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IAIMS Planning Grant for the

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**IAIMS Planning Grant for the
University of New Mexico Health Sciences Center
National Library of Medicine Grant Number 1G08LM06755-01A1
Final Report**

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Sally Bowler-Hill, Information Systems Planner

December 2004



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Introduction

Since 2000, the University of New Mexico Health Sciences Center (UNMHSC) has been implementing an IAIMS planning grant (1G08LM06755-01A1) and preparing the next stage of IAIMS development, including submission of an operations grant(s). The original time frame of the grant was February 1, 2000 through January 31, 2002; a no cost extension was received, and the award period was extended through January 31, 2003.

The following report details the major aims of the project, as specified by Principal Investigator Holly Shipp Buchanan, EdD, and Co-Investigator Fred Hashimoto, MD, in their original proposal to the National Library of Medicine (NLM). This narrative is a final report as of December 2004 and details the UNMHSC's progress accomplishing these aims and tasks. This report will demonstrate how the IAIMS infrastructure has developed on the UNMHSC campus over the last three years.

In 2005 a program review and plan evaluation is scheduled with external consultants to solicit commentary about the UNMHSC IAIMS planning experience. This task has been added to the UNMHSC Three-Year Plan for Knowledge Management and Information Technology.

Aim 1

Envision the UNMHSC as the comprehensive, easily-accessible, electronic healthcare resource and leader for the State of New Mexico.

1a. Develop and articulate a vision statement for IAIMS in collaboration with other UNMHSC strategic direction committees, the Leadership Council, internal and external focus groups, including members of health organizations and special populations served by UNMHSC.

✓ *Complete*

In 2000, the UNMHSC created a vision statement to guide the development of an integrated environment for knowledge management and information technology. Using the AAMC's better_health @here.now initiatives as a guide, the faculty advisory council for the IAIMS program developed and approved definitions for knowledge management and information technology.

These groups articulated Guiding Principles for Knowledge Management and Information Technology, envisioning the UNMHSC as a comprehensive, easily-accessible, electronic healthcare resource and leader for the State of New Mexico. *See* Section 2a of the report for a description of the faculty advisory council for the IAIMS program.

UNMHSC Guiding Principles for Knowledge Management and Information Technology (KMIT)

Knowledge management creates a user-centered environment that ensures easy access to and ethical use of appropriate information resources. Effective policy and training, as well as a ubiquitous, unobtrusive information technology infrastructure are essential to a knowledge management program providing stewardship of the collection, storage, organization, retrieval, archiving, and access to data and information.

Information technology supports knowledge management and includes a variety of devices and the connectivity that links them, in order to enable all forms of electronic communication.

Our **vision** fosters the creation of a knowledge management environment to maximize the power of information technologies. To achieve that vision:

- Data gathering takes place once, accurately, and at the original source. Data is integrated and is gathered in anticipation of future needs.
- Information is available in a timely, useful, and intuitive way to those with the need to know.
- The UNMHSC environment enriches knowledge-based interactions and decisions, and eliminates all process steps that do not add value.¹

¹ Adapted from: Association of American Medical Colleges. [Better-health@here.now](#). Washington, DC, AAMC, 2000 and presentation by Ralph W. Muller (University of Chicago), AAMC Annual Meeting, October 29, 2000.

One of the most visible displays of campus support for Knowledge Management and Information Technology (KMIT) is the inclusion of both concepts in the UNMHSC Strategic Plan, and their prominent mention in strategic plan marketing documents such as “The 20-Year Strategic Plan of the University of New Mexico Health Sciences Center – FY 2004 Operational Goals.” *See* Appendix A for the “The 20-Year Strategic Plan.”

1b. Disseminate vision statement throughout UNMHSC community and State.



This vision is shared throughout the UNMHSC community and the State of New Mexico using a variety of mechanisms. Most notable is the web site at <http://hsc.unm.edu/kmit/> and the committees created to support the KMIT initiatives and the IAIMS planning process. A more detailed description of the KMIT committees can be found in Section 2a below, and details of the web site are in 2e.

The IAIMS vision is also embodied through our participation in various outreach ventures. On the UNMHSC campus, examples include:

- formation of the Vice President's Leadership Forum described in section 2c
- support of departmental programs, e.g., the Research Involving Outpatient Settings (RIOSNET) described in Appendix U
- collaborations with the Veterans Administration Medical Center in Albuquerque referenced in Section 2g
- information exchanges with state programs such as the New Mexico Council for Higher Education Computing Services (NM CHECS) mentioned in Section 2h; and
- national programs, e.g., the Experimental Program to Stimulate Competitive Research (EPSCoR), the Biomedical Research Infrastructure Network (BRIN) (section 2h), and the Tribal Connection Libraries (section 4h).

We have disseminated the IAIMS vision statement in various ways, including in grant proposals, since 2000. In addition, the orientation manual prepared for the KMIT Advisory Council, mentioned in Section 2a below, prominently features the vision statement.

It is possible to measure progress toward this objective by using the results of responses to the 2000 and 2002 administration of the Planning and Assessment Aid, an evaluation method described in Section 2j. Responses compared between 2000 and 2002 show a marked increase over the granting period in awareness of the IAIMS initiative taking place at the UNMHSC.

1c. Utilize vision statement as a framework for developing the IAIMS Master Plan.

✓ *Complete*

The vision and guiding principles for the IAIMS planning project influenced the development of the IAIMS “Master Plan”. This IAIMS Master Plan includes the UNMHSC Three-Year Plan for Knowledge Management and Information Technology as its primary framework. This plan describes and tracks individual projects and initiatives across the UNMHSC campus as they progress from planning to implementation.

The first UNMHSC Three-Year Plan was created in July 1998, and serves as the Three-Year Information Technology Plan as required by the New Mexico Commission on Higher Education. It uses input from the UNMHSC as well as other UNM campus committees and user constituencies. *See* Appendix B for a copy of the current UNMHSC Three-Year Plan for Knowledge Management and Information Technology.

The UNMHSC Three-Year Plan for Knowledge Management and Information Technology is incorporated, as appropriate, into plans for individual components. An example of a component plan that integrates the UNMHSC Three-Year Plan for Knowledge Management and Information Technology is the Health Sciences Library and Informatics Center’s (HSLIC) own multi-year Strategic Plan. *See* Appendix C for a copy of the 2003-2005 HSLIC Strategic Plan. The IAIMS Master Plan also includes sub-plans for major processes and organizational components or units. One example of a sub-plan for a major process is the UNM Information Technology Infrastructure Plan (UNM ITIP) that details the results of a campus-wide planning process for the physical infrastructure of UNM IT. *See* Appendix D for UNM ITIP.

Moreover, the vision and guiding principles for the IAIMS planning project were introduced and discussed with the committees discussed in Section 2a, as well as with UNMHSC and campus-wide committees.

Aim 2

Identify a leadership and a planning structure that assures continuous planning, evaluation, and process improvement of information systems, is consistent with ongoing UNMHSC planning initiatives, and involves partners with key constituencies.

2a. Establish IAIMS Steering Committee and sub-committees, and convey charges.

✓ *Complete*

As introduced in Section 1a, early planning re-named the IAIMS processes at UNMHSC as institution-wide Knowledge Management and Information Technology (KMIT) initiatives. As part of this process, the UNMHSC leadership decided to streamline, creating a committee structure with three, consolidated new groups directly involved with IAIMS as well as involving relevant, existing committees in the process. Committees and sub-committees originally proposed in the IAIMS proposal were therefore transitioned and integrated into the new KMIT nomenclature. The IAIMS Planning Office, described in detail in 2d, provides support for all of the Councils and Committees established to facilitate the IAIMS programming.

In 2000, the Vice President for Health Sciences, Dr. R. Phillip Eaton, commissioned the **KMIT Leadership Council** to oversee the incorporation of KMIT initiatives into the UNMHSC strategic planning initiatives. The KMIT Leadership Council is composed of the Assistant Vice President of Finance and Administration, the CIO of University Hospitals (UNMH), the Director of the Health Sciences Library and Informatics Center, and the chair of the KMIT Advisory Council. This group meets twice a month.

In 2002, the KMIT Leadership Council established or incorporated two additional broad-based committees, the **KMIT Advisory Council** and the **KMIT Operations Group**. See Appendix E for a list of current committee current members.

The KMIT Advisory Council (KMIT AC) is an elected body comprised of individuals and key stakeholders representing each of the major components of the UNMHSC, which includes the School of Medicine, College of Nursing, College of Pharmacy, the Health Sciences Library and Informatics Center, UNMH, and UNMHSC Administration. In addition there are members (regular and ex-officio) representing education, administration, research (HSC Research Council and the SOM Office of Biocomputing) clinical care (UNMH IS Steering Committee), and technology (IS Directors), as outlined in the original proposal.² This committee also includes representation from Main Campus components, such as CIRT (Computer and Information Resource and Technology) and the Veterans Administration. All regular members serve staggered three year terms. Committee charges are conveyed during new-member orientations as

² Some of these members represent committees that pre-date this grant proposal and are direct stakeholders in the IAIMS implementation, such as the representative from the IS Directors group.

well as being included in the KMIT AC Council Member Handbook described in Section 2b below. The Council participates in monthly presentations on knowledge management and information technology initiatives, reviews policies and planning documents, and provides feedback to HSC leadership on issues that affect faculty, students, and staff. In 2004, this group moved from bi-weekly meetings to extended monthly meetings.

The **KMIT Operations** Council is a working group primarily comprised of managers from UNMHSC units responsible for knowledge management and technology key to the IAIMS process. Like KMIT AC, this group includes key stakeholders representing each of the major components of the UNMHSC. There are also cross-over members from the other two KMIT committees. The Council's purpose is to ensure communications and consistent planning and policy development throughout the IT community on campus and the successful execution of these plans and policies. This working group actively engages in policy development and information technology planning at the enterprise level. As the issues presented to this group, which meets twice a month, directly affect their units, membership in this committee is based on specific job titles.

The three KMIT committees aided in the development of the UNMHSC Three-Year Plan for Knowledge Management and Information Technology, facilitated the development of the University of New Mexico's Information Technology Infrastructure Plan, and devised an overall vision for knowledge management and information technology for the future. Through these KMIT committees, an ongoing planning process for the UNMHSC campus has taken shape.

The UNMH **IS Steering Committee** serves as the IAIMS Clinical Task Force. This clinical leadership group meets monthly, under the chairmanship of Frederick Hashimoto, MD, the Co-Investigator for the IAIMS grant. The committee includes representation from all areas of the UNMHSC. Its charge is to assess the information needs of clinicians and make recommendations regarding technologies.

