

This study was made possible by a grant from IREX (the International Research and Exchanges Board) with funds provided by the Carnegie Corporation of New York. The statements made and views expressed are solely the responsibility of the author.

The structure, management, using and strategic planning of development of computer facilities in University of Wyoming: what are possible and what are impossible for Rostov State University

Case Study

Konstantin Nadolin,
Deputy Dean on the Informatization,
Mechanics & Mathematics Department,
Rostov-on-Don State University

Laramie, WY
2004

Introduction

Usage of the computer facilities is a base not only for a modern education, but also for a successful scientific research especially connected to applied mathematics and mechanics. Modern computers and network equipment are very expensive^{1,2}. So increasing of management effectiveness and achieving just proportion of funds invested by university and by faculty is important. Complexity of this problem is caused by the lack of funds in classical Russian universities.

The main questions under the research are:

- What is the structure of computer facilities and network in UW?
- How the computer facilities and network are managing in UW?
- How the computer facilities and network are using in UW?
- What is the strategic plan of development of computer facilities and network in UW?

and the main goal of the following study is an answering the question “What are possible and what are impossible for Rostov State University?”

Why it is so important for Rostov State University. Rostov State University (RSU) is located in different parts of Rostov-on-Don. This brings significant difficulties to university network management³. Recently, some segments of network utilized optical fiber but others used dialup connections over municipal telephone network. At present, permanent cable connection between all University parts is established. RSU had to cooperate with offside companies and institutions to accomplish this project⁴. So, experience of USA universities in network management would be very interesting and useful for RSU.

As the world of information technology has grown, so too have the demands on the Division of Information Technology. The Divisions of Information Technology (IT) in the USA Universities are an evolving customer service support organizations⁵⁻⁹. The mission of IT Division in University of Wyoming is “...to provide students, faculty and staff with current technology and support for technology that will increase their abilities to conduct research, learn, teach and administer the University. This division serves every student, faculty, and staff member on the University campus as well as a growing number off campus”^{5,6}. The same mission has the Information Technology Services in University of Connecticut^{7,8} and in Yale University^{9,10}. The Computing Center (CC) in Rostov State University has very similar mission too^{3,4}. So, the experience of IT Division in UW is very important for CC in RSU.

Why the experience of UW is useful for this research. IT Division in UW manages the central elements of technology across the university, including administrative and academic computing, networking, telecommunications, student computing laboratories, and customer support services³. The Division is also responsible for developing and managing centralized computing standards, databases, network architecture and security. IT in UW is structured to work with both internal and external constituents to support diverse technology needs and build consensus on information technology issues. Further, IT in UW is an advocate for the development and use of information technology in instruction, academic support, and institutional support.

IT in UW has reorganized several times to deal efficiently with its continually changing and expanding responsibilities. Today, divisional duties are primarily divided among three departments to serve IT customers (see the scheme at the next page)

- 1) Client Support Services (CSS) focuses on end user support and service. This department provides connectivity support, desktop hardware and software support, training and consultation for students, staff and faculty.

- 2) The Department of Information Services (DIS) provides database, security, programming, and functional consultation for centralized administrative systems.
- 3) The Telecommunications and System Services (TSS) unit is responsible for providing network data connections, telecommunications services, and centralized computing facilities.

Central computing facilities include administrative and academic servers, World Wide Web (www) servers, e-mail servers, domain name servers, and computer lab servers. The Division also has a Business Services Unit (BSU) responsible for budget activities and for support and billing for all telecommunication charges.

Over the last ten years information technology has spread to nearly every corner of the campus community, which has created significant challenges for the Division of IT in maintaining and improving service to customers. The significance of this expansion resulted in the ever-increasing emphasis on providing the highest quality customer service. The foremost IT employee performance measurement is now customer service. IT will continue to strive to build strong partnerships with customers and continue to make improvements in ability to respond to customer needs.

What goals and objectives are today? The changes in technology over the years have brought with them strategic, budgetary and operational challenges for IT in UW. From a service perspective, IT in UW is focused on addressing two high priority issues³. First, there is growing demand for continuous 24 hour access to and support for UW's administrative and academic computing systems. Second, the increased support of multiple operating systems, database platforms, and desktop software versions for all users. Meeting these challenges is made all the more difficult by past problems in hiring and retaining skilled technical personnel, in addition to escalating training needs. As the use of technology increases at UW, the demand for supporting infrastructure and user support services will also continue to increase. Information technology and its support are expensive endeavors. Adequate funding will continue to be one of the Division's most critical issues.

As institutional technology continues to grow, IT must continue to be customer oriented and flexible enough to anticipate and meet user and institutional needs. Technological innovations are constantly changing the way we learn, teach, research and communicate. IT will continue to focus on the integration of technology in furthering these critical aspects of UW's mission. IT in UW will continue to emphasize administrative systems, distance learning, administrative and academic use of local and wide area networks, including the Internet and the Web, connectivity solutions that will allow students, faculty and staff to telecommute, and support for re-designing UW's business processes.

1. Rapid changes and the growing dependency on technology

The Division of Information Technology faces three primary issues: managing the rapid growth and change of technology; managing UW's growing dependency on technology and the direct tie with the associated increasing customer expectations of capacity, availability, reliability, access and support; defining an approach to secure and maintain adequate long-term funding for services.

The University of Wyoming has an exceptional reputation for technological excellence in many important areas. Three particular areas of excellence are the student computing labs, data network, and voice network.

Prior to the availability of Windows NT, which was the first Microsoft operating system to offer operating system security, UW developed a student lab system that automatically loaded the operating system as well as applications from remote network storage devices. Since the operating system was freshly loaded for each student session, students could be confident they were utilizing a system free from viruses and accidental or intentional modifications.

**University of Wyoming
Division of Information Technology**

Vice President

Strategic Planning Org Administration
Policies & Procedures Budget Review

Manager

Business Services

Telecom Help Desk
Telecommunications Records
and Billing
Divisional Finance and
Accounting
Switchboard Operators

Director

Telecommunications & System Services

Manager

Systems
Servers
Software Installation
Desktop management
Operating Systems
TCP/IP Applications
Postmaster
Webmaster
Student Lab Hardware

Manager

PBX
Network Infrastructure
Electronics
Remote Access
Network Management
Cable Plant/Closet
WAN/LAN

Supervisor

Operations
Computer Environmentals
Backup/Restore
Job Scheduling
Disaster Planning

Director

Client Support Services

Manager

Departmental Consultants
Instructional Lab Support
PC Maint and Sales

Manager

Academic Support Unit
Lab Support
Student Consulting
ResNet

Web Site Coordinator
Information Coordination

Training and Instruction
Documentation

Director

Information Services

Manager

Database Administration
University-wide Data Architecture
Information Security
Computer Account Management
Application Auditing Phone & Data Fraud
Software License Auditing
Quality Assurance & Librarian

Manager

Human Resources & Financial Applications
Analysis Project Management
Development Maintenance
Design Change Management

Manager

Student, Alumni, & Development Applications
Analysis Design
Development Change Management
Maintenance Project Management

In contrast, most other universities at that time utilized local disks where the operating system, drivers, and applications were often corrupted resulting in an unstable, unreliable environment. UW was one of the first universities to utilize Windows NT on local disks to maintain a secure locally booted operating system.

Network based storage has allowed UW students to use any public workstation and still have a consistent interface since user settings are all loaded from network storage. Students have always been able to save their data on network storage devices, thereby avoiding the need to keep data on floppy disks.

