaboration with the Calumet Regional Archive at the IU Northwest campus. (www.dlib.indiana.edu/collections/steel/steel.html)

- Charles W. Cushman Collection: In November 2000, IU received an IMLS National Leadership Grant to digitize and present on the Web nearly 18,000 Kodachrome slides taken between 1938 and 1969 by the photographer Charles W. Cushman. Cushman's photographs document a wide breadth of American life in skillfully composed and socially revealing images that add color to the World War II era, which was primarily documented in black and white. The project is a collaboration of the IU Digital Library Program and the University Archives. (www.dlib.indiana.edu/new/cushman/)

- Digital Library of the Commons: The Digital Library Program and the Workshop on Political Theory and Policy Analysis are developing a Web site to support online access to research papers, working papers, and other scholarly materials in the field of common pool resources. The Workshop hosts the Web site of the International Association for the Study of Common Property (IASCP), providing access to working papers, pre-prints, and other full-text resources. (dlc.dlib.indiana.edu/)

- Electronic Texts. IU plays the leadership role in the Wright American Fiction Project, in which nine libraries in the Committee on Institutional Cooperation (CIC) have undertaken a three-year project to digitize the novels listed in Lyle Wright's bibliography, American Fiction 1851-1875. IU also plays a major role in ongoing development of the Text Encoding Initiative (TEI) standards for electronic texts.

A number of digital library projects have been undertaken by the IUPUI University Library, including:

- University Libraries and Museums Community Project: In this project, funded in part by an IMLS National Leadership grant, the IUPUI University Libraries offers access to digital image databases to public libraries and K-12 educational institutions. The Indianapolis Museum of Art has joined IUPUI University Libraries as the main supporting partner on the Community Project, whose purpose is to enrich the lives of members of the community through visual arts. (www.ulib.iupui.edu/imls/)

- Electronic Atlas of Central Indiana: This project of the IUPUI University Libraries is a Web-based repository of maps and Geographic Information Systems (GIS) data covering central Indiana. Partners include The Polis Center, the IUPUI Center for Earth and Environmental Science, and the Indiana Geographic Information Systems Initiative. (atlas.ulib.iupui.edu/)

In October 2000, Indiana University received a $3M award from the NSF's Digital Libraries Initiative to support research and education in the field of digital libraries for music. The Digital Music Library project (dml.indiana.edu/) will develop a digital library testbed system containing music in a variety of formats, including sound recordings, musical scores, and computerized music notation. The system will serve as a foundation for research in the fields of music instruction, usability, human-computer interaction, and intellectual property rights. Participating in this project are faculty and staff from a broad range of disciplines and departments, including Music, Library and Information Science, Law, Computer Science, the University Libraries, and UITS.

In Fall 2001, Indiana University received two additional awards for major digital library development initiatives. The Cultural Digital Library Indexing Our Heritage (CLIOH) project is a multi-disciplinary project attempting to digitally preserve endangered archaeological sites, compiling vast amounts of data – from still photos to virtual-reality tours – that can be accessed through the Internet. Funding for CLIOH comes in part from an award from IMLS (www.cs.iupui.edu/~clioh). The ReciprocalNet project is an inter-institutional collaboration, led by the IU Molecular Structure Center, to create a national digital library of molecular structure data; software tools for visualizing molecules and interacting with these data; software components for constructing educational lessons based on the collection; and examples of such lessons as the beginning of a public repository for educational materials based on the collection. Funding for ReciprocalNet comes in part from the NSF's National Science Digital Library program (www.recipnet.indiana.edu/). The CLIOH and ReciprocalNet projects are both initiatives of the School of Informatics with participating faculty and staff from a number of disciplines and departments. CLIOH includes faculty and staff from Computer Science, Library and Information Science, Anthropology, Journalism, New Media, Museum Studies, and Music. ReciprocalNet includes faculty and staff from Chemistry, Computer Science, Education, and UITS.

During Fall 2001, the IU Libraries piloted electronic reserve projects in the Main Library and Education Library. A mix of graduate and undergraduate courses including some which serve students at a distance made use of e-reserves as part of this pilot. Systems for scanning documents into reserves were set up at the Education and Main Libraries and use of an option to fax documents directly into posting queues has aided a decentralized approach. The e-reserves pilot has proved very popular with students and faculty, with over 300 accesses per month on some documents. The Libraries are planning to expand implementation on the IUB campus during Spring 2002, with a further goal to make the system available to all IUB libraries in Fall 2002, and begin to phase in the other IU campuses at that time. The IU Libraries are also currently defining library services for access through the OneStart portal. Access to Digital Library services should also be incorporated into OneStart.