The **IS Directors Committee** serves as the IAIMS Technology Task Force. This group includes technician representation from individual IT units within HSC colleges, departments and research centers. It also includes representation of main campus components (CIRT). Chaired by PI Buchanan, its charge is to communicate departmental information technology needs and to make recommendations regarding technologies.

2b. Train subcommittees and inform them of timetables and expected deliverables.

✓ *Complete*

As introduced in section 2a above, subcommittees were established in 2002 and committee deliverables articulated. Initial training for the KMIT AC was very brief. With the rotation of terms in fall 2003, a formal training plan was put into place. Beginning in 2003, each Council member now receives a Council Member Handbook that includes Council Charge, KMIT Definitions, Role of the Advisory council Chair; a description of the Current Membership Roster, UNMHSC 3-Year IT Plan; summary of the IAIMS grant proposal; copies of policies, and other background material. *See Appendix F* for the charges and charters of KMIT AC. Additional information about the Councils can also be found on the KMIT web site at <http://hsc.unm.edu/library/kmit/committees.shtml>.

KMIT Advisory Council members who were commissioned in 2003 will also receive orientation evaluations in May 2004. The scheduling of these evaluations is done prior to the election of a new Chair and the appointments of new members in order to gather information on improving the orientation process.

Since membership in the KMIT Operations Group and KMIT Leadership Council are based on job title, orientation of any new incumbents is done individually on an as-needed basis.

2c. Offer quarterly lecture symposium on IAIMS, technology trends, and other topics related to planning for information systems integration.

✓ *Complete*

Shortly after receiving funding from NLM, the Vice President's Leadership Forum was initiated. This seminar series focuses on how information technology will impact health care research, education and the delivery of clinical care in the next ten years. Since February 2000, there have been ten unique sessions with topics ranging from virtual reality to creating community-wide health information systems to IAIMS implementation grants at other Universities. A list of Forum speakers is included in Appendix G.

These presentations are available on the KMIT web site as PowerPoint slides. Following each session, an evaluation survey for all attendees is administered to ensure quality improvement. *See* Appendix H for the Forum evaluation form and a summary of evaluation data.



Stuart Nelson, MD, Vice President's Leadership Forum, February 2004



Lawrence Lessig, J.D., Keynote Speaker, 2nd Annual Symposium on Scholarly Communications



Charles P. Friedman, Ph.D., Vice President's Leadership Forum, January 2002



Patricia Brennan, Ph.D., M.S.N., Vice President's Leadership Forum, May 2002

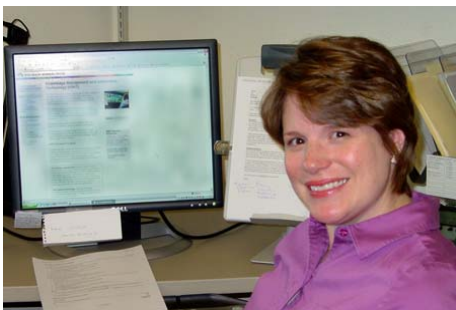
2d. Establish IAIMS office in HSC Library.



Established in March 2000, the Planning Office in the Health Sciences Library and Informatics Center (HSLIC) manages a variety of planning initiatives for the UNMHSC as well as the IAIMS planning grant. The Planning Office is operated and staffed by an Information Systems Planner, who reports directly to the HSLIC Director and IAIMS PI.

The Planner provided support for the development of the UNM Information Technology Infrastructure Plan, referenced in Section 1c, and is the point of contact for planners at CIRT and UNMH. The Planner coordinates the meetings and planning-related activities of the KMIT Councils, provides continuity between the groups, and markets the KMIT processes and value of integration across the organization. This position participates in UNMHSC-wide information technology projects and implementations, ensuring that the Planner is also an active participant toward achieving the UNMHSC information technology goals. Finally, the Planner facilitates HSLIC strategic planning which ensures continuity between HSLIC and KMIT. The Planner position now is fully funded by the UNMHSC.

In addition, the HSLIC has provided office space for UNMHSC informatics faculty to help create an on-campus informatics community. The first informatics fellow was recruited in August 2003 (Randall Stewart, MD) and the new faculty position of Assistant Director for Health Sciences Informatics Program Development was recruited in March 2004 (Philip J. Kroth, MD, MS).



Sally Bowler-Hill, Information Systems Planner



Philip J. Kroth, MD, MS
Director for Health
Sciences Informatics
Program Development



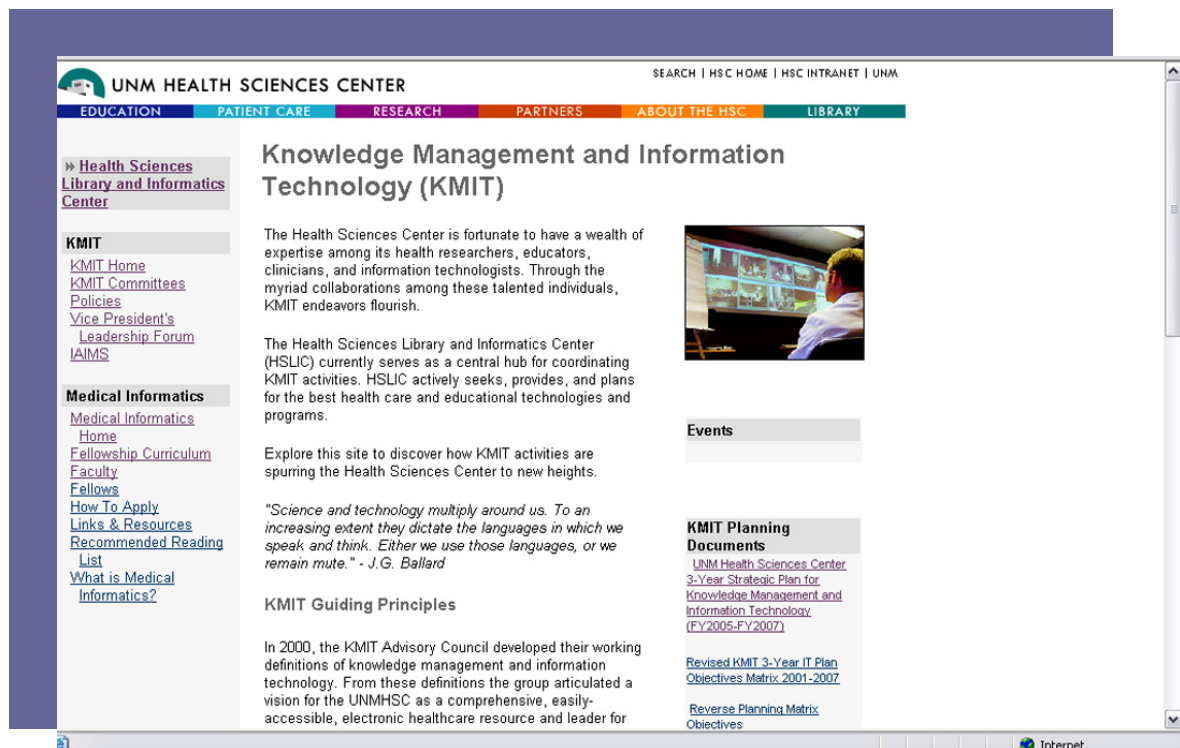
Randall Stewart, MD
Informatics Fellow

2e. Create and maintain IAIMS homepage.



The address for the UNMHSC KMIT/IAIMS web site is <http://hsc.unm.edu/library/kmit>. This site was created in 2000 and was revised and re-launched with added features in 2004. The site is a central information source for IAIMS and KMIT initiatives, the various participants in the process, and the UNMHSC community as a whole.

The home page provides an overview of IAIMS Planning Process at UNMHSC, including the vision statement, meeting schedules, and contact information for the Principal Investigators and Planning Office. Other pages identify participants on the each of the IAIMS and KMIT sub-committees. They detail committee meeting minutes, display presentations made by external speakers as part of the Vice President's Leadership Forum, and link to key internal policies. The site also offers links to the IAIMS Consortium, the National Library of Medicine, and other IAIMS sites. Usage of the site averaged approximately 1,200 page views per month during FY04.



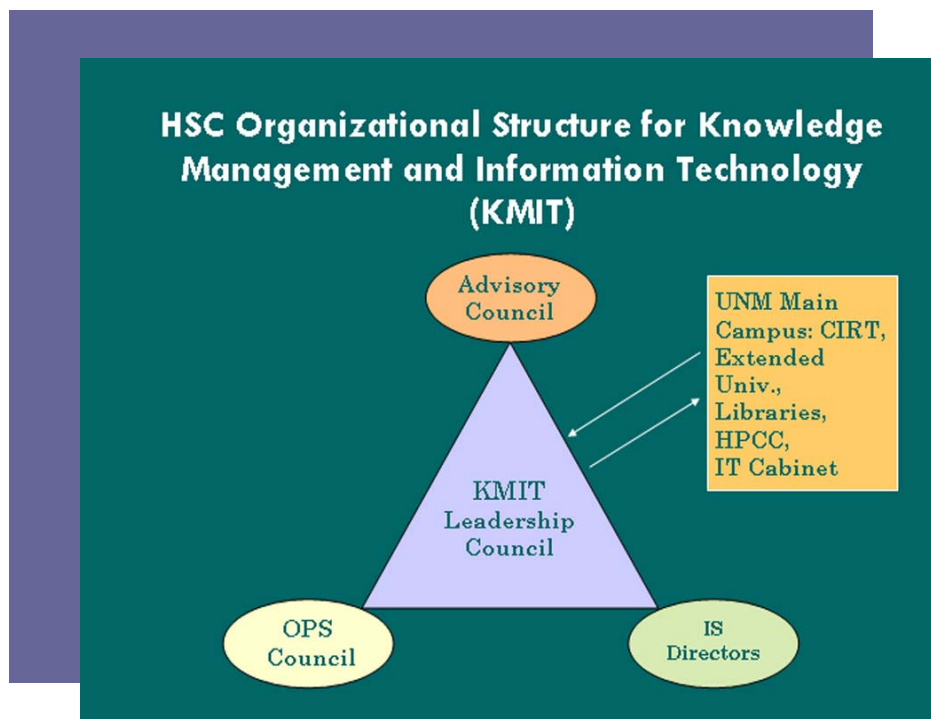
KMIT home page, May 2005

2f. Integrate IAIMS planning into ongoing work of university-wide information groups, i.e., IS units at HSC, CIRT, Cancer Center, etc.