UW was one of the first universities to offer high-speed (Ethernet) data access from offices, residence hall rooms, and student apartments. Today, UW offers 100 Mbps Ethernet access from almost all campus locations. The data network currently supports approximately 5,000 connected computers and other devices, utilizing a backbone network based on ATM technology. ATM can support gigabit (billion bit) speeds and is well known for its ability to reliably carry multimedia data, including real-time voice and video. UW was one of the original Internet2 institutions and co-developed an early Internet2 GigaPOP in Denver.

The University of Wyoming voice network is an advanced, full-featured, digital telecommunications system that would be the envy of most Wyoming towns. The University's telephone system supports over 6,000 telephone lines, and its advanced architecture provides for improved redundancy and protection against service failure.

Because of the technology's intense resource demands, funding will continue to be one of IT's most critical concerns. Since implementation, maintenance, and support of technology is extremely capital and resource intensive, the budget limitations placed on the University over the years have considerably impacted the IT Division. Recent changes in technology at UW and the growth of customer needs and increasing expectations help explain the funding pressures created by technology needs.

The University, in order to remain viable and competitive, has adapted to the rapid technological changes and demands of the modern world. Various new and enhanced services have been provided to faculty, staff, and students. The University's computing and networking infrastructures have been continually upgraded to keep current with technology.

To help understand the growth of technology and how it has affected daily work lives, it is helpful to compare the technology at UW now and ten years ago:

- With only a couple hundred users, email was practically non-existent.
- The World Wide Web and global Internet did not exist. Today UW is a member of Internet2 – the advanced second generation of the Internet.
- Instead of high-speed networks computer documents were typically exchanged via 5.25-inch floppy disks.
- Most computing desktop facilities were dumb terminals without an operating system.
- Only the most basic versions of Microsoft Windows had been released. The early releases were so problematic that few users had adopted their use.
- Less than 10% of current network connections existed.
- Of the few campus network connections there were, most were connected via RS232 ports with a standard data rate of 19.2 kilobits per second. Today the connection standard is 5,000 times faster.
- The few “computing labs” on campus consisted of slow computers without network capability.
- Budget and financial reports had limited content and were distributed via hard copy printouts.

The most significant changes to the University of Wyoming's technological environment have been the development of the Internet and the World Wide Web, networked computing, and ubiquitous email. However, even areas such as research have been transformed; research now depends heavily on technology's capabilities for computation, connectivity, and communication.

Information Technology's department of Client Support Services (CSS) has borne one of the larger impacts from changing technology. One of the greatest technology growth areas on campus has been the increase in demand for student services. CSS now maintains 535 student computing lab nodes spread across campus. Today the Division provides more than 8,000 student computer accounts, various support services, numerous software packages, computer storage, electronic mail, and Internet access. In 1995, the ResNet program was implemented to provide students living in the residence halls with high-speed network access. In 1995 there were 240 network connections. Information Technology now supports more than 900 student ResNet connections.

Ten years ago the CSS staff supported 375 faculty and staff computer users in administrative and academic environments. Today, faculty and staff users have increased from 375 to over 2,600, requiring the department to handle over 4,000 user contacts a month.

Rapid changes in electronic mail have required Information Technology to keep pace with user needs and expectations. Ten years ago students, faculty, and staff had limited access to an elementary e-mail system on the VAX computing system. Electronic mail was sent to other universities and research institutions via the pre-Internet BITNET network. Facsimile was the primary means of universal rapid communication. But today, faculty, staff, and students depend heavily on e-mail for work, class work, research, and general communications.

There is also an increased reliance on the University's network infrastructure. The data network is now expected to be robust and as stable as the telephone system. Users no longer tolerate short network outages. The campus network has been upgraded several times in an effort to improve performance continually and to keep ahead of user's bandwidth needs. Currently the campus backbone is an advanced ATM network. ATM is a flexible transport method designed to support multimedia data and real time data flows (such as video and voice).

In addition to above-mentioned changes, there have also been significant changes in the University's applications area and in the University's database technology. Ten years ago:

- Access to data, information, and applications was limited to a few users accessing the IBM mainframe applications using "dumb" terminals.
- All processing and printing was done on large, centralized IBM mainframe.
- Data was normally entered by centralized data entry clerks.
- Data retrieval was very difficult. Reports generally required a program to be written by a trained programmer.
- Registration was done in the ballroom with students carrying computer cards.

Now more than two thousand employees and thousands of students have access to data, information and applications via the Internet and directly from networked personal desktop computers. They can employ sophisticated reporting tools that do not require extensive training, and these tools can be applied for both personal and institutional excellence.

The goal of many technologies in the past few years has been to shift away from raw computing power and move toward meeting the various needs of the end-user. The simplicity created for the user has added significant cost and complexity to the back-end software, hardware, development, and processing. More important than the changes in technology, however, has been the expansion of the user base it serves. The University's students, researchers, teaching faculty, administration, and various support services all depend on technology for computation, connectivity, and communication. The next few years are guaranteed to be even more exciting and technologically intensive, creating an even greater reliance on technology.

2. Financial planning for Information Technology

Because of the revenue limitations of the last few years, efficient resource allocation has been of utmost importance to the Division of Information Technology. In an attempt to provide adequate levels of services and the appropriate upgraded infrastructures for customers, IT has operated at a net annual deficit. The deficit is being met by the reallocation of funds from areas such as equipment replacement.

IT is essentially operating in a maintenance mode. For any organization expected to supply new technology, this mode of operation is difficult. IT's annual operating budget is consumed by ever-increasing costs in the form of personnel, training, fixed, and other contractual obligations. Specifically, the ratio of personnel expenditures to support expenditures has increased over 29% in the last eight years, nearly 3.6% per year since 1992. (Total expenditures have increased a compounded average of only 4.6% per year.) Like many other divisions, IT's revenue sources have remained constant or have decreased. Long distance revenues are down significantly. IT receives \$589,000 for supplemental administrative computing. This funding level has not been adjusted since 1991, yet associated personnel and support costs have increased substantially. In 1999, a legislative action resulted in a permanent \$175,000 reduction of the IT support budget for equipment.

Support funding that was historically available for new projects and a general operation has slowly eroded away. New, non-maintenance projects can only be undertaken with either end-of-year salary funds available from vacant positions, ear-marked reserves, or requests to the central administration. While a great deal has been accomplished with one-time funding, it does not adequately address long-term problems and it does not address the escalating costs for on-going annual maintenance and upgrades.

The Division must address these two major budget issues: operating at a deficit and establishing on-going funding. During 2002 and 2003 the last payments was made for \$1.2 million in annual obligated expenditures. The expenditures are for past bonding obligations and telephone system upgrades. However, operating under status quo conditions until 2005 is not a viable or appropriate solution. The inherent problems with IT's cost accounting for services need review and appropriate correction now. In addition, because of other institutional needs the \$1.2 million may not be made available for general IT operations.

An important element of any accounting system is the ability to accurately track costs for individual cost centers or individual services. The Business Services Unit (BSU) now maintains an in-house "shadow" system to track revenue and costs. This spreadsheet based shadow accounting system needs fairly extensive refinement. Depreciation accounts need to be established to account for the short life cycles of technology. Sometime later this year this type of tracking in UW will be available through the PeopleSoft Financial System.

IT needs to move to full cost center accounting now so that it can specifically identify the costs and expenditures associated with the various services and infrastructure IT provides. In moving to this methodology ahead of the planned PeopleSoft availability IT in UW will be able to identify and assign costs earlier and thus address costing issues sooner. Being properly positioned sooner will also provide an easier migration once the PeopleSoft cost-center functionality is available.

IT recognizes the anxieties the move to cost-center accounting has caused in the user community and that many of IT clients have no mechanism to pay for all of the services upon which they rely.

