ORGANIZING INFORMATION TECHNOLOGY SUPPORT
FOR A NETWORKED ENVIRONMENT

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ABSTRACT
As networked computers rapidly become the primary source of information, an essential platform for collaboration, and a means of conducting the business of the university, an Information Technology (IT) support organization must re-evaluate its roles on campus. It must become knowledgeable about what it supports in ways that are quite different from what was necessary in the past and take an active role in redefining overall organizational issues of the university. In this presentation, we report how Information Technology at Northwestern University has been reorganized to address the issues and opportunities emerging from the distributed computing and network environment it has established.

INTRODUCTION
Northwestern University is a relatively small university with 7,000 undergraduate and 7,000 graduate students. It consists of eleven highly-rated professional schools built around a large College of Arts and Sciences. The University has over 5,000 employees, including 1,800 faculty members. The University’s 150 buildings are located on lakefront properties in Evanston and Chicago, Illinois. All University buildings are networked, including student housing. Since 1993, Ethernet connections have been available to all employees and all students. Modem and ISDN services provide off-campus access. Most employees and 80% of the students take advantage of the network in support of their daily work or studies. Detailed information about Northwestern University is available at www.nwu.edu.
Having completed a substantial network infrastructure investment, Northwestern has been aggressively enhancing its IT capabilities and developing a common vision for the deployment of technology. The University recognizes that a robust technological environment is essential to support its academic mission, improve the effectiveness and efficiency of its administrative operation, and enrich its scholarly community.

The Information Technology organizations report to the Vice President for Information Technology, who reports directly to the President. Information Technology is charged with operating central IT services and planning for the University’s overall IT needs. Information Technology was recently reorganized into five operating departments. Rather than simply respond to immediate issues and concerns, the reorganization was designed to prepare the University for a future built on an integrated voice, video and data infrastructure that supports a distributed computing environment. The five department are:

- Academic Technologies
- Computing Services
- Management Systems
- Telecommunication and Network Services
- Technology Support Services

Two of these departments, Computing Services and Telecommunication and Network Services, develop and maintain the infrastructure, servers, and associated systems that are the foundation of the University’s networked environment. Management Systems, Technology Support Services, and Academic Technologies, which have front-line responsibilities to interact with users, are described in the remainder of this presentation.

**DISTRIBUTED COMPUTING AND ADMINISTRATIVE SYSTEMS**

The ready availability of the network to the entire University community has made it possible for Northwestern University to consider replacing all mainframe-based central administrative systems with true client/server technology. If there were not an existing network infrastructure to leverage, this would not have been feasible.

Human Resources was the first administrative system selected for replacement. The PeopleSoft Human Resource Management System was purchased in June, 1994 and will go into production in December, 1997. The next major client/server decision occurred this
spring when Northwestern University became a charter member for the PeopleSoft Student Information System project.

These administrative system decisions are having an enormous impact on the administrative environment at Northwestern. Almost 70% of the usual staff support expended on all the central administrative systems will be affected. The decisions are also causing a major paradigm shift in the administrative technical environment. For example:

- File Management is moving from VSAM to the Oracle relational database
- Programming Languages are changing from COBOL and Natural to PeopleCode, SQR, SQL, and COBOL
- Query is moving from DYL280 and SAS to Query and Crystal
- System architecture is migrating from an IBM mainframe with dumb terminals to client/server run on desktop computers and large Unix servers
- Operating system is changing from MVS to HP-UNIX
- Presentation is shifting from character-based to GUI Windows

Equally important, the University’s emerging distributed computing architecture makes it possible to move functionality beyond the traditional central administrator, to not only the departmental user but to students, faculty, and staff. Instead of central administrators continuing to act as the interface between departmental users and the central system, the departmental user will work directly with the central systems, accessing data and entering information directly into the database. This is a radical redefinition of an “administrative system user” for the new Human Resource Information System (HRIS) and for the new Student Information Systems (SIS).

The planning implications of this redefinition of the administrative user in a networked environment is significant. The new technology provides an opportunity to bring together the expanded user community to review and redesign the processes of the University and implement those changes with the new system. Simply replacing an administrative system with client/server technology and benefiting from improvements in performance and efficiency would be only a partial solution. It is necessary to take the next step and use the new functionality to redesign administrative processes.