✓ *Complete*

During 2002/2003 the PI, Buchanan was appointed by the UNM Provost to serve as a member of a UNM-wide task force to create a UNM-wide planning process for IT, modeled after the UNMHSC IAIMS/KMIT planning processes. The Provost envisioned the eventual creation of a UNM IT Cabinet (similar to the UNMHSC KMIT Advisory and Operational Councils). New UNM President Caldera put a hold on implementation of the IT Cabinet during appointment of a UNM CIO in 2004. It is anticipated that the new Cabinet will be chartered and members appointed in early 2005.

Within the UNMHSC, an integrated planning process using regular meetings of the KMIT Advisory Council, KMIT Operations Council, IS Directors, the UNMH IS Steering Committee assures communication and UNMHSC-wide buy-in of policies dealing with knowledge management and information technology. *See* Section 2a for a description of Council membership. As new programs or initiatives at the HSC are created (e.g., the SOM Office of Biocomputing) these areas are assessed to determine how to best incorporate them into the KMIT Councils and Committees. Meeting minutes for the KMIT Advisory Council and Operations Council are available for review on the web site to facilitate communications across the UNMHSC.



2g. Invite participation from UNMHSC programs, statewide health organizations, and special populations served into planning process.

✓ *Complete*

UNMHSC faculty and staff are involved in several campus-wide projects, including a new Enterprise Resource Planning (ERP) system (*SCT Banner*), a grants administration and management system (*InfoEd*), and a document management system (*work2gether*). The Planning Office also played a key role in working with consultants to develop the UNM Information Technology Infrastructure Plan detailed in Section 3c.

Speakers from the Veterans Administration and the State of New Mexico's CIO visited UNM and described their technology plans. The UNMHSC, in large part through the efforts of HSLIC faculty and staff, have included Native Americans and other special populations in the planning process through various initiatives detailed in Section 4h below.

Another example of collaborative activities is the statewide New Mexico Telehealth Alliance being developed by the Center for Telehealth. *See* Section 3e for more information on the Center for Telehealth. In November 2003, the Center co-sponsored a conference with the New Mexico Department of Corrections and the Las Vegas (NM) Medical Center to identify what a telehealth alliance could do to ensure access to healthcare in rural New Mexico. Planning for a state-wide telehealth alliance continues. It is anticipated that Governor Richardson will appoint in 2005 members to a new Telehealth Commission.

2h. Explore collaborations with state health information systems, national labs, and state technology facilities.

✓ Complete

The UNMHSC mission states we “provide added value to health care through leadership in ...facilitating partnerships with public and private biomedical and health enterprises.” Partnerships are therefore a priority for the UNMHSC, and its leadership actively pursues ongoing collaboration with state and national technology facilities such as the New Mexico Department of Health, NASA, Sandia National Laboratories and Los Alamos National Laboratory. Examples of several initiatives implemented since the award of the IAIMS planning grant are listed below:

- UNMHSC worked with CIRT to assess potential collaboration with the state-led networking initiative MAGNET (Multi-Agency Network). This program seeks to consolidate network resources and bandwidth purchasing contracts for all state sponsored institutions. HSLIC also participated in 2004 in the analysis of membership in the national LambdaRail fiber initiative, which led to UNM’s eventual membership.
- The Virtual Collaborative Clinic (VCC) is a joint effort between the UNM School of Engineering and the UNMHSC General Clinical Research Center. NASA, Sandia National Laboratories, and Los Alamos National Laboratory also expressed a strong desire to work with the UNMHSC in developing “plug and play” infusion devices for the VCC. In the longer term, tools for examining patients for retinopathy, neuropathy, and cardiovascular disease, as well as data compression/transmission of real time images, need to be developed.
- Through it’s collaboration with the Center for High Performance Computing, the HSLIC participated in two Department of Defense biosurveillance pilot programs known as ENCOMPASS and RSVP. These two programs required collaboration between The Center for High Performance Computing, Sandia National Laboratories, Los Alamos National Laboratory, the US Army, the Defense Advanced Research Projects Agency (DARPA), and the New Mexico Department of Health.
- Project TOUCH (<http://hsc.unm.edu/touch/>) is a jointly sponsored program between the University of Hawaii, UNMHSC, and the Center for High Performance Computing. Project TOUCH seeks to improve the quality of health care services and education in remote, multicultural areas through modern telehealth technologies. It is hoped that this program will demonstrate the feasibility of employing advanced computing methods such as virtual reality and three-dimensional images to enhance education in an innovative problem-based learning (PBL) format currently being used in the medical school curriculum, applying specific clinical case models, and deploying to remote sites/workstations.

In the IAIMS proposal, we stated that we would also involve our faculty and staff in presentations to and with external entities in the state. Some examples include a HSLIC lecturer participating in a statewide Biomedical Research Infrastructure Network (BRIN) initiative using a community planning group. PI Buchanan presented on Internet 2 at an annual meeting of the Alliance for Innovation in Science and Technology Information (AISTI) and the Planning Office hosted visitors in the HSLIC *Access Grid* studio and made a presentation on Internet2 Day in March 2003. Moreover, in October 2003, PI Buchanan visited leadership from Eastern New Mexico University and the New Mexico Rehabilitation Center in Roswell to investigate institutional collaborations and informational needs.

The photographs below illustrate investigators working on Project TOUCH experiments using the HSLIC *Access Grid* studio as well as project meetings incorporating national partners.



Project TOUCH meeting over the *Access Grid*, HSLIC



Project TOUCH simulation in HSLIC *Access Grid* studio



Project meeting over the *Access Grid*, HSLIC

2i. Join IAIMS Consortium.



The UNMHSC joined the IAIMS Consortium in July of 2000. Reflecting upon lessons learned at other IAIMS institutions assists the Planner and KMIT leadership in planning and creating successful integrated information environments in the areas of biomedical education, research, and patient care.

The IAIMS planning grant PIs and the Planner provided a poster for the May 2003 Consortium meeting in Philadelphia, and served as speakers for various program sessions. Representatives from HSLIC faculty have subsequently participated in the annual Consortium meetings for 2004 and 2005. The current UNMHSC Planner has been involved in planning Consortium meetings, and files progress reports annually, which can be found on the IAIMS Consortium website at <http://www.iaimscons.org/reports/default.html>.

2j. Establish ongoing evaluation of the IAIMS planning process.



The UNMHSC Planning Office established the AAMC Planning and Assessment Aid -- used in the better_health@here.now initiative -- as its mechanism for ongoing evaluation. This tool allows planners to benchmark opinions regarding the information culture of the institution, and ascertain how information technology impacts the educational, clinical, and research missions of the UNMHSC.

The IAIMS Steering Committees (UNMHSC Leadership Council, KMIT Operations and Advisory Councils) used the Planning and Assessment Aid to benchmark perceptions regarding the current state of information technology on campus, as well as future aspirations. The survey included topics on the information culture of the institution, its information management plan, administration, its educational mission, its clinical mission, and the research mission. Using a Likert-type scale, respondents indicated whether they perceived there was very little progress, initiatives were partially present, mostly present, or fully implemented.

The survey was administered in 2000, and again in 2002. During those two years, the overall perception of the survey topics increased, evidencing an increased awareness across the campus of the IAIMS initiatives. A schedule for future evaluations is under development so that trend data may be collected. The next survey is scheduled for 2005. *See Appendix I.*

In addition, HSLIC has begun to regularly conduct surveys of its patrons. Specific questions target patron perceptions of the technology services available. In 2002, an internally-created, web-based survey was developed. In 2003, HSLIC used the LibQUAL+™ survey. Moreover, within the last few months, a special survey for PDA users gathered their feedback on the services available to them. Finally, a technology satisfaction survey was administered in summer, 2004. *See Appendix T.*

In our proposal we originally planned to use the CAUSE survey “Self-Assessment for Campus Information Technology Services”.³ We opted instead to use the AAMC Planning and Assessment Aid due to its robustness, its specificity to health services, and the availability of comparative data. We expect to use CAUSE as a future survey

Our proposal also mentioned the use of NCACS criteria. Refer to Section 5b for details on those criteria and how they were incorporated into the initial plan.

³ Fleit, LH. Self-Assessment for Campus Information Technology Services. CAUSE Professional Paper Series, #12. Boulder, CO: CAUSE, 1994.

Aim 3

Assess UNMHSC information technology infrastructure and establish system readiness to support IAIMS implementation, including existing communications systems and networks, especially as they related to telehealth; evaluate current information management resources, and project future resources and funding needs.

3a. Create and maintain a web-based catalog of information technology resources, including people, hardware, software, services, and training available at UNMHSC, and provide easy access for faculty and staff.

✓ *Complete*

UNMHSC has defined web technology as the primary medium for providing access to clinical, research, education, and administrative information. The access and use of these web pages within a comprehensive clinical, academic and consumer environment are common, convenient, and intuitive. As an example, during FY03 8.5M web pages were viewed on the UNMHSC web site, and 160 UNMHSC academic courses are web-based or web enhanced.

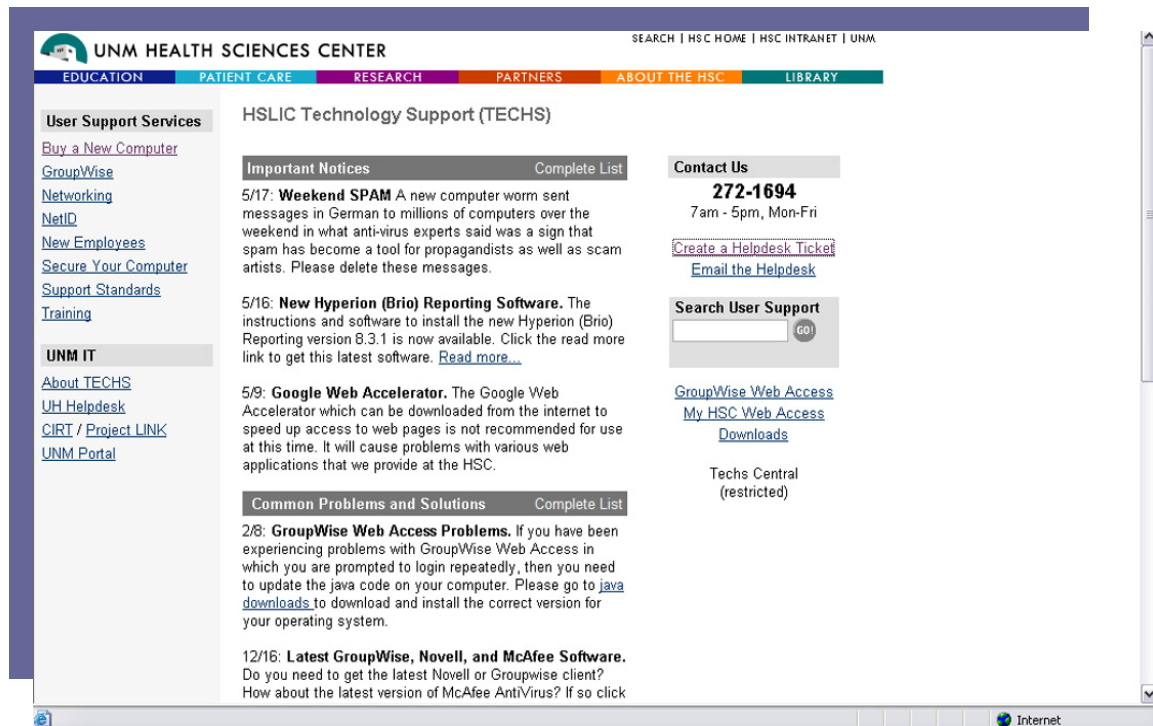
Through the re-creation, reformation and standardization of common web services, interfaces, and pages for the academic and clinical components of the UNMHSC, a centralized and easily accessible catalog of information technology resources and services is available. Through each of these component-specific pages, information is made available regarding primary contacts, breadth of services, hardware standards, training, and software support and licensing.