Information Technology has been able to fund or supplement funding for a variety of services over the years by reallocating existing funding. Some of these services include the data network, ResNet services, Exchange e-mail, Web servers, modem servers, and Internet access. In the past there have been two significant sources of funding that were being reallocated to fund new technology and

new services: 1) Funds for central mainframe computers, and 2) Long distance telephone revenues, In 1996, both sources of revenue reached their maximum reallocation carrying capacity.

One source of reallocation was the funding that was originally given to IT for mainframe support. The costs of computing systems have dropped steadily over the past twenty years. Major (leased) central computing systems have been replaced repeatedly with lower cost systems. Each time a system was replaced at a lower cost, funds were then available for other purposes including support personnel, software and hardware. This source of funding has disappeared in recent years since the cost of major systems has stabilized.

Long-distance telephone revenue peaked in 1996. Much of this revenue has historically been reallocated for the support of the data network and other IT services. Since 1996, long distance revenues have fallen substantially due to decreases in market prices and the resulting competition from prepaid calling-card long-distance providers. Long-distance revenues are no longer capable of supporting the data network and other IT services.

The Division of Information Technology in UW must offer competitive rates to provide an incentive for retaining and attracting customers. Rates for toll and other telecommunications voice services need to be restructured to reflect actual costs. Once the billing system supports specialized calling packages, long distance calling packages will be developed for customers with high call volumes.

Coincidentally, prior to 1996, network users were assessed a controversial fee of \$8.00 per month to use the data network. This fee paid for some of the costs of the data network but the data network still needed subsidies from telephone revenues to cover all costs. As far back as 1994, it was estimated the true cost to supply and support one data network connection and the Internet access behind it was \$300 one-time and thereafter \$27 per connection per month. (UW's annual cost of Internet access alone is over \$300,000.) In 1996 the \$8.00 fee was dropped and 90% of the fees paid at that time were permanently transferred to IT. The transfer amount has not been adjusted since 1996 yet the number of data connections has close to doubled since then.

Permanent funding for the data network has never been identified in any University budget. In the past, the network was funded by long distance telephone revenues and minimally by departmental fund transfers that were price fixed in 1996.

The majority of campus constituents hope that these services previously subsidized by long-distance charges can ultimately be centrally funded. It's also IT's desire that these services be centrally funded. IT in UW will pursue options to establish a central funding source and seek permanent funding for the data network.

As just pointed out, the problem with many IT services is that they have grown over time and are no longer producing enough revenue to support themselves. There has not been an increase in departmental telephone charges since 1989. IT has always attempted to hold down end-user charges. If an operational funding model supplies sufficient revenue for fund reallocation then subsidizing some services works well.

Once costs are appropriately allocated to corresponding services, then improper funding mechanisms will become more apparent and options for alternatives can be discussed.

While IT in UW needs to raise revenue and create a business operation that functions without deficit, this is a difficult problem. A model that only raises internal rates may well serve IT's needs, but it is problematic for the institution. When the institution is treated as a whole – as a system – one department cannot raise internal rates without negatively affecting other departments. The preference would be to find internal institutional savings that would offset any rate increases or find new external revenue sources. IT will review possible new external revenue sources as a result of this planning process. New telecommunication services can be offered to students and staff. Some internal institutional savings can be gained through further standardization and consolidation of institutional services.

A similar funding problem exists with ResNet. Originated with one-time funds as a relatively small project in 1995, the ResNet program provided students living in the residence halls and students apartments with high-speed network access. In 1995 there were 240 network connections. UW Information Technology now supports more than 900 student ResNet connections.

ResNet has been highly successful; however, costs have escalated significantly with substantial annual investments in networking equipment and support. Because of its successful growth, Information Technology can no longer afford to subsidize the program. IT is currently working with the President's Office and the Housing Office to outline one-time and reoccurring costs necessary to provide access to all housing students.

3. Standardization of hardware and software

Hardware and software standards play a critically important role in managing support costs for both IT and the institution as a whole. For standards to be successfully implemented, at least two things need to occur. First, standards must extend beyond just the technology. Standards should be applied to how that technology is configured, managed and supported. Standards should also be applied to the processes and procedures used to manage a networking environment and the sharing of data. Second, standards should be applied strongly where they make sense but altered in situations where they do not. Standards cannot be viewed as an end to themselves. The ultimate goal is organizational effectiveness, not 100% conformance to a standard. Many standards programs have stumbled because of attempting to enforce a 100% model.

The benefits of standards come from the organization's ability to negotiate volume pricing, decrease acquisition processing costs, decrease support and training costs by supporting fewer types of systems, improve the University's ability to share data and applications, and increase end-user availability due to faster resolution of common problems. Organizations with strong implementations of standards have lower total costs and support costs per user than those organizations with weak implementation of standards. Standardization also helps to decrease support costs due to vendor liaison, product introduction, product review, install/move/upgrade and service/preventive maintenance. For example, the University of Wyoming has negotiated a campus-wide Oracle database site license. This license entitles any academic or administrative department to implement Oracle databases with no additional licensing fees. This has enabled IT to focus on developing Oracle database expertise to assist departments while maintaining centralized Oracle database environment.

Departmental technology at the University, desktop computing in particular, is typically funded from unspent end-of-year salary funds. Because of the ever-growing need for computing throughout the University, the UW IT Division recommended integrating the funding of technology into the University's budget planning process for the replacement of all faculty, staff, and administrative desktop computers on a standard life-cycle replacement schedule. The Division of Information Technology in UW strongly supports that concept and the recent legislative budget request that sought funding for equipment replacement on a five-year replacement cycle.

It is important to prioritize technology procurement by establishing a central funding source for desktop computer purchases for faculty and staff. Computer life-cycle replacement costs should be built into the funding model. A campus-wide evaluation committee should set computing standards for institutional procurement.

IT in UW isn't suggesting a 100% standardization of desktops. IT recognizes the need for departments to procure equipment outside of a recommended standards list. Nonetheless, having a standards list, developed by the campus community, provides the capability to have an efficient and cost effective computing environment.

4. Preparing for near-term, new technologies at UW

In the future UW IT expects a trend back to centralized computing (as opposed to distributed client-server computing). Experience has shown that remote distributed computers are expensive to maintain. Gartner Group studies indicate that the purchase price of a PC represents only 20% of the total cost of ownership of the PC. New technologies are emerging (for example Microsoft terminal server, Citrix servers, Java servers and clients, thin WWW clients) that maintain the rich graphical interface users expect but move the applications to a central server. The generic term for clients in this environment is "Internet appliances". While these systems have heavy up-front costs for the central servers, net cost savings are realized through reduced support and client equipment costs.

Data backup has become a serious problem as a result of UW's current distributed computing environment. Many departments are not taking adequate precautions to back up their data. There is a growing need for large central disk farms where important departmental data may be stored on fault tolerant disks and backed up routinely.

In the near future, most applications will be accessed using a Web browser. Web interfaces will continually have to be developed and enhanced for central applications such as SIS, HRMS, Pistol, BSR Advance, e-mail and other services. Additional personnel resources will be needed for this development.

Electronic commerce (e-commerce) will soon become a common way of doing business. IT will need to provide secure Web servers that provide the necessary functionality to allow UW customers to do business with the University electronically and also allow UW departments to do business electronically with vendors.

The packet-switched data network will continue to grow in importance and capacity. Voice, video and data will be integrated into a single network. The voice telephone system (PBX) of today will ultimately become obsolete being replaced by IP telephones utilizing the data network. Video will also be integrated and will be based on the Internet H.323 technology or later equivalent. Stored video will be available on demand (from digitized archives stored on disk).