Sustaining Progress and Mid-course Revision

Digital library developments in the areas of access to electronic resources and electronic reserves (actions 61, 62) are closely linked to the mission of the TLIT division of UITS and to the Office of Distributed Education (ODE), and to the various teaching and learning initiatives. Activities related to these action items should be coordinated with initiatives of TLIT and ODE in order to assure that they are developed in a way that supports teaching and learning and contributes to the University's distributed education initiatives.

Although the recommendation does not explicitly state that the Digital Library Program is intended as a university-wide initiative, to this point, the Digital Library Program has clearly pursued initiatives involving the various campuses and units. It is important that the Digital Library Program continue its outreach to the various campuses, and that it continue to develop mechanisms for the orderly inclusion of all the campuses in its projects.

The IU Libraries and the IU Archives are actively planning for the preservation of digital records, documents, and publications. These plans will impose additional requirements on UITS – permanent, secure storage in particular – thus continuous coordination among the IU Libraries, University Archives, and UITS is important. As well, there should be coordination of these efforts with any upcoming work in the areas of document imaging and document management, as described above in comments on Recommendation 6.

Recommendation 10

The University, with leadership from the OVPIT, must continue to develop policies and implement procedures that protect the security of IU's information technology resources and institutional data, safeguard personal privacy, and respect intellectual property rights, while at the same time promoting two traditional university values associated with academic freedom: access to information and freedom of discourse.

The Actions associated with this Recommendation address issues of information technology policy and security, including: the protection of information and security of IT resources (action 66); authentication and access mechanisms (action 67); and intellectual property (action 68).

Summary of Accomplishments

Over the last five years OVPIT and UITS have responded to computer security threats and to the challenges of copyright and other legal mandates and constraints with both programmatic and organizational changes.

IT Policy and Security Offices in OVPIT have been established, well staffed, and given broad powers related to securing the University technical infrastructure. Many online services have been established, including security how-to and best practices documents, a subscription vulnerability advisory service, and a vulnerability scanning service. The Indiana University Board of Trustees resolved (4 May 2001) that the University network must be secure from intrusions, and that the privacy of sensitive information available through the University network is protected from unauthorized access. Implementation of this resolution was delegated to the Vice President for Information Technology and Chief Information Officer and through him to the Policy and Security Officers. As a result, more scans for vulnerabilities within the University network are being done unilaterally by the Security staff based on reports of potential threats, and more proactive self-defense actions are being taken such as isolating non-secure University systems from the campus network and the Internet. In addition, wide distribution of anti-virus software, secure connection software, and other security software to all users, and the deployment of specialized security software at the network and server level, is helping users and technicians better secure their workstations and servers.

There is also a heightened general awareness amongst users of security dangers, unfortunately fueled by recent high-profile incidents. The Policy and Security Officers have been busy making presentations to executive and senior administrators, and meeting with various constituent groups, in an effort to help counter threats through education.

Considering all of this, there are still risks to personal and institutional information, and it remains the responsibility of the individual user and the technician to ensure that systems they use and maintain, and the data housed thereon, are secure.

Sustaining Progress and Mid-course Revision

One of the major ongoing initiatives of the IT Policy office, requiring continued attention and effort, is the deployment of Global Directory Services (GDS), which will:

- Establish standards, procedures, and mechanisms for appropriate identification and authentication of users of Indiana University technology resources; includes management of University account administration procedures, applications, processes, and authentication devices.
- Develop and administer a comprehensive University online user information store ("directory") with application program interfaces and associated access controls as required.
- Establish procedures for address book services, including procedures for record suppression as required in consultation with data stewards and other data and functional area experts.
- Establish procedures for generation, distribution, and management of computer accounts, in conjunction with technology support centers, service administrators, and functional area staff.

IU holds licenses for a large number of important databases that serve the needs of faculty, staff and students. Given the increasingly diverse set of paths available to access the University network, and given the limitation on database access in many cases to those who have authenticated to the network, it is important for UITS to structure new authentication mechanisms that will allow legitimate users of these resources access under a broader range of circumstances. It is important to recognize that GDS is a partial solution to a broader problem.

Global authentication and authorization for all University campuses is a major outstanding need for support of online library services. Many of the electronic resources now available through the catalog are licensed separately by campus, or groups of campuses. Without the GDS in place, the Libraries cannot easily authorize patrons for appropriate access. In addition, one of the richer enhancements needed would allow patrons to self-renew materials, place holds, receive e-mail notices for overdue notices, recalls, etc., and check on-line to see what materials they have checked out. Without a means to authenticate patrons across all campuses, these features cannot be deployed. There is also an increasing demand to provide electronic reserves for all campuses; again, this requires a means to authenticate and authorize patrons based on their enrollment in particular classes.

The Policy Office is also charged with developing and administering policies related to appropriate use of technology, including application of and responding to violations of University "Fair Use" provisions for digitized intellectual property and copyright, in consultation with University Counsel and the Copyright Management Center. The Policy Office is working with Dr. Kenneth Crews, Director of the Copyright Management Center, to develop resources for University faculty using technology in instruction, to ensure that faculty they are aware and are adhering to acceptable principles of copyright and fair use.