The UNMHSC's web development group, known as the Web Team, shares information gathered via *WebTrends* on the number of hits and the variety of user domains for the various sites on a monthly basis. See Section 3d for more information on web-based services.

Extensive, detailed inventories of hardware, software and support services across the UNMHSC campus are now available. These inventories, constructed in early 2003, are critical in planning for enterprise wide development, growth, and the repurposing of resources across the campus. For example, there are 88 servers used departmentally or as part of the infrastructure. With these inventories, a business continuity plan for the academic and clinical components was developed, and the inventory became part of the gap analysis undertaken in preparation for HIPAA compliance in 2003.

In addition, as part of the UNMHSC preparation for system readiness to support an IAIMS implementation, the HSLIC TECHS department worked to improve communication with UNMHSC users by expanding and relaunching its web site in 2003 to include self-submittal of Help Desk tickets, virus updates, common problems, and

support standards to cite a few examples. More users are now accessing the TECHS website for information (<http://hsc.unm.edu/library/usersupport/>). In FY03, the TECHS User Support unit logged 253,595 page views.



TECHS User Support home page, May 2005

3b. Develop and recommend guidelines and standards for connectivity and compatibility, upgrades, and products.



Through a collaborative process which includes input from information technology representatives across the UNMHSC campus, the UNMHSC seeks to create and codify information technology standards and guidelines for connectivity, network communications, desktop and server hardware standardization, software support and a standardized mechanism for purchasing.

The creation of an Information Technology Standards document, developed collaboratively by UNMHSC IT professionals and approved in 2000, was a success. This document describes best-practice solutions for application usage on the campus, as well as help desk support standards for the academic and clinical components of the UNMHSC. *See Appendix J for the most current version (2005).*

In 2000, a pilot project in collaboration with the School of Medicine encouraged the annual replacement of one-third of the workstations used by faculty with cost-effective, standardized workstations equipped to meet the computing needs of instructors, clinicians, and researchers.

Moreover, in 2001, the project received additional support from the Council of Higher Education and supplemental funds from the Office of the Vice President for Health Sciences. With the additional support, the project expanded to include the College of Nursing and the College of Pharmacy. By 2005, there are 800 standardized machines deployed. Each workstation has a standardized hardware and software profile, which facilitates the speed of deployment, enhances the ability to provide technical support across the campus, and provides a sizable price break due to volume orders. During the IAIMS Spring 2003 Consortium meeting, UNMHSC presented a poster on the success of the faculty workstation project. The poster appears in Appendix K.

3c. Develop and recommend projection for future IS purchases, maintenance, software, upgrades, and staffing.

✓ *Complete*

The impact of IAIMS is seen in two major projects: the UNM Information Technology Infrastructure Plan and the UNMHSC Three-Year Plan for Knowledge Management and Information Technology. These projects are so encompassing across the UNMHSC and the entire UNM campus, that future IAIMS grant requests will be done in concert with these goals.

The Three-Year Plan, described in Section 1c above and referenced throughout this report, is a dynamic document holding the proposed and active technology projects from UNMHSC constituents, and campus-wide technology endeavors underway. Several times a year, the KMIT groups discuss the feasibility of projects, and where those projects should be ranked vis-à-vis the Three-Year Plan. Funding and IT services are then allocated appropriately. UNMHSC continuously evaluates and assesses technology and planning via its KMIT initiatives which yield the UNMHSC Three-Year Plan for Knowledge Management and Information Technology.

UNM Information Technology Infrastructure Plan (ITIP)

The University of New Mexico recently completed a campus-wide Information Technology Infrastructure Plan (ITIP) as a component of its strategic planning initiatives. Created in 2002, ITIP provides guidance for new University buildings under construction as well as for the renovation of existing buildings. Dr. Buchanan and the Planning Office served on the project's Steering Committee. A substantive overview of ITIP follows as the process used for its development will serve as a guide for the development of future sub-plans.

ITIP is a strategic initiative that was developed by the UNM Facilities Planning Department. The ITIP project emerged from the recommendations of the Campus Strategic Plan, originally sponsored by the UNM Provost's Office. The ITIP is included with other campus strategic planning exercises, including the Campus Master Plan, the Long range Development Plan, the Health Sciences Center Facility Master Plan, and the Five Year Capital Plan.

Following a search process, UNM appointed Vantage Technology Consulting Group to undertake the project. The aim of ITIP was to chart a course that will enable UNM to build and maintain an information technology infrastructure which supports the goals outlined in the Campus Strategic Plan and to promote technology centers of excellence on the UNM campuses. For the purposes of ITIP, infrastructure is defined as the physical spaces, pathways, and cable plants that support the provision of information technology systems (including data, telephone, media, clinical and low voltage systems) throughout the campuses. In that context, the infrastructure must meet the following criteria:

- Capable of supporting today and tomorrow's technology
- Resilient, reliable, and easy to manage
- Ubiquitous, providing access wherever and whenever it is needed
- Appropriate, cost effective and demonstrating clear return on investment to UNM

Participation in the ITIP process involved representatives from all facets of campus life, including campus leadership, faculty, students, and staff. A Steering Committee was formed to direct the work and provide feedback throughout the process. Principal Investigator Holly Buchanan and the Planning Office were a part of that Steering Committee.

The membership of the Committee included representatives from the Provost's Office, Extended University, Campus and UNMHSC Facilities Planning, CIRT, the Health Sciences Library and Informatics Center, University Hospital, Telecommunications, Student Life, Campus Police, and other constituents.

The ITIP project included of the following steps:

- Determine the current state of the information technology infrastructure at UNM
- Compare technology at UNM with other campuses using a Peer Benchmarking process
- Conduct Focus Groups representative of the UNM population (leadership, technicians, students, faculty, staff) to determine internal views towards technology
- Develop a set of criteria for the design and construction of the next generation infrastructure
- Produce a series of prioritized recommendations regarding upgrades and replacements for the infrastructure

There were four major deliverables the Vantage Technology Consulting Group in association with the ITIP Steering Committee provided with the ITIP:

1. Peer benchmarking
2. Feedback from Focus Groups
3. Project recommendations
4. Building and campus standards

In order to identify UNM's standing in relation to its peers from a technology perspective, the project undertook a peer benchmarking exercise. The project team developed a questionnaire that contained a series of technology-focused questions, and sent it to various peer institutions as identified by UNM. Responses were gathered and analyzed, and UNM's position relative to other institutions was determined.

To assist with the identification of goals for the infrastructure project and to encourage participation of a wider section of the UNM campus, a series of Focus Groups were held on campus. The group included participation from leadership, faculty, students, and

technologists. These interactive sessions encouraged the participants to discuss their opinions on the current state of technology at UNM, and to identify a vision for the future of technology on campus.

The current infrastructure supporting technology systems on campus is aged and considered insufficient to support the introduction of new technologies. The ITIP team investigated the current state of the infrastructure and produced a series of coordinated campus drawings showing the existing infrastructure and major cable routes. Based on this information, the ITIP identified a series of construction projects recommended to improve the infrastructure and meet the goals of the Information Technology Infrastructure project. These construction projects were prioritized based on need, cost, risk, and sequencing with other campus projects. The top ten project recommendations were:

1. Audit of existing cable plant and infrastructure.
2. Reinforcement of infrastructure (duct banks and cabling)
3. Completion of central campus backbone loop
4. Provision of distributed telephone system
5. Construction of a new, centralized technology building
6. Upgrade of CIRT
7. Rerouting of cabling around The Pit
8. Upgrade of core switch environmental support
9. Extension of existing South Campus conduit connections to create a second, resilient connection
10. Upgrade of campus backbone data network

One tangible benefit of the ITIP and the budget process is that individual projects will not have to develop the infrastructure to support the project by themselves.

UNM is continuously upgrading and constructing buildings and associated facilities on campus. As part of the ITIP project, a set of standards were produced for architects and engineers to use as they design and plan for the construction of infrastructure to support information technology systems. These standards were reviewed and approved by the ITIP Steering Committee and will be used by both Campus and UNMHSC Facilities Planning departments.

The different components of the ITIP development process will provide UNM with several beneficial outcomes. The Peer Benchmarking component gives UNM a fix on its position relative to its peer institutions. It also contains useful information that can be used to shape future policy with respect to UNM's technology direction and comparative level of technology investment. The Focus Groups revealed interesting and surprisingly consistent attitudes and perceptions of UNM's leadership, faculty, and students toward technology and levels of technology service at UNM. The execution of the physical ITIP projects will provide resilience, flexibility, expansion capability, and redundancy to the technology infrastructure of the UNM campuses. Finally, the ITIP standards provide UNM with a living document for the consistent implementation of new infrastructure

elements that will support future technologies consistent with the ITIP goals of resilience, flexibility, expansion, and redundancy.

In addition to the four primary deliverables outlined above, UNM received a number of other benefits by undertaking the ITIP project. One of these is the increased level of communication that has developed between various campus technology groups.

The new ITIP standards began to be used for six new buildings planned for construction on the UNMHSC campus beginning in 2004. These new buildings include a research wet-lab building, an innovative research incubator dry-lab building, an expansion of the MIND Institute, an educational building, a 400,000 square foot expansion of the hospital, and a new outpatient cancer facility. The IAIMS PI and other UNMHSC technology staff participated in the design phase for the buildings and will continue to be involved in the process through occupancy.

In the design and development stage, UNM Facility Planners conducted multiple focus groups. Some of these focus groups included information technology staff and library services, in order to ensure the integration of ITIP into the new buildings which will support the UNMHSC's research, clinical, and educational missions.

The ITIP final report is included as Appendix D and is available online at <http://hsc.unm.edu/facilityplanning/>.