High-speed Internet access (satellite, DSL, cable modems) will become wide spread, enabling the trend toward distance education with rich multimedia course materials. The role of UW will continue to evolve from education of traditional full time students living in Laramie to education of non-traditional students living anywhere in the world. Competition for students will first become more national and then more global in nature. More specialized classrooms will need to be developed for presenting real-time and recorded distance education classes.

Every student in UW will ultimately need to have a computer. Wireless access systems will provide UW campus wide Internet access on campus. Classrooms in University will need to be equipped for wireless computing services.

The campus network in UW will continue to grow in importance, scope, and capacity to accommodate a large variety of Internet computers and appliances (for example the equivalent of today's entertainment systems, telephones, security devices, environmental control systems, etc.). The backbone network that now runs at 155 megabits per second will be fully upgraded to 10 gigabits per second within three years and terabits per second within 10 years. The Internet connection off-site will need to grow proportionally to support remote collaborative research, distance education and general communications.

The demands on Client Support Services will continue to escalate. Support costs, not including hardware, for each installed desktop computer in UW are near an average of \$1,700 annually. As PC

usage rises and the technology becomes more complex, diagnosis and problem resolution time increases.

Most organizations that offer support services in UW have evolved through three stages of support infrastructures. The first stage is through a help desk or call center, enabling call tracking and reporting, incident escalation, and workload balancing. The Division of Information Technology is at the early stages of this support life-cycle, as it is currently implementing a help desk solution. The second step is to establish knowledge management applications to ensure that call centers can monitor service levels and build knowledge bases. The third, and most advanced, stage is the electronic support (e-support) model. E-support is based on an internet-centric application framework. Customers can allow User Consultants to remotely access their computers to repair software problems. Customers may obtain self-help resolutions, connected or disconnected from the network, or be redirected to higher level expertise and response personnel. The support chain software offers increased efficiency and effectiveness for technical support.

The growing need for 7x24 customer support (24 hours a day, 7 days a week) may be managed through the use of extended call center hours and self-help electronic-support for off hour, unstaffed service.

The advent of terminal server and Internet appliances will change the scope and impact of the current open computer lab model. The lab usage will peak in the future, and as Internet appliances become less expensive, the result will be a decrease in lab node utilization. Students, faculty, and staff will no longer need to physically locate themselves on campus to gain access to services and applications. Access points to connect to the UW campus computing systems will have to be increased.

5. Centralization versus decentralization of IT services in UW

The question of centralization versus decentralization of administrative computing staff and other resources is important to discuss at UW. On the one hand there can be a need for administrative departments to have specific in-house support and unique computing power that is not associated with the Division of Information Technology. On the other hand what sometimes occurs may not be the most effective and efficient solution from an institutional perspective, particularly if the result is duplication of services or incompatible systems.

There are two issues that often occur with decentralization. Resources (hardware, software and manpower) are often duplicated raising overall costs. Frequently there is a reduction of functionality because of incompatible networks, incompatible and inaccessible distributed data, and data that is ultimately either lost or at risk because of inadequate system redundancy, backup systems or other system administration resources. The objective should be to maintain an efficient balance between centralized and decentralized systems making sure alternatives are properly understood before departments make large investments in stand-alone technology centers.

Well intentioned departments often start out with a good idea to create a unique application that may only require part-time personnel support resources and limited computing resources. What often occurs is the application quickly grows, requiring several personnel for its support and extensive computing resources. In some cases these personnel and resources duplicate services offered by the Division of Information Technology.

Some departments could benefit themselves and the University as a whole by consolidating their technology needs with the Division of IT. There are roughly 144 information technology positions on campus with 79 of those within the IT Division. The salaries and benefits of the 65 non-IT positions are over \$2.5 million. Recently, one department who had lost several of its technical staff

requested IT to consider assuming responsibility for the majority of its in-house computing operations. Even IT managers were surprised to discover that IT division could absorb most of the responsibilities of two full time employees of the department's staff with the addition of between one-half and three-quarters on a full time employee. IT's economies of scale allow provision of more services with less cost than other departments might incur.

In addition to the employee savings in the example above, IT was capable of absorbing the department's computing needs on existing IT servers without the purchase of additional hardware. The hardware has essentially been duplicated. The annual savings to the University for this type consolidation of services could easily exceed \$100,000 the first year and over \$60,000 in subsequent years. Consolidation would be an effective strategy for the department. Another larger department has also recently requested IT to perform an audit of its technology and in-house support staff to determine what savings may be available by moving its computing needs to the IT Division. This particular department has had significant problems in the recruitment of technical support staff and is seeing their computing needs escalating while not having the funding to address the escalation.

There are pockets of computing resources and administrative computing personnel that are in similar situations. In many other cases, the computing needs are so specialized that it does not make sense to consider a consolidation. This is particularly true in most academic, research-intensive departments. IT in UW recognizes that consolidation of services is only a viable alternative if IT can provide quality, responsive services to the departments. Consolidation of personnel, equipment and services makes the most sense in the administrative units where there is a clear duplication of services.

Institutional Administrative Technology Advisory Committee of the University of Wyoming (IATAC) should be tasked with reviewing and approving new centralized and decentralized administrative software replacement and development, and associated hardware. Such review could eliminate duplication in hardware, software, and personnel costs. It would also minimize compatibility issues. A good example of the need for review is with the current portal issue on campus. Numerous vendors are contacting various departments trying to sell their portal access products. The evaluation and selection of any of these products must be made at IATAC's institutional level.

A key aspect of efficient information technology planning is a campus-wide strategic and financial plan for administrative technology systems and infrastructure. Technology investments should be maximized by driving towards shared use of strategic systems and central "ownership" of UW administrative systems. Working closely with administrative departments and IT, IATAC should develop an institution wide long-term administrative computing strategy that allows for responsiveness and department initiatives while maintaining centralized coordination and authority. In conjunction with the strategy, a consolidated financial plan for administrative systems should also be developed.

6. Other issues facing the Division of Information Technology

PeopleSoft Operational Support Plan. The Division of Information Technology and the Division of Administration and Finance have jointly developed the following proposed PeopleSoft Support Plan. (Five year budget see on the next page).

The new PeopleSoft systems, Financials and Human Resources, are valuable resources for the University of Wyoming. The exceptional value of these systems comes from their flexibility and continuing enhancements to provide strategic and operational effectiveness. The programming staff in University of Wyoming has decreased during this transition to the new systems and a client server environment. IT Division continues to support legacy SIS system as well. All of these systems are invaluable to the business functions of the University.

IT currently has the equivalent of six programmer/analysts, one IT project manager, one database analyst, 25% assignment of a User Consultant, 75% assignment of the Quality Assurance/PS Librarian, one UNIX system programmer and 50% assignment of an NT Systems Administrator supporting both the Financials system and the HRMS implementation project. The programmer/analysts assigned to the PeopleSoft initiatives are primarily entry (i.e., computer programmer senior) and junior (i.e., programmer analyst) level positions, which necessitate the System Specialist mentoring the other five programmers. The current programmer/analyst staff breaks down as follows:

- One System Specialist
- One Programmer Analyst Executive
- Two Programmer Analysts
- Two Computer Programmer Seniors