Implementation of the Board of Trustees resolution of 4 May 2001, and prudent protection of sensitive personal and institutional information, will require that all departmental servers which contain such information (so called "shadow" databases), whether in academic departments, institutes, or centers or under the control of offices like the bursar, admissions, or the registrar, are as secure as the secure administrative computers and databases under UITS control. If these departmental servers cannot be secured, then all personal information must be removed from them or the servers must be placed under the control of and be secured by UITS in consultation with IT Security Office. If this mandate is approached as a "client-server" security problem, then it has a fairly straightforward resolution. Even if the "server" is a desktop computer in an academic department that contains student information that is protected by law and regulation, then it must be secure or that

information must be expunged. If, however, the model becomes "Peer-to-Peer" (P2P), then security becomes an even more critical element in the management of even the most humble laptop computer that is brought into a lecture hall as part of a course (either by the lecturer or by a student).

Conclusion

As we stated at the outset, it is the opinion of the UITC that extraordinary strides have been made already to achieve the vision outlined in the IU Information Technology Strategic Plan. In some areas, progress has exceeded expectations; in a number of areas, the university is recognized as a national leader; and in many areas, while much progress has been made, further challenges remain. This midterm assessment contains a number of recommendations, yet the briefest summary of our findings and our strongest recommendation to OVPIT and UITS would be: "Well done! Press on!" Indeed, the greatest challenge for the remaining two years of the IT Strategic Plan may be to sustain the progress achieved during the first three years, as the State's fiscal crisis threatens to put all these accomplishments in jeopardy.

The UITC fully appreciates the State's fiscal crisis, and we know that IU is committed to cooperating with and assisting the State as we work through current economic difficulties. Spending reductions proposed by the Governor include reduced appropriations to higher education. These cuts will be very painful, particularly as they would affect planned investments in information technology. We know that IU will make every effort to protect the academic mission of the university, so that research, teaching, learning and service are not adversely affected. However, the UITC also believes that Indiana University already plays a leadership role in enhancing the State's economy by building upon our strengths in information technology, thereby fostering growth and opportunity for all Hoosiers in the New Economy. We would not want to see this leadership role undermined, or to see the potential for IU and information technology to be a force for growth and development in the Indiana economy diminished.

Appendix: UITC and Taskforce Membership

University Information Technology Committee

Name	*School*	*Campus*
Gannon, Dennis (chair)	CSCI	IUB
Andrews, Moya	Dean of Faculties	IUB
Cronin, Blaise	Dean, SLIS	IUB
Huffman, John	Chemistry	IUB
Oakman, Jacob	Student Body President	IUB
Randolph, J.C.	SPEA	IUPUI
Landess, Jackie	Study Body President	IUPUI
McBride, Angela	Dean, Nursing	IUPUI
Plater, William	EVC and Dean of Faculties	IUPUI
Schneider, William	History	IUPUI
Stocum, David	Dean, School of Science	IU
Dunn, J. Michael	Informatics	IU
Thorin, Suzanne	Dean, Libraries	IUK
Desai, Mayur	Business	IUN
Moran, Bob	Libraries	IUE
Shapiro, Susan	Psychology	IUB
Miller, Ted (chair, UIS Taskforce)	SPEA	IUPUI
Jay, Steven (chair, Telecom Taskforce)	School of Medicine	IUB
Sept, Jeanne (chair, TLIT Taskforce)	Anthropology	IUPUI
Palakal, Mathew (chair, RAC Taskforce)	CSCI	IUPUI
Billings, Diane (chair, IN ITC)	Nursing	IUS
Mand, Larry (chair, CCDs)	OIT	
OVPIT Members		
McRobbie, Michael	Vice President for Information Technology and CIO	IU
Boschmann, Erv	Associate Vice President, Distributed Education, OVPIT	IU
Elmore, Garland	Associate Vice President TLIT, OVPIT	IU
Holland, Norma	Associate Vice President UIS, OVPIT	IU
Peebles, Chris	Associate Vice President RAC, OVPIT	IU
Voss, Brian	Associate Vice President Telecom, OVPIT	IU
Adams, Karen	Committee Liaison, OVPIT	IU

Research & Academic Computing Taskforce

Name	*School*	*Campus*
Palakal, Mathew (chair)	CSCI	IUPUI
Alberts, Jeffrey	Psychology, Assoc. Dean of RUGS	IUB
Biegle, Melinda	Student	IUB
Dzierba, Alex	Physics	IUB
Haven, Betty	Kinesiology	IUB
Horowitz, Charles	Physics	IUB
Pavlis, Gary	Geological Sciences	IUB
Wheeler, Brad	Kelley School of Business	IUB
Buckwalter, Kenneth	Radiology, School of Medicine	IUPUI
Chin, Raymond	CIS	IUPUI
Fineberg, Naomi	Medicine	IUPUI
Stocker, Randi	Libraries	IUPUI
Sutton, Robert	Liberal Arts/Classics	IUPUI