In addition to the outcomes of the ITIP planning process, UNMHSC has worked with representatives across the campus to achieve a number of critical infrastructure and technology planning initiatives that have created policies or guidelines to help us envision and manage projections for IT purchases, maintenance, software, upgrades, and staffing. These include:

- Establishment of a Web Development Policy (*See Appendix L*)
- Development of an Electronic Communications Policy (*See Appendix M*)
- Development of an Integrated Information Systems Policy (*See Appendix N*)
- Development of Graphical Standards for Websites (*See Appendix O*)
- Drafting IS Security and Maintenance process standards
- Licensure of *Cold Fusion* as a standard UNMHSC application development tool
- Standardization of Windows Streaming Media for encoding
- Implementation of streaming media server and established guidelines for use, e.g., Grand Rounds at the Albuquerque Veterans Administration Medical Center
- Establishment of DB / Application development standards – develop on access migrated to *SQL* and *Oracle* depending upon the specific need.
- Establishment of Web Development Application Standards: *FrontPage* and *MS IIS* – *Cold Fusion* Application Server
- Development of Testing – Test Environment
- Evaluating content management process

Of particular note are improvements relating to the UNMHSC technology maintenance process. In 1999, HSLIC created a technology maintenance process to support the proper development of the UNMHSC data network. To date, funding for network development currently comes from a number of unstable sources such as federal indirect charge (IDC) recovery, individual department contributions and competitive awards. The ITIP, described above and published in 2003, suggests that this fragmented approach is inappropriate for a critical infrastructure service. Due to the critical nature of network development in a health care, research and education environment, it is essential to identify a stable source of funding for ongoing information technology maintenance. Additional funding is also needed to support future network intensive initiatives such as Internet2, desktop video conferencing, voiceover-IP telecommunications and online education. All of these capabilities are closely tied to the institution's education and research missions. Therefore, in 2003 the UNMHSC submitted a legislative proposal for FY05 that was approved as one of the UNM legislative priorities for consideration by the 2004 Legislature. This proposal is intended to supplement existing annual funding for major one-time capital purchases.

The IAIMS planning grant has raised the profile of the knowledge management and information technology missions across the HSC. IAIMS and KMIT have been significantly supported by HSC leadership. As an example, every capital request submitted to the HSC since 1999 has been approved and implemented by HSLIC. The addition of technical FTEs to the HSLIC component has increased during this same period from 41.3 FTEs in 1997-1998 to 73 FTEs in 2002-2003.

3d. Establish the web (internet/intranet) as a primary information service for clinical, educational, research, and UNMHSC information.

✓ Complete

HSLIC is designated as the primary unit responsible for website administration at the UNMHSC. Apart from creating and maintaining internet web pages, the Web Team, described in Section 3a, creates intranets to facilitate information transfer and communication within UNMHSC. These intranets promote the concept of a unified organization and strengthen communication, and the development of standardized, easily accessed communication systems and processes will continue to be an integral part of the infrastructure.

The Web Team works with every component in the UNMHSC on web design and implementation, applications development, streaming media or online courses. The Web Team also works with various Principal Investigators on grant funded projects. Since 1998, the Web Team has grown from two to eight and one half FTE's and also includes four student employees.

In 2001, the Web Team worked with UNMHSC web authors and representatives from all UNMHSC components to redesign the UNMHSC home page and create one standard navigation bar across site. All top level UNMHSC component web sites, including the intranet, now use the standard UNMHSC navigation bar, a first for the UNMHSC, which demonstrates that standards can be accepted UNMHSC-wide.

The end result of having a website that is robust and easily navigated is that campus communications have improved. For example, the Public Affairs Department sends a Weekly Announcement Bulletin to all employees via e-mail. The e-mail contains a link to the intranet. The intranet spotlights the week's events, announcements, conferences, and studies. There are also numerous links to employee-specific sites, like cafeteria menus, job postings, e-mail directories, policies and procedures, and employee training. A sample list of internet/intranet projects is available in Appendix P. As mentioned in Section 3a, the Web Team shares its information on the number of hits and the variety of user domains for the various sites it maintains on the UNMHSC on a monthly basis.

Home Page Views on Academic Sites from FY2002, FY2003 and FY2004				
	FY 2002	FY2003	FY2004	% Increase FY03 to FY04
HSC	362,291	507,918	681,282	34%
HSLIC	677,994	895,283	1,024,590	14%
College of Pharmacy	63,786	126,246	130,030	3%
College of Nursing	85,903	154,904	252,386	63%
School of Medicine	289,690	410,822	417,595	2%

3e. Establish a forum for telehealth and distance education where various disciplines and information systems groups can coordinate services for distant, usually rural, areas.

✓ Complete

One of the domains included in the KMIT Advisory Council's 2000 charge was telehealth. Various teleconferencing and telehealth initiatives are underway at the UNMHSC.

As an example, in 2000, the Center for Telehealth was awarded a planning grant by NASA to establish a virtual collaborative clinic. The concept involved creating a virtual "collaboratory" where experts would be able convene to solve a medical problem at a remote site, develop the best solution, and transmit it back to the remote site of care as a virtual guide, including support for implementation.

The Center for Telehealth provides clinical, educational and administrative healthcare services to rural New Mexico sites using interactive televideo and other advanced communication technology. Based at UNMHSC, the program includes interactive televideo sites in Las Cruces, Roswell, and Truth or Consequences. A videophone project, funded through the Children's Miracle Network, allowed the addition of 21 new sites statewide.

The Center for Telehealth conducted focus groups with all types of health care providers, patients, administrators, and other users and participants. The focus groups primarily were conducted during the Needs Assessment phase of the Rural Telemedicine Network Grant from the Office for the Advancement of Telehealth. The Center contracted the evaluation to the Office of Evaluation and at the end of the grant conducted focus groups in all of the communities where they worked, including Roswell, Santa Rosa, and Las Vegas.

As part of the evaluation procedure the Center for Telehealth conducts face-to-face interviews with individuals on a quarterly basis, who are regular users of the system to gather quality improvement input. The evaluation process is internally reviewed and revised bi-annually. The report results are also included in the New Mexico Commission for Higher Education (NM CHE) evaluation measures.

In 2001, as part of Project TOUCH, HSLIC became the first library nationally to install *Access Grid* technology. The *Access Grid* is TCP/IP-based video conferencing running over Internet2 that uses multicasting for simultaneous interactions with multiple sites. Originally developed by the National Computational Sciences Alliance (NCSA), the *Access Grid* is a prototype of an advanced computational infrastructure for the 21st Century.

And finally, the UNM School of Medicine (SOM), Department of Medicine began partnering in 2003 with the State Health Department and Public Health District III to

develop a program to train providers in New Mexico to treat patients with Hepatitis C. The goal of this program (Project ECHO) is to expand access to the treatment of patients infected with HCV through an intensive program of provider education, training, and support. Using technology from the Center for Telehealth, SOM specialty providers will partner with rural providers to co-manage their HCV patients in community-based practices. In 2004, Project ECHO received funding from the National Library of Medicine to continue support of the program.

In 2003 the medical director of the Center for Telehealth, detailed in Section 3f, was added as an ex-officio member of the KMIT AC to provide the opportunity to strengthen communications between the Center and its constituencies as well as to better integrate the Center into strategic planning.



Hepatitis Presentation by Sanjeev Arora, MD

3f. Formalize an organizational structure for distance education and telehealth communications (data, voice, video).

✓ *Complete*

Distance Education:

Three campus units support distance education at UNM: the Extended University, Computer and Information Resources and Technology (CIRT), and HSLIC. Staff members in each of these units are available to provide faculty with *WebCT* technical support as well as one-on-one training sessions. Students receive course support through online tutorials and an automated help request form. In addition, some distance education is delivered via the Center for Telehealth.

During 2000, UNM selected *WebCT* as the standard application for online course delivery. UNM's web-based programs and courses give students the flexibility to study as their schedules dictate. As with on-campus studies, online students belong to a community in which dialogue and interaction with other students and faculty are central to the learning experience.

Web-based course offerings at the UNMHSC have grown steadily over the past three years. In 2001, there were 10 web-based and 14 web-enhanced courses offered at the UNMHSC. In 2002, the number expanded to include 28 web-based and 61 web-enhanced courses. As of 2003, there are now 40 web-based and 75 web-enhanced courses offered across the UNMHSC.

The chart in Appendix Q indicates the growth of *WebCT* on the UNMHSC campus. Currently the College of Nursing has two degree programs offered entirely online: Nursing Administration and the RN-BSN Conversion degree. In 2003, there were 14 web-based courses and 23 web-enhanced courses in their curriculum.

All four Phase I-1 School of Medicine blocks and one Phase II Clerkship are web-enhanced using *WebCT*. Several components of the Phase I-1 curriculum have also been web-enhanced. There are eight web-enhanced courses within the diagnostic and therapeutic science portion of the School of Medicine as well as courses for Physical Therapy, two courses for Occupational Therapy and two courses for Medical Laboratory Sciences that are currently available.

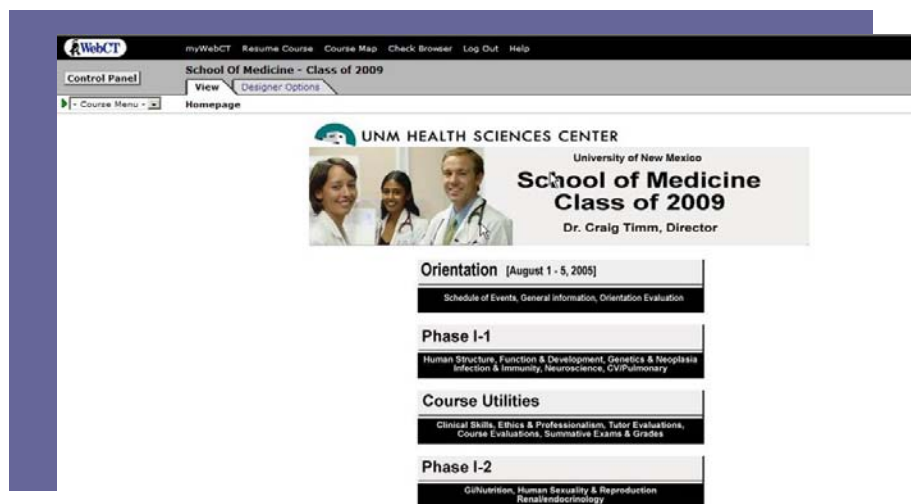
The UNM College of Pharmacy also offers a program for Nuclear Pharmacists every 10 weeks. It includes 11 courses, plus an additional course offered independently in conjunction with the University of Arkansas Department of Radiopharmacy and the University of New Mexico.