		Five Year Budget						
	Dept	2001	2002	2003	2004	2005	Total	
Current IT Funded Expenditures								
DIS Resources	IT	\$347,200	\$364,581	\$382,810	\$401,950	\$422,048	\$1,918,589	
Oracle License (pro-rated 50%)	IT	\$107,000	\$126,260	\$149,000	\$175,820	\$207,500	\$765,580	
Sybase License	IT	\$25,380					\$25,380	
COBOL	IT	\$1,002	\$1,100	\$1,100	\$1,100	\$1,100	\$5,402	
CONVOY	IT	\$10,440	\$10,440				\$20,880	
Database Mgmt Package	IT	\$19,914	\$19,914	\$19,914	\$10,000	\$10,000	\$79,742	
Hardware-Developers & DBA	IT	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$30,000	
PS Training	IT	\$36,000	\$36,000	\$36,000	\$36,000	\$36,000	\$180,000	
Total Funds		\$552,936	\$564,295	\$594,824	\$630,870	\$682,648	\$3,025,573	
Current A&F Funded Expenditures								
Personnel -- Financials		\$143,964	\$148,283	\$152,731	\$157,313	\$162,033	\$764,324	
Personnel -- HRS		\$235,332	\$242,392	\$249,664	\$257,154	\$264,868	\$1,249,410	
PS Training		\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$225,000	
Total Funds		\$424,296	\$435,675	\$447,395	\$459,467	\$471,901	\$2,238,734	
Proposed Incremental Budget Expenses								
Additional IT Personnel Salary & Benefits	IT	\$332,800	\$350,000	\$367,500	\$385,900	\$405,200	\$1,841,400	
Technical Training	IT	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$200,000	
Additional F&A Personnel Salary & Benefits	F&A	\$332,000	\$341,960	\$352,219	\$362,785	\$373,669	\$1,762,633	
Purchases								
<i>System</i>								
Hardware - Reporting Server	F&A							
Hardware - SUN Processors		\$50,000					\$50,000	
Hardware - SUN Memory			\$18,000				\$18,000	
Hardware - SUN Storage		\$4,000	\$30,000		\$30,000		\$64,000	
Hardware - SUN Replacement				\$500,000			\$500,000	
Hardware-NT Server					\$75,000		\$75,000	
Hardware-NT Storage		\$3,000			\$3,000		\$6,000	
Hardware-Web Server			\$15,000			\$15,000	\$30,000	
Hardware-Technical Personnel	IT	\$12,000			\$12,000		\$24,000	
Hardware-Functional Personnel	F&A						\$0	
<i>Consulting</i>								
PS Consulting	F&A	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$125,000	
Total Incremental Expenses		\$798,800	\$819,960	\$1,284,719	\$933,685	\$858,869	\$4,696,033	
Maintenance								
PeopleSoft FRS & HRS	F&A	\$165,000	\$173,250	\$181,913	\$191,008	\$200,559	\$911,729	
Hardware	F&A	\$25,000	\$26,250	\$27,563	\$28,941	\$30,388	\$138,141	
Misc Software	F&A	\$5,000	\$5,250	\$5,513	\$5,788	\$6,078	\$11,866	
Total Maintenance Costs		\$195,000	\$204,750	\$214,988	\$225,737	\$237,024	\$1,061,736	
Total Expenses		\$1,971,032	\$2,024,680	\$2,541,925	\$2,249,759	\$2,250,442	\$11,022,076	
Additional Funds Required		\$993,800	\$1,024,710	\$1,499,706	\$1,159,422	\$1,095,893	\$5,757,769	

This team is attempting to support enhancements to the current systems as well as implementation of ongoing PeopleSoft, operating system and Oracle database 'fixes' and upgrades. In addition, experienced PeopleSoft programmers are in high demand in the information technology industry employment marketplace. Excluding the System Specialist, the programmers average nine months of experience and the Programmer Analyst Executive position is currently vacant.

Administration and Finance Division in UW currently has two project teams working on PeopleSoft systems. The financial system implementation is being directed by a project manager that has been assigned full time to the project. Three other functional personnel from Accounting, Purchasing and Accounts Payable also spend up to 50% assignment on the project depending upon the need to test fixes, implement a new software release or enhance system functionality. A full time manager, three people from the Human Resource Office, two people from Payroll, and two people from the Budget Office complement the HR implementation team. The time allocation for these people ranges from 100% assignment on the project (1 person) to 50%-75% time assignment as required for the initial implementation.

The IT department of Information Services needs additional programming resources and a database analyst resource to effectively support the upgrades, fixes and implement the new functionality provided in future releases from the vendor to achieve the full potential of the University's investment in both the financial and human resource systems. The overall complexity of the systems requires a higher level of technical expertise and systems analysis skills than currently exists today. It will be necessary to add the following positions to supplement existing PeopleSoft technical resources.

- One System Specialist
- Two Programmer Analyst Executives
- One Database Analyst
- One Programmer Analyst Senior

The above additional resources would enable IT to properly maintain the system to PeopleSoft certified release levels, decrease the learning curve for new programmers, increase the depth of knowledge, reduce the upgrade cycle time, increase quality, and improve audit controls. IT Division will be able to spend more time and effort on learning and improving business processes, improving the overall effectiveness of the systems to the campus community through the implementation of web interfaces and automated workflow as well as enhance business partnerships.

Increased support for the financial and HR systems is vitally important. Unlike the large mainframe applications that previously existed on campus, the new PeopleSoft systems are relational databases integrally linked and distributed to the campus through client server architecture. Not only has the complexity of these systems increased tremendously, but the vary nature of the software now requires continual updating as new software releases are provided by the vendor, fixes are delivered and functionality changes. In the past support for this production environment was easily managed by a small complement of programmer analysts and database personnel from IT and the various functional experts from Administration and Finance. Today, the sheer level of functional time required to test fixes and prepare for software upgrades on an interval of every 18 to 24 months prevents the full deployment of many of the enhanced capabilities of the new systems using existing personnel to accomplish the tasks.

To address the ongoing production needs for administrative software systems, it will be necessary to create a cadre of both functional personnel (those knowledgeable about business processes) and technical people to support the dynamic computing environment. For the functional side of the administrative systems it is proposed that a core management group of people be dedicated to forming, in conjunction with IT, a production support team.

In addition to the new positions required to adequately support the administrative systems, long term planning is needed to provide for hardware replacements on some regular schedule and software maintenance funds. A training budget is also needed to not only keep the production support team up

to date with the changing software, but also to train the numerous campus users as the business processes and technology applications change.

Customer Communication and Partners Program. A primary issue with Information Technology having such extensive service offerings is figuring out how to keep the University well informed of them. IT currently maintains an informational Web site, www.uwyo.edu/infotech. General and specific information about all IT services may be found on these pages. Approximately quarterly an IT newsletter is distributed both in paper and electronic form. Additional documentation is developed and distributed to faculty, staff and students on a continual basis. Handouts are also available on the Web for viewing and downloading. IT attempts to provide up-to-the-minute information to its customers by maintaining and posting pertinent facts addressing systems, applications, and network status on the UW Web. Information about system problems can be found on the Information Technology's Hotpage accessible from the above Web address.

The University's Partner's Program is a main conduit for the distribution and sharing of information among the campus technical community. The Partner's Program is currently being enhanced to strengthen institutional information technology decision making and collaboration on campus-wide technology issues.

To further develop the function of the Partners Program and increase communication, the following was recently proposed to the Partners Program: 1) Quarterly "systems presentations" specifically to bring partners up to date on projects, plans, and initiatives of the Telecommunications and Systems Services (TSS) unit of Information Technology. 2) Creation of ad hoc subcommittees of the Partners Program to advise TSS on the implementation of new technologies such as SMS, Windows 2000, Windows XP, wireless networks, central directories, and other new technologies. 3) Creation of a technical subcommittee of the Partners Program to meet periodically with the TSS department to discuss general campus computing and networking issues.

Recruitment, Retention and Training of IT Employees. The current national shortage of information technology workers has had a significant impact on the Division as well as other UW departments with information technology positions. In the recent past, University staff employed in information technology positions was leaving the University for up to three to four times the level of their University salaries. The turnover of employees in these areas had reached a near crisis stage and was placing a tremendous burden on the University's operations and placing mission critical systems at risk.