Our experience bringing the new Human Resource Information System on-line has been that the appropriate first step in implementing a new administrative system is to focus
on the replacement of the current system. This will provide a faster improvement in service to the current users and will make the technical implementation more efficient. This can be done in parallel with re-engineering efforts involving the new end-user community. It avoids delays we initially encountered waiting for re-engineering recommendations to be produced and then for decisions to be made about implementing and funding the recommendations. The client/server software and development tools make it possible to incorporate the re-engineering recommendations over time after system replacement is accomplished.

For Information Technology at Northwestern University, the shift to a distributed computing environment for administrative systems brings the challenges of effectively managing platform migration, staff re-tooling, staff retention, vendor revisions, and access to data. Previously, administrative system support staff felt hindered by old technology and systems that increasingly did not meet the users’ business requirements nor the needs of students and faculty. There is now a sense of excitement among these staff as they see the opportunity to drastically improve the delivery of system functionality, presentation, and availability to the new customer base and to greatly enhance their own technical skills.

SUPPORT SERVICE CRISIS

The enormous growth of the University networked community has been accompanied by a growing dependence on the Information Technology organizations for assistance. In order to provide more effective support, computer and network guidelines are revised twice a year. By providing central support for recommended products, users are encouraged to adopt the same network and productivity tools. However, as user dependence on these tools continues to increase, growing expectations about the level of support required to meet this demand has become a serious challenge.

Increasingly, students find they needed to use the same network tools and resources for all of their classes rather than just an isolated few. At the same time, a growing number of administrative users are becoming dependent on the same network and productivity tools as students and faculty. Recognizing that distinctions between academic and administrative users were rapidly breaking down, the Technical Support Services group was created to provide support to all users in the University’s network environment.
With a foundation of common tools and resources, compelling models for network-based learning and research, and technology becoming a vital tool even in traditionally non-technical fields, the faculty demand for support was extending well beyond the campus pioneers. Equally important, Schools were better able to identify strategic initiatives and place high priorities on the use of technology in specific disciplines. In response to these changes, Academic Technologies was established specifically to support faculty in their efforts to integrate technology in their instruction, research, and scholarly activity and to work with schools and departments on strategic initiatives.

Technology Support Services

The mission of Technology Support Services (TSS) is to provide support to the 20,000 Northwestern University employees and students on the Chicago and Evanston campuses. To accomplish this, Technology Support Services has adopted a proactive strategy of leveraging networked and distributed technologies that make it possible to expand support with available resources, lead change in the face of inevitable market forces, manage user expectations, and help departments and users become more self-reliant.

Leverage Networked and Distributed Technologies

A major focus of Technology Support Services is to leverage staff efforts through networked and distributed technologies. Networked help desk software has been installed and is used to track problems and their resolution. Web pages are developed and maintained which provide technical information and guidance to the Northwestern community. During New Student Week, incoming students are trained in the basics of using the campus network and receive software installers that include standardized software. Next year, Technology Support Services plans to provide campus network training for all students by CD-ROM.

Lead Change on Campus.

As new technologies that impact the networked community as a whole become available, Technology Support Services evaluates them in the context of the University networked environment. It determines a migration policy that includes training and professional development for IT staff and University IT support personnel in anticipation of general adoption. For example, Windows 95 and Windows NT migration policies for Northwestern University are set by Technology Support Services.
Manage Expectations.

As technology services evolve, often suddenly, from pilot projects into core campus services, policies about use and access to these need to be developed. Technology Support Services led the change this year to POP-only email support for campus network accounts. It also helped manage the migration off technologies that can no longer be supported centrally, such as 386 technology.

Market-oriented Support Policies

Technology Support Services recognizes that market forces will be increasingly important and modifies its support policies accordingly. For example, while only a specific email client and Web browser are currently recommended and supported, TSS expects that users will soon have a number of commercial options that will work well in the campus networked environment and will need to be supported.

Student Staff Development

Students are proving to be an increasingly important resources in supporting the University’s networked community. For example, as demand for Help Desk support was increasing, Technology Support Services changed to a 100% student-staffed Help Desk that is now managed by students and serves the entire community. Recruiting, training, and developing student staff will continue to play a key role in the ability of TSS to expand support to the University community.