Telehealth:

The Center of Telehealth operates as a division of the School of Medicine, reporting to the Dean. The Center for Telehealth current operates on funding received through several grants and as a special project through the New Mexico Legislature's Instruction and

General (I&G) Funds. Each fiscal year, this I&G funding allotment is reviewed and evaluated by the legislature based upon the Center's annual report and the achievement of previous year's performance measures. In 2003, the staff at the Center for Telehealth developed a comprehensive business plan to ensure ongoing funding, organizational support and continued growth and expansion of the program throughout New Mexico and the Southwest.

The Office for the Advancement of Telehealth (OAT) supports Project TOUCH. As discussed in Section 2h, this is a collaborative project between the Schools of Medicine in Hawaii and New Mexico, their remote training sites, and high performance computing centers in each state. The multidisciplinary TOUCH team is investigating the delivery of enhances applications for virtual collaborative distance learning via the *Access Grid*. This program will test the feasibility of integrating virtual reality and three-dimensional images into an experiential learning environment distributed over the Next Generation Internet National Computational Science Alliance *Access Grid* to remote sites.



Screen shot of School of Medicine WebCT component



Screen shot of College of Pharmacy WebCT course

Aim 4

Identify and assess information needs for patient care, research, education, and administration.

4a. Identify short- and long-term information needs of practitioners, staff, and patients.

✓ *Complete*

UNMHSC identifies short- and long-term information needs of practitioners, staff, and patients by using information gathered from the working committees and task forces, such as the KMIT groups. Then, it factors this information into revisions of the UNMHSC Three-Year Plan for Knowledge Management and Information Technology. However, as of the end of 2004, assessing patient information needs has not yet been addressed, but the Three-Year Plan includes the exploration in FY2006 of a joint HSC patient portal for preceptors.

While not specific to healthcare practitioners and patients, several initiatives at UNM have identified faculty needs in general. The Computer Use Committee (CUC) is advisory to the Office of the Provost/Vice President for Academic Affairs on all matters relating to computing information. Through communication with academic and administrative units, it represents the needs and concerns for computing resources, particularly of the academic community. Its purview includes, but is not limited to, articulation of needs, advocacy of innovative and effective instructional computing, active participation in planning, advice on computing budgets, recommendation for priorities, and liaison with academic as well as administrative computer users. The CUC reports to the UNM Faculty Senate and submits a yearly report.

In 1999, the CUC conducted a faculty survey regarding information needs. Well over half said computing enhancements would be “essential” or “very important” for research (71%) or teaching (60%). The lowest levels of satisfaction were expressed for remote access, computer classroom facilities, management of departmental computers, and training/support. While the survey findings were not specific to the UNMHSC, the issues identified in 1999 were enterprise-wide and in many cases have resulted in significant improvements at the UNMHSC; e.g., improved UNMHSC network; addition of a second electronic classroom (within HSLIC); and centralized budget and support for standardized UNMHSC faculty workstations.

During the granting period, surveys have become useful tools at the HSLIC. In 2002, an UNMHSC-wide survey on PDA use was administered to a wide array of users. The same year, a web-based internal customer satisfaction survey was administered to library patrons. In 2003, HSLIC conducted the national LibQUAL+™ survey to increase its information regarding benchmarking. The project, discussed in Sections 3c and 4c, also offered several opportunities to gather data from internal and external customers.

The need for assessment continues. In CY04, HSLIC's TECHS Department conducted its first user satisfaction survey. HSLIC plans to alternate administration of the LibQUAL+™ and IT surveys. Results of the 2003 LibQUAL+™ survey were addressed in several ways: 1) a summary of user survey results (quantitative and narrative comments) were posted on the HSLIC website, along with responses from HSLIC managers; 2) an article summarizing the results and actions taken was published in the HSLIC newsletter; and 3) HSLIC managers incorporate issues and needs into their strategic planning deliberations. Analysis of the 2004 IT survey and the 2005 is still underway. In addition, the UNMHSC Three-Year Plan for Knowledge Management and Information Technology will be updated based on information gathered from the various components of the UNMHSC.

To assess the information needs of patients, in 1999, the UNMHSC evaluated the provision of a web link to a commercial health information site. Patients and family members were invited to determine the usability of the site, ease of navigation, and understandability of the information.

Focus groups were also conducted as part of the faculty workstation replacement project. Faculty, department administrators, and departmental IT staff participated to determine hardware and software application needs on standardized workstations being deployed at the UNMHSC. The project was highly successful, and is on-going.

4b. Integrate information systems supporting patient care.

✓ *Complete*

Over the course of the IAIMS planning grant, the clinical information systems environment at the UNMHSC changed dramatically. It evolved from an environment comprised of many stand-alone systems and databases towards a centralized electronic patient record system. This progress closely relates to the planning initiatives of IAIMS.

UNM Hospitals is currently in the fourth year of a five year implementation project to establish a centralized patient information system across all UNMH facilities and clinics. The rollout completion date for the project is 2005.

The progress UNMHSC made regarding its clinical infrastructure was newsworthy. Hospitals & Health Networks (HHN) *Most Wired* magazine acknowledged UNMH as one of the "100 Most Wired" hospitals in the country. This list also included notable hospitals such as Cedars-Sinai Health System of Los Angeles, Children's Hospital of Philadelphia, Yale University Hospital and Northwestern University Hospitals and Clinics.

The "Most Wired" list, according to HHN, helps health care professionals to examine how their organizations use online technology to serve constituents and to measure how the use of online technology changes. The list also creates a benchmark group CEOs can use to determine best practices. For more information about the "100 Most Wired," visit <http://www.hhnmag.com> and click on "2002 Most Wired."

In addition, there are several other elements critical to the success of the patient care technology initiatives. As mentioned in Section 2a, the IS Steering Committee is also the IAIMS Clinical Task Force. This clinical leadership group meets monthly, under the chairmanship of Frederick Hashimoto, MD, the Co-Investigator for the IAIMS grant. The committee includes representation from all areas of the UNMHSC. Its charge is to assess the information needs of clinicians and make recommendations regarding technologies.

Dr. Hashimoto, Co-PI and also SOM Director of Medical Informatics, is a resource for information technology and medicine. Physicians across the UNMHSC participate in this two-way dialogue to present their views and discuss new and emerging technologies, as well as policy-related issues. In 2004, Dr. Hashimoto was joined in this work by Dr. Philip Kroth from HSLIC.

Dr. Hashimoto also participates with a national Cerner PowerChart Office (PCO) Users Group. Comprised of high level users of PCO, this group makes recommendations to Cerner Corporation regarding software developments, enhancements, and overall application and performance consulting. The PCO Users Group meets quarterly, and the 1Q03 meeting was hosted by Dr. Hashimoto and the UNMH IT Department in Albuquerque.

4c. Identify information needs of and level of satisfaction with services provided to faculty, students, and practitioners located on and off campus.



Three questionnaires have provided data regarding satisfaction with services and access to information. First, as part of campus-wide Focus Groups for the UNM ITIP project in the Summer of 2002, the short- and long-term information needs of faculty, students, staff, and University leadership were polled. *See* a discussion of this in Section 3c. Included within these questionnaires were specific questions regarding the use of various current technologies vis-à-vis productivity (e-mail, internet access, intranet access, online storage, video distribution, phone system, and medical technologies), the reliability of those technologies, and UNM's position with respect to implementing new applications. Focus Group members were asked for their projections about the future, e.g., what are the technologies that UNM should consider adopting within the next 5, 10, 15 years? All data was captured using handheld audience response systems. Briefly summarizing the results, few in the community want UNM's technological pursuits to be "bleeding edge", but all have firm expectations of reliability and responsiveness.

Second, an additional component of the UNM ITIP strategic planning included a survey of UNM leadership, including the branch campuses. The full results of the ITIP surveys are available in Appendix D. Third, the 2003 LibQUAL+™ survey included a dimension relating to access to information. *See* Section 4e for more information.

4d. Develop plans to develop faculty in computer-based instruction and to expand computer-based curriculum throughout UNMHSC.



To support the growth of a web-based curriculum, HSLIC employs three full-time course programmers and developers who coordinate efforts directly with UNMHSC faculty members.

Additional details about the growth of web-enhanced or web-based courses can be found in Sections 3d and 3f.

Since the inception of the use of web-based courseware at the UNMHSC, faculty development in the pedagogical and functional use of this type of course delivery has been individualized. This approach to training has been appropriate for the following reasons:

- Support of courses in the *WebCT* platform is tailored to the facility and comfort of the individual faculty member
- Use of *WebCT* in courses maintained for the Masters in Public Health Program, Allied Health Programs, and the School of Medicine is primarily focused on providing access to lecture materials, assessments and evaluation online; interaction on the part of faculty in these courses is minimal.
- Courses currently supported for the College of Pharmacy are self-paced and do not require much interaction by faculty.
- Skills in the use of *WebCT* components experienced in workshop settings are commonly not retained unless the experience takes place immediately prior to the need

From 2001 to the fall of 2003, two to three workshops were held per semester on issues related to course delivery on the web were offered to College of Nursing (CON) faculty as a part of the CON's plan for faculty development. The subject matter of these workshops had to be generalized for applicability to the diverse needs and experience of the faculty teaching on the web. If new subjects were approach at these workshops, the material had to be covered on an individual basis anyway for faculty not able to attend. These workshops were eventually discontinued due to a lack of attendance and have been replaced by an increase in documentation, periodic "brown bag" sessions and an introductory workshop for faculty new to *WebCT* (began in the summer of 2003).

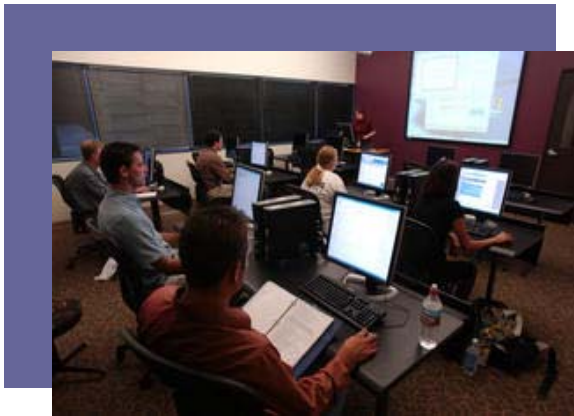
The need for resource materials that faculty can use at their convenience has grown. HSLIC is currently developing the following support materials:

- "Quick reference" guide on common functions
- Completion of the orientation manual, customized for each program or school using *WebCT*)
- Web-based tutorials on the use of most common functions

Seminars and demonstrations encouraging the use of *WebCT* have been offered to the MPH faculty and are planned for COP faculty.