In order to slow the drain of the University's information technology employees, salary adjustments were made for many of these individuals. Although the adjustments were still below market levels they nonetheless achieved the desired objective of reducing the outflow of UW's information technology employees. The planned salary increases beginning July 1, 2000 will also undoubtedly have a significant positive effect in helping to retain skilled employees. In the future, the University will need to be mindful of the market dynamics for information technology workers to prevent outflows of skilled employees.

Training costs for information technology workers has skyrocketed. Systems and applications are highly specialized and constantly changing. This constant change and high level of specialization requires a frequent updating of skills. Last year the IT Division in UW spent over \$40,000 in PeopleSoft training alone. Employee recruitment, retention and training will continue to be a significant challenge for the Division. IT has informal programs to train and promote employees. The Division has also successfully utilized flexible work schedules to retain employees.

External employee recruitment is one of IT's most difficult challenges. Most experienced information technology candidates are earning significantly more than the University can afford. IT

has had success in utilizing a strategy of training, developing and promoting internal entry level employees, many of whom have been UW student computing lab assistants.

There are a few downsides to this approach. Large training costs, a long learning curve and the requirement for additional oversight are some. Another downside of this approach is that obstacles are often encountered with University hiring practices which many times require relatively high levels of experience for low level information technology positions. Nonetheless, this approach has been valuable for recruitment.

As one strategy of employee recruitment, IT in UW will continue with a "grow your own" approach. Other creative approaches will also be sought to keep open a pipeline of potential employees. UW sponsored internships are one possible avenue to be explored.

7. Information Technology Departmental Strategic Tasks

The following tasks are specific to the individual departments within the UW Division of Information Technology.

Client Support Services. Because of its high level of success, the current computing lab development and support structure have to be maintained and expanded until such time as the needs of students changes or until such time as technology dictates a different direction. The group provides a central focal point for all the departments, colleges and Student Fee committees with respect to technical advice, reviewing computing standards, central maintenance of lab software, hardware, training and staffing of labs. It is a highly efficient and effective operation that has been able to increase services to students, faculty and staff.

As mentioned earlier, Information Technology has begun development and implementation of a Help Desk & Call Center. This system will enable IT to increase the number of people answering questions over the phone and help offset the growing demand to have consultants in the field. The result should be improved customer service, quicker response with more knowledgeable and consistent problem resolution. In the next five years the service support model should be developed further into a mature electronic support (e-support) model

Computer training for faculty and staff, including updating of computer skills is an important element in increasing the overall productivity and efficiency of the institution. Information Technology's training program should be expanded to include more classes on more applications. IT training will be coordinated with the efforts of Human Resources Development in structuring a shared PeopleSoft database to record employee training.

PC repair is a small but important part of Information Technology's services. The PC sales function was established with the thought of being able to support and implement an institutional computing standards model. As discussed previously this model is critical for the efficient and cost effective support of computing at the University of Wyoming. Information Technology strongly recommends the adoption of such a model.

As described earlier, if such a model is adopted a campus committee should set the standards based on IT recommendations. IT would negotiate with vendors to pre-configure hardware and software to meet the needs of faculty, staff and students. (This would be following a common model used at several institutions where PCs are pre-configured with institution specific software and shipped from the manufacturer directly to the student, staff or faculty member.)

Telecommunications Support Services. Telephone circuits for dial-in modems cost the university over \$100,000 each year. Existing modems are used to capacity and much of the use is for

personal use. New technologies such as DSL (Digital Subscriber Loop) or cable modems provide higher remote access speeds than modems and will be available in Laramie soon. Dial-in modem service and remote access should be provided by commercial Internet Service Providers or by the university on a cost recovery basis.

IT is partnering with US West to provide high-speed (256 Kbps) Internet access from Laramie homes at an affordable price. In addition to these options, some incremental relief is possible by implementing modem pool time-out restrictions on the faculty and staff modem pool, by providing Ethernet access to UW residences as proposed by the ResNet proposal in IT Action Item 6, and by the growing number of companies now providing free Internet access in Laramie and across the nation.

Users have become increasingly dependent on information technology for communications, teaching, research, and administration. Today many users expect the voice and data networks, dial-in modems, e-mail servers, Internet access, and administrative systems to be available on a 24 hours basis 365 days per year (including holidays). While the expectations for IT support and availability has grown, the ability to fund the 7x24 required personnel and hardware support is not available.

It would be desirable to offer expanded 7x24 service to the campus community (24 hours a day, 7 days a week). Extended service exists now, but in a very limited capacity. Costs of upgrading the existing components of systems such as the IBM mainframe, as well as the necessary software and persons needed to implement and maintain the expanded services would have to be considered.

The University should consider the feasibility of offering 24 x 7 service to increase opportunities for student, staff, and faculty self-service via the Web, (i.e. Web registration) and increase availability of computer resources to faculty and staff, (i.e. on-line processing on the IBM available 24 hours a day).

The Internet is having a significant impact on education and research in higher education. Many universities offer classes and entire programs using the Internet for the delivery of class materials. Researchers are increasingly dependent on the Internet for remote data and collaboration. Students rely on it for e-mail, research and other activities. It is important for UW to maintain a reliable and high-speed connection to the Internet. Today, federal grants fund a significant portion UW's Internet connection. To maintain high-bandwidth Internet access, the University will have to commit significant ongoing funds, beginning with at least \$250,000 annually, for continued Internet access. Information Technology is working with vendors to locate one or more Point of Presences (POPs) in the Laramie area. A POP should provide a small reduction in Internet access costs.

Communications of all forms (voice, video, and multimedia communications) are rapidly being converted to a digital format for transmission over digital networks. It is now possible to deliver quality voice and/or video over the Internet without incurring charges for dedicated leased circuits or dial up circuits. Voice, video, and data should be integrated into a single seamless network to reduce costs, increase functionality, and simplify network management

Various departments have installed their own building cabling in an effort to reduce costs, however overall costs have grown because much of the cabling has not met building and fire codes or communication industry specifications. National fire codes require the installers to have appropriate certification and be supervised by someone with a contractor's license. It's important that communications installers are not only knowledgeable about building and fire codes they must also be knowledgeable about communications protocols and standards. In addition, to provide appropriate, coordinated and timely installation services it's necessary that these services be provided by the Division of Information Technology.

With the emergence of client-server computing, it has become necessary to rapidly upgrade software on hundreds of client computers when new software versions are released. System Management Server (SMS) is an administrative package that will enable IT to support the UW network and computers more effectively and at a reduced cost.

Disaster recovery is the plan and facilities to resume business operations in the event critical computing facilities are damaged or destroyed from flood, fire, tornado, and other catastrophes. Information Technology needs to develop a more thorough and comprehensive disaster recovery plan. A partnership with the State needs to be pursued for offsite systems backup.

The data network has provided the necessary technology for Duplicating Services to offer many of the same printing services offered by IT. The overall cost of printing should be able to be reduced if done by a single UW entity. A review of printing services should be performed with a goal of eliminating redundant services.

Department of Information Services. A challenge of university administrative support is to improve resources and services given rising expectations and demands of students. Technology and the administrative business processes can be designed together and the distinctive opportunities and requirements of each should be brought to bear on each other. Technology is enabling business process changes at an unprecedented pace.

IT can assist in redesign of UW administrative business processes by helping identify comprehensive UW business processes at the institution level and re-engineering them with the goal of achieving high-performance, focused, aligned and streamlined processes with 'one face' to our students and faculty.

The vendor of the University's current Student Information System (SIS) was acquired by SCT in March 2000. They have announced that support of UW IT current product, SIS, will end in 2006.