Willing, Steve	Medicine	IUPUI
Wilson, Kathryn	Science	IUPUI
Xu, Zao C. (Joe)	Medicine	IUPUI
Aune, Kirk	OIT	IUSB
Rosen, Marty	Library	IUS
Scott, C.L. "Bert"	Business	IUN

OVPIT/UITS Members

Peebles, Chris	Associate Vice President RAC, OVPIT	IU

Teaching & Learning Information Technologies Taskforce

Name	*School*	*Campus*
Sept, Jeanne (chair)	Anthropology	IUB
Brogan, Martha	Library	IUB
Caras, Kathryn	IU Press	IUB
Cunningham, Don	Education	IUB
Dunning, Jeremy	Interim Dean, Sch. of Continuing Studies	IUB
Foltz, Jeramy	Student	IUB
Galindo, Enrique	Education	IUB
Leone, Peter-John	IU Press	IUB
Maki, Dan	Mathematics	IUB
Smith, Ray	ISS & Writing Program	IUB
Acheson, Doug	Engineering & Technology	IUPUI
Barger, Kenneth	School of Liberal Arts	IUPUI
Billings, Diane	Nursing	IUPUI
Freeman, Julie	Liberal Arts/English	IUPUI
Hernandez, Emily	Allied Health Sciences	IUPUI
Keck, Juanita	Nursing	IUPUI
Overhage, Marc	Medicine	IUPUI
Chaifetz, Marshall	Student Development & Diversity	IU
Good, Jennifer	Foreign Languages	IUSB
Mettetal, Gwynn	Director, Center for Excellence in Teaching	IUSB
Shrider, Tricia	OIT	IUE

OVPIT/UITS Members

Elmore, Garland	Associate Vice President TLIT, OVPIT	IU

Telecommunications Taskforce

Name	*School*	*Campus*
Jay, Steven (chair)	School of Medicine	IUPUI
Agostino, Don	Director, R/TV	IUB
Borner, Katy	SLIS	IUB
Burke, Ray	Kelley School of Business	IUB
Busey, Tom	Psychology	IUB
Dunn, Jon	Library	IUB
Gardner, Rob	Physics	IUB
Henderson, Robert	CSCI	IUB
Marakas, George	Business	IUB
Patterson, James	Business	IUB
Wagner, Jen	Student	IUB
Ambrose, Thomas	Medicine	IUPUI
Conrad, William	Electrical Engineering	IUPUI
Ho, Thomas	Computer Technology	IUPUI

McDaniel, Anna	Nursing	IUPUI
Price, Timothy	Eng & Technology	IUPUI
Rogers, Richard	Business	IUPUI
Wilson, Jeff	Liberal Arts/Geography	IUPUI
Zwirn, Enid	Nursing	IUPUI
Kaden, Jeff	VP Administration	IU
OVPIT/UITS Members		
Voss, Brian	Associate Vice President Telecommunications, OVPIT	IUB

University Information Systems Taskforce

Name	*School*	*Campus*
Miller, Ted (chair)	SPEA	IUB
Darbonne, Ed	IU Foundation	IUB
Goehlert, Robert	Library	IUB
Haynes, Chris	CSCI	IUB
Hossler, Don	VC Enrollment Services	IUB
Jacobs, Robert	Business	IUB
Mostafa, Javed	SLIS /Sch. of Informatics	IUB
Rubin, Barry	SPEA	IUB
Soni, Ash	Kelley Sch. of Business	IUB
Thompson, Maynard	VC & Dean, Budgetary Affairs	IUB
Witoszynski, Scott	Student	IUPUI
Avgoustis, Sotiris H.	Physical Education	IUPUI
Brenner, Mark	Graduate Office	IUPUI
Galanti, Paul	Law	IUPUI
Martin, Robert	VC, Administration & Finance	IUPUI
Morgan, Jim	Medical Library	IUPUI
Plater, William	Dean of Faculties	IU
DeStefano, Guy	Director, Purchasing	IU
Davidson, Phyllis	University Libraries/UITS	IU
Keucher, Steve	VP for Finance & CFO	IU
Linderman, Art	FMS	IU
Rives, Dan	University Benefits	IUS
Kalmey, Don	Business	IUK
Yost, William	Interim Vice Chancellor	
OVPIT/UITS Members		
Holland, Norma	Associate Vice President UIS, OVPIT	IU

UNIVERSITY INFORMATION TECHNOLOGY SERVICES