Distributed Support Services

Recognizing that with dependence on information technology increasing, Technology Support Services alone cannot provide support to all users, departments, schools and administrative units, a distributed support initiative was established. Under the initiative TSS works with units of the University to identify their support needs and develop or hire departmental support staff who work closely with TSS. Departmental IT support personnel provide the first line of support for their users and have direct access to IT specialists who can assist them with problems requiring greater technical expertise. They receive training to make sure they remain current with the state of the University networked environment and participate in planning activities.

Academic Support
Academic Technologies provides support for over 1800 faculty who hold high expectations for quality support. 80% of the students living on-campus have computers and expect their instructors to take advantage of network capabilities in the courses they take. Faculty research, collaboration, and interests may extend far beyond the borders of the Northwestern campuses. Academic Technologies concentrates on providing support to faculty interested in exploiting the opportunities of technology for instruction, advancing University goals and priorities, exploiting network tools and resources, making possible new opportunities for collaboration, and anticipating technologies that might play an important role in instruction at Northwestern.

Faculty Support

Academic Technologies provides a very high level of service to Northwestern faculty. The Learning Technologies Group (LTG) was formed to provide direct support to faculty interested in integrating technology in instruction. In addition to working with faculty on projects, it has developed the popular Technology in Learning and Teaching (TiLT) workshop (originally with Cornell University) and the Faculty In Technology (FIT) program. The Learning Technologies Group also manages the distribution of University site licenses that support instruction and research. To better support faculty efforts to integrate technology into instruction and assure that faculty collaboration with LTG is successful, the Classroom Technologies Group was formed to support the computer labs, electronic classrooms, and interactive video classrooms.

Advancing University Goals and Priorities

Major initiatives and efforts in Academic Technologies are focused on activities that advance the University’s goals for instruction and research. For example, Academic Technologies has collaborated with the Northwestern University Library in the deployment of digital technologies in the Marjorie I. Mitchell Multimedia Center and the development of the Electronic Reserve System. Academic Technologies worked with the College of Arts and Sciences on establishing the Multimedia Learning Center and its support of foreign language instruction, as well as with the Math Department in their work to integrate symbolic programming into the Calculus sequence.

Exploiting the Network

Academic Technologies places great emphasis on network-based applications, tools, and collections, in part because investment in this area can have very broad application and can benefit a variety of disciplines. Having piloted the use of newsgroups and listservs for
instruction, Academic Technologies now supports asynchronous conferencing over the campus data network that supports over 4,000 students and faculty in classes throughout the University. It also supports a web server for faculty courses and initiatives. An on-line multimedia notebook system called ClassACT, created using an Oracle database, is used for a number of courses.

New Opportunities for Collaboration

The University’s networked environment also enables Academic Technologies to expand faculty opportunities for interaction and collaboration beyond the campus community and make new resources available for instruction and scholarly activity. In collaboration with Northwestern faculty and the Chicago Historical Society, Academic Technologies developed the on-line museum exhibit of the Chicago Fire. Collaboration with Northwestern faculty and the Newberry Library will result in making the Plains Indians Tribal Narratives available over the Internet. Other collaboration includes work with the National Archives on the development of a web-accessible archive of Supreme Court oral arguments, featuring audio recordings of major court statements.

Anticipating Technology Opportunities

An important function of Academic Technologies is to anticipate the technology needs of instruction and research, especially those involving the University’s networked environment. An Emerging Technology Group and Technology Testbed were established to evaluate technologies that could have near-term impact on faculty opportunities in instruction and research. Desktop video conferencing to support collaboration and joint instruction, as well as video server technology that will extend the capability of multimedia databases and the Library’s media distribution system, are examples of current initiatives. The Research Technologies Group has been supporting an OSF/DCE cell for social science research and will begin to develop local supercomputing resources for the University as a whole.

CONCLUSION

The reorganization of Information Technology at Northwestern University is intended to position the University to take advantage of current and future opportunities that technology will bring to advance the instructional, research, and administrative missions of the University. It will make the Information Technology organizations more responsive to the core business needs of the University. At the same time, Information Technology is
using the networked environment to leverage its limited resources in order to empower users, help them to be more self-reliant, and improve the overall capabilities of the University community.