In addition to the UNMHSC's development in the area of *WebCT* usage, HSLIC also contributed to faculty development in web-based curricular tools. The HSLIC education unit (Academic and Clinical Services unit--ACS) provides both structured group and individual computer based instruction for faculty. ACS has offered Library Instruction Series courses each month since 2000. All UNMHSC faculty members can attend these classes, ranging from 1 to 3.5 hours in length, at no cost.

Currently, the courses offered include: Advanced *GroupWise*, Basic *GroupWise*, *Endnote* Basics, *FrontPage* (HTML Editor), *MD Consult*, *Ovid Medline*, *PowerPoint*, *PubMed* DeMystified, and *UpToDate*. Individual sessions involving *PubMed* and *Ovid* have been provided for HSC faculty members. Finally, the Nursing Librarian has conducted brown bag lunch sessions on information literacy as well.



One of two computer classrooms at the UNM Health Sciences Library and Informatics Center



Screen shot of College of Nursing *WebCT* course

4e. Survey library users about use of information resources and levels of satisfaction with services provided, especially outreach clientele and special populations.

✓ *Complete*

As introduced in Sections 2j and 4c, the HSLIC conducted an internally-developed online user satisfaction and quality assurance survey in April 2002. In April 2003, HSLIC also administered LibQUAL+™ as the assessment tool. Through these two surveys, HSLIC gauged user satisfaction and evaluated the current needs and perceptions of its patrons.

The 2003 LibQUAL+™ findings include the data collected from 307 undergraduate, graduate, faculty, and staff members at the UNMHSC. Although specific topics are covered in the survey, LibQUAL+™ aggregates the survey results into four main categories: Affect of Service; Library as Place; Personal Control; and Access to Information. Overall, HSLIC was perceived as offering greater than the minimum level of acceptable service. Areas that require further attention are the electronic journal collections and remote access to the HSLIC collections. Interestingly, these two areas are common in their perceived deficiencies throughout all 308 ARL libraries (Association of Research Libraries) participating in this year's survey. HSLIC posted its analysis of the 2003 LibQUAL+™ data on its web site at <http://hsc.unm.edu/library/libinfo/LibQUAL.cfm>. See Appendix R for 2002 survey results.

Though we indicated the use of focus groups in our initial proposal, we opted instead to use the online surveys in 2002 and 2003, because we the surveys could reach a larger audience in a relatively short amount of time. Since both surveys had the option for users to make general comments, we collected both survey item responses and user commentary.

4f. Identify information need of HSC research groups, and provide electronic access to grant resources.



The HSC Research Commons (<http://hsc.unm.edu/research/commons.shtml>) was created in 2001 for a one-stop web site to access information on research faculty, facilities, and projects at the UNMHSC. It includes links to various resources principal investigators need to manage externally funded research at the UNMHSC. It also includes links to web pages detailing the research efforts of the UNMHSC components.

In February 2002, the KMIT Advisory Council hosted a forum to discuss the possible development of a patient research database and the future of Clinical and Academic Research at UNMHSC in the era of electronic patient records and HIPAA. Participants included representatives from UH Finance, UNMHSC Legal, Human Research Review Committee, UNMHSC HIPAA Committee, UNMH Medical Records, the UNMHSC Bio-Ethics Committee, and several key researchers from across the campus.

Currently, the Planning Office is part of a project team implementing an HSC-wide research grant administration software *InfoEd* (also used by main campus). Included in this software are electronic updates on grant availability. Implementation of the software package began in the fall of 2004, and includes modules for animal use, biosafety, and human subject protocol administration.

Focus groups were not used as part of the evaluation process for *InfoEd*. Instead, the vendor was onsite for several days demonstrating the product. Key faculty and staff members of the research community were invited to assess the software application. Meetings were scheduled for specific groups to view the modules that they would most use. For example, the Human Research Review Committee evaluated the Human Subjects Compliance module while researchers from the Cancer Research and Treatment Center reviewed the Clinical Trails module. All participants completed an evaluation form, and the results were used as determinants in purchasing the product.

4g. Identify information needs of HSC administrative units.

✓ Complete

KMIT leadership identified the three highest priorities for administrative units: an Enterprise Resource Planning (ERP) system, a grants management application, and a collaborative authoring tool. By the end of 2003, all three needs have been addressed.

All University of New Mexico administrative units received welcome news in May 2002, when the Executive Cabinet approved the campus-wide installation of a new Enterprise Resource Planning (ERP) system using the *SCT Banner* product. The implementation began in 2004 with the financial module. The Student modules are expected to be online in mid-2005 and the entire suite of products -- Financial, Student/Financial Aid, Human Resources, and Alumni -- by early 2007. Formal focus groups were used as part of the *SCT Banner* selection process.

As discuss in Section 4f above, the UNMHSC purchased *InfoEd*, a grants management application, in late 2002. *InfoEd* is used on the UNM Main Campus, so its implementation allows for easier collaboration and reporting on grants.

In 2003, *Work2gether* was chosen as a collaborative authoring tool for the UNMHSC. *Work2gether* fills the need for a centralized document management system. One of the first tasks was to load all UNMHSC policies and procedures.

4h. Survey representatives of special populations served by UNMHSC, especially Native American groups, to identify unique information needs related to patient care, research, and consumer health issues.

✓ *Complete*

The information needs of special populations, especially Native Americans, have been assessed in numerous ways.

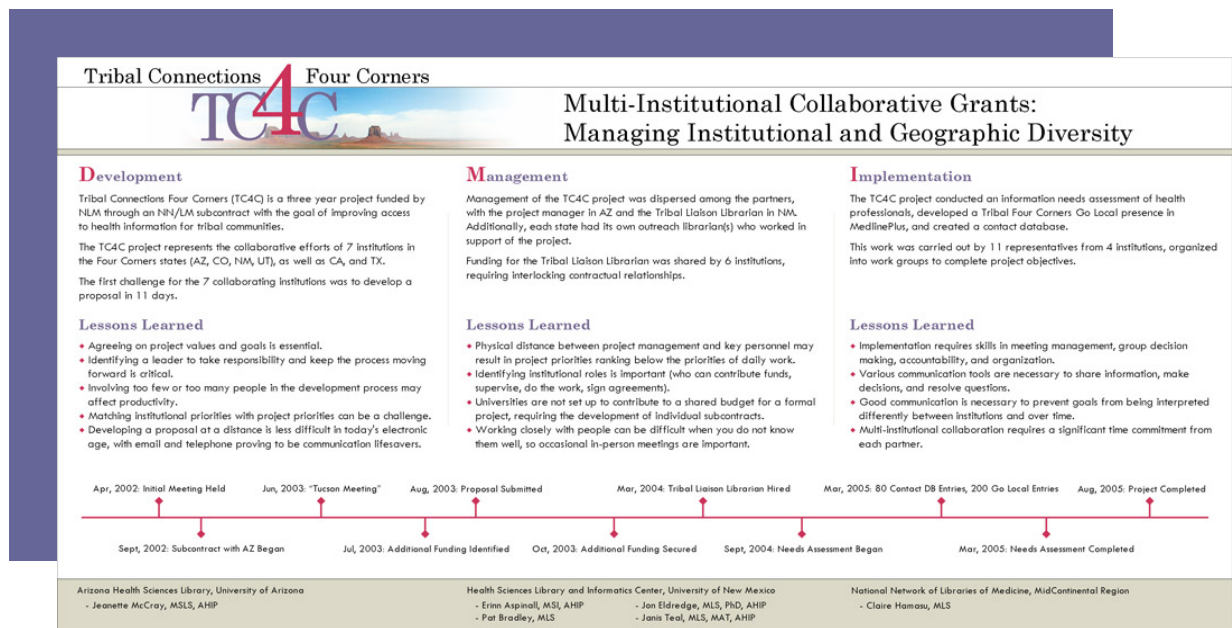
As part of the Native Health Databases project, funded by the Indian Health Service (IHS), HSLIC has worked closely with IHS leaders to create searchable databases of both contemporary biomedical information and historical health-related materials targeted specifically to Native American populations. The original Native Health History Database project included an advisory board, and an advisory board for the new Native Health Research Database is to be established in the near future.

With responsibility for the Native Health Databases, the library's Archivist attends conferences emphasizing Native Health issues and exhibits the databases there. Encounters at these conferences have been a source of knowledge about information needs of minority populations.

HSLIC collaborated with the National Library of Medicine's Tribal Connection project when it was based at the University of Washington. This project assessed the information needs of health practitioners in the Four Corners region, developed a contacts database, and created a Four Corners *MedlinePlus Go Local* presence. In 2002, HSLIC faculty met with Native American tribal leaders, project heads, and staff members from the Pacific Northwest Regional Medical Library to discuss points of potential collaboration for the Tribal Connections Project. Beginning in spring 2004, HSLIC leadership supported the newly emerging Tribal Connections Four Corners Project, in which HSLIC hosts a tribal liaison librarian. The role of this librarian is to establish contacts with health care providers in the Four Corners area so their information needs and solutions can be identified. The tribal liaison librarian also works with the resource libraries in the four states, and their respective Regional Medical Libraries. Formal surveying and needs analyses with HSLIC regional partners is scheduled for spring 2005.

As a Resource Library in the National Network of Libraries of Medicine, HSLIC has long had a librarian position to focus is on information needs of citizens of the State of New Mexico. Formerly titled "Outreach Librarian," this job title has recently been changed to "Distance Services Librarian," to emphasize the development of processes and services for those located beyond the HSC campus. However, the role still includes assessing the needs of health care practitioners and citizens in the State. With this new title comes an increased expectation that such services can now be conducted at a distance through electronic resources and media, lessening the amount of travel the position must undertake. Outreach projects in recent years have included visits to pueblo and chapter house libraries, and installation of computers in those libraries.

Finally, the academic units of the UNMHSC have large percentages of special populations. For example, 28% of College of Pharmacy students are Asian, and another 28% are Hispanic. The Pharmacy Librarian acts as a liaison to the College of Pharmacy to ascertain the needs of its students and to work with Pharmacy faculty to meet those needs. In the College of Nursing, 35% of the students are Hispanic. The College of Nursing specializes in distance learning opportunities for remote communities in New Mexico, where an even higher percentage of the students are Hispanic. The Nursing Librarian serves as a liaison to assure that the information needs of these students are met.



Tribal Connections Four Corners Project Poster

Aim 5

Create an IAIMS Master Plan that will serve as a long-range guide for integration of information systems. This final aim is the outcome of the whole planning process.

5a. Recruit facilitators to assist with preparation of IAIMS Master Plan.