The University of Wyoming has a few options in the replacement of the SIS system. There are various major vendors with student administration systems, including PeopleSoft, Oracle and SCT. The vendor's products vary in degrees of maturity - from the 3 year old PeopleSoft Student Administration system to the proposed SCT system which is currently only a "concept'."

Under one replacement approach a campus committee would be formed to conduct a thorough needs analysis to understand the University's business and academic needs for a student administration system. This would be followed by an RFP and the selection of a software application most closely matching our needs.

A second replacement approach would be to work with SCT in their development of the successor to SIS, Relationship Leveraging System (RLS). The company has further stated they plan to build interfaces between RLS and the PeopleSoft Financials and Human Resource systems. Although the SCT RLS approach is promising the Division of Information Technology favors the first option of conducting a comprehensive needs analysis with the involvement of all the major stakeholders.

There are three key areas to consider in replacing a student administration system - software, hardware and data conversion. Although the data conversion effort may be slightly less in the RLS option, it will nonetheless be significant in any replacement approach. The replacement effort should be led by key stakeholders across campus, primarily Student Affairs and Academic Affairs with input from Student Financial Operations and Information Technology.

UW is immersed in the classic dilemma: How much secured information, secured access and programming should be held at the center versus how much should be let flow to the departments of the institution? While there are proponents and opponents of almost every possible centralized or decentralized structure, there is no question that the university needs to determine a path appropriate to provide both the effectiveness and efficiency it desires in utilizing administrative systems.

Resolving such questions will lead to a higher quality of service to our students and faculty through increased efficiencies, data integrity and security, reduced chaos, and reduced costs by eliminating redundancies and duplication of efforts.

UW should conduct an independent administrative systems audit, coordinated through UW Internal Audit Office. The audit should encompass all administrative systems on campus and set audit directions for the future given new technology (i.e., client server). The results would establish UW

standards for auditing, internal controls, and audit trails and ensure IT in UW has the appropriate role alignment to preserve the security and integrity of the data without circumventing established computer application control procedures.

“Hole in the Wall” is a web-based application that allows students, faculty, and staff to view class schedules, grades, transcripts, and other items via the Internet. The Division of Student Affairs and DIS are currently piloting upgrades which will allow comprehensive on-line web based registration, admissions application and status, student financial information including last bill and current activity and financial aid loan and award status and cost of attendance - all via the Internet.

IT will continue to assist in installing upgrades to the “Hole in the Wall” on-line system to provide convenient, seamless student registration via the web, and provide additional functionality to students, faculty and staff with broader access to information and self-service functions via the web.

The University of Wyoming is doing more with technology and doing it better than in the past. In the past few years DIS has successfully implemented several new administrative systems at less cost and in shorter time frames than comparator institutions.

The UW vendors and peer institutions are beginning to recognize DIS implementation achievements and the quality and dedication of its staff. DIS feels it is time for UW to begin partnering with key system vendors such as PeopleSoft, Business Systems Resources, and Pinnacle.

Information Technology will partner with system vendors in application enhancements by seeking to have UW administrative users and technical resources appointed to vendor advisory councils with the intention that UW’s needs would be highlighted and addressed in future vendor developed enhancements. UW could offer to serve as a beta site for vendors in the early release stages of application changes such as enhancements, new releases, and financial aid modifications.

With increased technology comes increased use of database systems, network systems, operating systems, and mainframe applications. Users in UW have access to these systems and applications with multiple sign-on commands that require different user id's and passwords, often resulting in the information being written down and kept in unsecured areas. This causes concern among those responsible for monitoring data integrity, privacy, and the maintenance of authorized on/off campus access to University wide systems.

Information Technology will evaluate secure single sign-on software to reduce security risks by eliminating multiple passwords that have been written down and left unsecured. It would increase user productivity with the ease of one sign-on screen and increase security personnel productivity with "one time set-up" for new users.

Computer security is a growing concern across campus. The historical role of the IT Security Office (ISO) has been to protect the central computing resources of the institution, investigate illegal activities and act as an information source for departments.

IT recognizes the need to develop an institution-wide security architecture. While departments seem to favor broadening ISO's role and responsibility to having expertise in all operating systems, current resource limitations prohibit that scope.

Business Services. The Business Services Unit will have the primary charge to develop cost-center accounting. The BSU accounting staff is developing independent and improved cost accounting procedures to refine the tracking and provide the ability to capture costs applicable to each type of service offered. Cost center information will be entered into a reconciliation model to provide a mechanism to accurately recommend a well-founded rate structure.

The Division of Information Technology must offer competitive rates to provide an incentive for retaining and attracting customers. Rates for toll and other telecommunications voice services need to be restructured to better reflect actual costs. Long distance calling packages will be developed for users with high call volumes.

8. Support of the Academic Plan Action Items

As a support organization the Division of Information Technology provides the infrastructure and support services for the implementation of many of the Academic Plan's Action Items. Information Technology provides the University of Wyoming's underlying computing and communications facilities that make the academic, administrative, and learning activities function. Most importantly IT works behind the scenes, striving to solve problems before they are noticed and improving services before they become outdated.

While Information Technology is indirectly involved in many of the Academic Plan's Action Items, it has a direct role in the following Action Items. (The Information Technology departments involved are abbreviated in the parentheses.)

- Expand the High School Institute (CSS/TSS). Provide account administration, user support, secure and reliable Web servers, and data network for Internet access to the open access computer labs for visiting pre-college students.
- Apply and enroll via the Internet (TSS/DIS). Provide secure and reliable Web servers and data network for Internet access for use of Hole in the Wall.
- Enhance role in statewide articulation with Wyoming's community colleges (DIS). Provide transfer credit software and OnCourse access for community college students so they can monitor their UW degree progress.
- Enhance nonresident recruitment (TSS). Increase UW's appeal by providing state-of-the-art remote education Web servers and other facilities including electronic classrooms, high-performance network access, and secure, reliable Web servers.
- Increase advertising of UW (TSS) and Enhance UW's Web site (TSS/CSS). Assist in enhancing UW Web sites by providing high-performance and reliable Web servers and network access, and helping develop attractive, efficient, and easy to locate Web pages.
- Implement procedures that ensure full distribution of Student Financial Aid (DIS). Develop administrative changes to the Student Information System (SIS).
- Consider an Academic Success Center (TSS/CSS). Assist with development of appropriate lab hardware and support.
- Allocate compressed-video time more efficiently (TSS). Develop infrastructure for Internet based video, audio, and Web-based delivery alternatives.
- Investigate alternatives to compressed video (TSS). UW should strive to develop the integration of voice, video and data services. Work with the video support and video engineering group in an effort to speed the deployment of digital TV and consolidate new services as they develop.
- Focus UW/TV on outreach efforts (TSS). Assist UW/TW in providing enhanced services, including Web delivered video.
- Strengthen computing, information technology, and information management (TSS). Provide the infrastructure to support the strengthening of these curriculums. Provide high-performance and reliable data network and servers, implement System Management Server (SMS) for the management of remote clients, implement terminal server and/or Citrix servers for remote clients, develop faster and more available remote access alternatives, provide campus-wide wireless computer access to UW's data network.
- Focus global linkages with foreign institutions (TSS). Enhance Internet and Internet2 connections.
- Move instructional designer positions in the Outreach School to the Center for Teaching Excellence (TSS/CSS). Work with CTE to provide necessary infrastructure including www servers, electronic classrooms, applications, and tools. Provide consultation for faculty and staff regarding access and software use. Provide students with assistance in navigation and use of products.

- Develop prospectus for Wyoming Research Park (TSS). Provide high-speed access to Internet and Internet2 for all research activities.
- Install integrated information access system for library, archives, and museums (TSS). Continue to provide high bandwidth network access to these locations and potentially provide server platforms including software support and disk storage.
- Examine space needs for libraries and cultural collections (TSS). Offer to assist in reducing space requirements by recommending electronic alternatives. Enhance research and usability by providing searchable electronic media in the form of video, audio and electronic images.

Partnerships with Community Colleges. The Academic Plan states, “UW must enhance its already active role in statewide articulation with Wyoming’s community colleges.” DIS proposes a partnership between UW and the community colleges to seek the development of, and coordination of, providing the UW ‘transfer credit’ and “On-Course” functions to advisors in Wyoming’s community colleges.

If possible, UW should partner with Wyoming Community Colleges by attempting to provide community colleges access to the UW "On-Course" and transfer credit functions of our Student Information System (SIS). In addition, automated interfaces might be able to be developed to transfer student information and transcript data from Wyoming community college systems to UW in conjunction with the submission of a web based UW application.

Conclusion

Now the goals that are common for UW IT Division and RSU CC can be formulated and associated recommendations can be proposed

- 1) Implement and maintain a routine upgrade and replacement schedule for technology. Integrate the funding of technology into the budget planning process to address campus-wide hardware replacement and software upgrades. Universities should work towards the goal of replacing all faculty, staff, and administrative desktop computers and basic software once every three years. Units typically fund computer technology for their members from occasional and ad hoc sources of funds. There are no funds set aside for upgrading or replacements. The computers that are seen on desks across campus are only rarely paid for with money allocated for computers.
- 2) Increase units’ ability to “talk” with each other through shared information and compatible computer systems. Address planning and standardizing issues through a three-tiered approach for short-term, medium-term, and long-term planning. Establishing a planning mechanism will help the Universities maximize the efficiency of funds, foster the sharing of information, and address compatibility issues. Because much of the responsibility for computing has been distributed to the end-user, a balance between a top-down and bottoms-up approach is necessary. To structure a balanced approach to planning, there needs to be centralized university level committees for long-term, medium-term, and short-term planning. Each division (college in UW, department in RSU) should have a computer and technology committee. One task of these committees would be to formulate a division-wide conceptual plan for the purchase and implementation of needed technologies. A member of each of these committees would serve on the central committees to represent their needs there and to IT when relevant.
- 3) Maintain a highly qualified technology staff, both in the division of Information Technology and in-house in departments. Make recruiting, retaining, and training technical support staff a priority and back it with competitive salaries. Low salaries have contributed to high technical staff turnover. The University cannot afford to hire and train staff only to have them leave in a very short time for

much higher salaries. The pool of available technology personnel is relatively small and highly competitive. Universities cannot maintain a highly qualified technological staff without increased funding for salaries.

- 4) Maintain the technological infrastructure so that it keeps pace with external changes and remains competitive. Begin planning for upgrading LAN. Discussion should take place about whether this should simply be the installation of 100base T lines and hardware or whether this should be a change to fiber-optic system that can be upgraded by software. Discussions should also include analysis of the role that mobile, wireless computing can play a role in addressing campus computer needs. Configure all classrooms, including labs and departmental seminar rooms, to support the instructional use of computers and the Internet. This includes access to the LAN and the Internet, computer hardware capable of displaying complex graphics, and projection facilities. Improve the modem pool and increase User-Support for dial-up users. The modem pool remains a major source of complaint. Access to the system needs to be expanded from outside campus and User-Support improved. Since it is unlikely that the University can afford to make significant increase in the number of modems it operates, creative solutions should be found.
- 5) Improve relations between IT and constituent users. Establish mechanisms that IT can use to consult with users about changes. IT needs to consult with users about proposed changes, both large and small. This should be done through consultative processes, such as regular discussion with faculty and staff committees, but also through surveys of the users. Surveys should target the general and specific areas, such as residence halls, specific computer labs, and on-line users. Clarify who is responsible for applications, their implementation, and their support. Technology has been made increasingly more available to the end-user, for use, trouble-shooting, and manipulation. As a result, responsibility for technology has become confused. Also, the Division of Information Technology has moved from being the sole control for the University's technology as that technology has moved to the end-user, especially with many units hiring their own in-house personnel. Information Technology cannot be responsible for all technological uses at the University as they do not have the personnel. Also, the control of much technology is directed toward the end-user, but in-house technical support staff cannot answers all questions or deal with all problems. Relations between IT, units, and in-house technical support staff in regard to training, dissemination of information, standards, and control is often stressful and difficult. Redesign training programs to increase efficiency of training and clarify who is responsible for training. Training and retraining often takes place in an ad-hoc fashion. Training in IT-supported software packages should be handled by IT in most cases. This includes department support staff training on basic office software as well as administrative systems software. It also includes training of technical support staff in their fields of expertise.

Acknowledgements. I would like addressing my good words to a lot of administrators and specialists, who spent a lot of their time in meting with me and helped me in better understanding of many questions. Some, but not all, of these nice people are

Lewis Bagby, Director International Programs Office, UW

Jeffrey Van Baalen, Professor and Head of Computer Science Department

Mark Balas, Department Head and Professor of Electrical and Computer Engineering, UW

Maggie Deming, Director of IT Client Support Services, ITS, UW

William A. Gern, Vice President for Research, UW

Robin Hill, Instructional Computing Coordinator, the Ellbogen Center for Teaching and Learning, UW

Robert Morrison, Director of IT/Telecom System Support Services, ITS, UW

Suresh Muknahallipatna, Associate Professor, Department of Electrical and Computer Engineering, UW

Andrew Newman, Director Technology and Planning, ITS, Yale University

Peter Polyakov, Professor of Mathematical Department, UW

Erin Stock, RESNET Computer Support Specialist, ITS, UW

Kenton Walker, Director Solomon D. Trujillo Center for e-Business, Professor of the Department of Accounting, UW

Patrick Wolfenbarger, Web Designer, University Public Relations, UW

Special thanks I would like say to bright people providing my visit to USA and my residence in Laramie

Natalia Petrova, Program Officer, Academic Programs, IREX/Moscow

Olga Chernova, Junior Program Officer, Educational Programs Division, IREX/Moscow

Ruben Doboin, Senior Program Officer, Education Program Division, IREX

Tova Pertman, Program Associate, Education Programs Division, IREX

Shown Bunning, Project Coordinator, International Programs, UW

Patti Flores, Office Associate, International Programs, UW

Sheila Nyhus, A&S Adviser, International Programs, UW

В заключение хочу сказать огромное спасибо моему студенческому другу Владу Клойзнеру и его семье - жене Оксане и сыну Данечке, в чьем гостеприимном доме в Коннектикуте я провел незабываемую неделю.

References

¹ An International Visitor's Guide to Higher Education in the United States / American Council on Education, Washington DC, 1999.

² Education in the United States. A Brief Overview / U.S. Department of Education, 2003.

³ Создание единого информационного пространства РГУ
(http://uginfo.rsu.ru/projects/rsu_info.php)

⁴ Создание и развитие научно-образовательной телекоммуникационной сети РГУ и г.Ростова-на-Дону (http://uginfo.rsu.ru/projects/rsu_telecom.php)

⁵ Web-site University of Wyoming (<http://www.uwyo.edu>)

⁶ Information Technology Support Services Plan, 2nd – Draft
(<http://uw-docs.uwyo.edu/supportplan/divisionplans/ITPlan.doc>)

⁷ Web-site University of Connecticut (<http://www.uconn.edu>)

⁸ The Network Master Plan Connecting UCON 2000 with UCON 21st Century
(<http://nmp.uconn.edu/july23/final-draft.html>)

⁹ Web-site Yale University (<http://www.yale.edu>)

¹⁰ Yale University Finance & Administration Senior Leadership Forum
(<http://www.yale.edu/fa/may17/1>)