✓ *Complete*

As discussed in Section 3c, Vantage Technology Consulting Group was hired as facilitators/consultants to assist with the preparation of the UNM Information Technology Infrastructure Plan (UNM ITIP). As sub-plans are commissioned, additional facilitators/consultants will be hired.

5b. Identify and approve scope of IAIMS Master Plan.

 **Complete**

As mentioned in Section 1c, and as submitted in the grant proposal, a key piece of the IAIMS Master Plan is the UNMHSC Three-Year Plan for Knowledge Management and Information Technology. This plan describes and tracks individual projects and initiatives across the UNMHSC campus as they progress from planning to implementation.

The IAIMS Master Plan includes sub-plans for major processes and organizational components or units. As an example of a Component plan, we integrate the UNMHSC Three-Year Plan for Knowledge Management and Information Technology into the Health Sciences Library and Informatics Center's (HSLIC) own multi-year Strategic Plan. An example of another sub-plan for Processes is the UNM Information Technology Infrastructure Plan (UNM ITIP) that details the results of a campus-wide planning process for the UNM physical infrastructure. The uniqueness of each sub-plan allows for ease in the development of work groups to handle the granularity of the tasks.

All of these plans have been through a multi-step revision process with leadership, and all have been approved. The scope of the current planning process has focused on the UNMHSC, although there are certain tasks that mandate the inclusion of the main UNM campus as well. Working with Vantage Technology Consulting Group on the UNM ITIP is an example of the UNMHSC and the main UNM campus collaborating on such an initiative. We envision the future planning process will require a much stronger collaboration with components of the main UNM campus, especially in regards to collaborative IT projects, appropriate standardization (e.g., one campus-wide e-mail system) and economies of scale (e.g., purchasing baseline faculty or staff workstations in bulk).

The scope of the IAIMS Master Plan has been identified and reviewed following the itemization submitted with the grant proposal. The following criteria were submitted in the original grant proposal, and brief responses or references follow:

1. Recommendation for the administrative infrastructure of information systems

Sections 2a and 2b discuss the administrative committees created as part of the IAIMS planning.

2. Comparison of needs versus resources, and a list of resulting priorities

The Information Technology Infrastructure Plan in Appendix D features a listing of top priorities for UNM.

3. Clear goals and objectives for each issue

Goals and objectives are defined in both the UNMHSC Three-Year Plan for Knowledge Management and Information Technology and the Information Technology Infrastructure Plan. See Appendix B and Appendix D, respectively.

4. Projection of required funding over 3-5 years, and a list of funding strategies

The ITIP offers funding projections for UNM's technology infrastructure. This is available in Appendix D. Generally, there are two funding strategies for IT initiatives. The first strategy uses two mechanisms at the State level: a) The State of New Mexico Commission on Higher Education's funding for IT projects which required submission of a three-year information technology plan; and b) annual legislative proposals. The second funding strategy uses internal UNM funds: a) capital requests for allocations from the equipment replacement and renewal (ER&R) process; and b) requests for internal increases to the operating budget. An example of a request for ER&R funding was the HSLIC request for a phased 4-year plan to improve network infrastructure.

5. Recommendation for information policies, standards and compatibility that include consideration of system security and user access to information

The creation of policy and standards is described in Section 3c. Many new policies pertaining specifically to system security and user access are being drafted as part of HIPAA readiness at the UNMHSC.

6. Projection of required levels of systems support and related personnel needs

Annual requests and five-year projections of needs are discussed as part of the annual budget hearings with the Executive Vice President for Health Sciences and the Associate Vice President for Finance and Administration. The KMIT Leadership Council also discusses budget implications of the UNMHSC Three-Year Plan for Knowledge Management and Information Technology and determines funding allocations for shared projects and personnel.

7. Recommendations that address the specific needs of patient care, education, research, administration, and collaborative activities with affiliated and community groups

These recommendations are addressed in the sections of Aim 4.

8. Recommendation concerning inclusion of medical informatics and evidence-based medicine in the curriculum to appropriate sub-committees

HSLIC faculty participates with the School of Medicine in its evidence-based medicine curriculum. A new position, the Assistant Director of Health Sciences

Informatics Program Development, was filled in spring 2004 by Phillip Kroth, MD, MS. Dr Kroth will be working with all UNMHSC components to integrate informatics into the core curriculum. Library faculty liaisons, especially those for College of Nursing and College of Pharmacy are also actively involved on curriculum and accreditation teams for those academic units.

9. Recommendation for how IS competencies can be developed and implemented throughout UNMHSC, and identification of a mechanism for assessing IS competencies in rural areas

Work on this objective has not progressed as quickly as we had hoped. However, several actions are now underway in 2005 that should significantly improve the HSC's knowledge of informatics competencies. HSLIC and the School of Medicine (SOM) plan to use the AAMC Group on Information Resources informatics survey (scheduled to be administered early in 2005) to provide a baseline analysis of the degree to which informatics is currently incorporated into the medical school curriculum. In addition, in 2004 the SOM appointed a strategic planning working group to develop an integrated for plan medical education learning technologies. PI Buchanan and Deborah LaPointe, PhD, HSLIC Assistant Director for Educational Development serve as members of this working group. When developed, the learning technologies plan will link to the broader UNM HSC Three-Year Plan for Knowledge Management and Information Technology. A revision of the College of Pharmacy (COP) curriculum, begun in 2004, will also integrate informatics into the curriculum for the first time. Both the HSLIC Pharmacy Librarian and the Assistant Director for Health Sciences Informatics Program Development are involved in these COP activities.

10. Recommendation for evaluating the impact of IAIMS

The grant proposal included a description of the evaluation methodology to be used. Based on external consultation, three of the accreditation criteria used by the North Central Association of Colleges and Schools (NCACS) were selected as an assessment tool to be used at the end of the project. The three criteria most applicable to the IAIMS initiative were:

- 1) Criteria One: The institution has clear and publicly stated [IT] purposed consistent with its mission and appropriate to an institution of higher learning.*
- 2) Criteria Two: The institution has effectively organized the human, financial, and physical resources necessary to accomplish its [IT] purposes.*
- 3) Criteria Four: The institution can continue to accomplish its [IT] purposes and strengthen its educational effectiveness.*

Much of the narrative in this Section 5b address how these criteria have been built into the IAIMS planning process. In general terms, Criteria One concentrates on goal setting, evaluation, and communication. Criteria Two focuses on organizational structure, and available academic, human, and financial resources. Lastly, Criteria Four discusses ongoing assessments, planning, and resource allocations to ensure future growth., These criteria were embedded throughout the tasks detailed in this report and were used to guide our assessment.

11. Proposal for IAIMS implementation

See sections 5f and 5g for discussion of this criterion.

12. Identification of a mechanism for ongoing updating of the Master Plan, and methods of how the Plan will be disseminated throughout the community and State.

Section 5e cites the availability of the plan and its components on web sites.

5c. Create action plan and timetables for identified tasks.



As a result of the IAIMS planning initiative, action plans with appropriate tasks and timetables are routinely developed as part of any IT planning process. As an example, the UNMHSC Three-Year Plan for Knowledge Management and Information Technology includes an objectives matrix that identifies tasks and timelines. In addition, ITIP document includes timetables with proposed project prioritization list. The HSLIC Strategic Plan also cites specific deliverables and timeframes.

See Appendix B for the Three-Year Plan, Appendix C for the HSLIC Strategic Plan, and Appendix D for details of the UNM ITIP.

5d. Review draft of IAIMS Master Plan.



The UNMHSC Three-Year Plan for Knowledge Management and Information Technology and the UNM Information Technology Infrastructure Plans were reviewed by various stakeholders prior to, during, and after plan completion. This review has included campus leadership committees, as well as the KMIT Councils and Committees. Special meetings have been held with UNM leadership to share the plans.

As mentioned in the Introduction, a program review and plan evaluation is scheduled using external experts to solicit commentary about the UNMHSC IAIMS planning experience. The health sciences library directors comprising the Four Corners Library Directors consortium have agreed to serve as expert external reviewers to provide feedback on the plan and planning process which can be used for continued development. This external review is scheduled for fall 2005 and has been added to the UNMHSC Three-Year Plan for Knowledge Management and Information Technology.

5e. Approve and publicize IAIMS Master Plan.



Approval of all plans is done by the KMIT committees and leadership structure mentioned in Section 2a. Upon approval, updated versions are posted to the web.

Key planning documents are available online for review at <http://hsc.unm.edu/kmit/>. These documents are able to be viewed by anyone with a web browser.

Documents (including drafts) dealing with IT services and standards are found at <http://hsc.unm.edu/library/usersupport/>.

After the completion of the external review, the final document will be posted to the HSLIC website and externally to appropriate sites such as the IAIMS Consortium website. Promotional activities will use the KMIT Councils and Committees, the HSLIC departmental liaisons, and the Medical Informatics Seminar Series.

5f. Develop plan for IAIMS implementation.



The IAIMS Master Plan is the outcome that was developed during the years of the Planning Grant.

Like many institutions of higher education, a challenge in this process is reliable funding. At UNM, and UNMHSC in particular, many components struggle with internal funding allocations. Being a state school, legislative priorities may impact our planning adversely. For the implementation of the IAIMS Master Plan to truly succeed, we require appropriate budgeting to assure that resources are in place. Information technology infrastructure is not addressed in formula funding. The HSLIC, in general, is not formula funded either. UNM is working with the New Mexico Commission on Higher Education to improve that. Additionally, the awarding of external grants must increase.

5g. Begin IAIMS implementation.



Implementations of HSC priorities have begun where possible and with available funding. One example comes from the ITIP project. Standards developed for building wiring and cabling for new and existing UNM facilities were adopted and put into use immediately. Another example is the success of the faculty workstation project. Using financial and process incentives from the Office of the Executive Vice President, such as bulk purchasing discounts, hardware and software standards are being painlessly implemented at the UNMHSC with every new PC purchased.

Updates to the Three-Year Plan for Knowledge Management and Information Technology are under taken annually so that goals are regularly revised and potential funding sources can be identified. Like most higher education institutions, planning and budget allocations at the UNM HSC remain disconnected, although less so with IT purchases. The UNMH allocates an annual budget for capital IT projects, and HSLIC requests for IT improvements regularly receive high priority for use of internal capital funds through the Office of the Executive Vice President.

In addition, during the last two years, external funding through grants and contracts has enabled progress toward various HSC goals. Examples include; Project ECHO to support a research network on Hepatitis C; a contract from the National Heart, Lung, and Blood Institute for the New Mexico practice-based research network (contract #BAA-RM-0423).

CONCLUSION

In December 2003, R. Philip Eaton, MD, the Vice President for Health Sciences, issued a memo to all faculty and staff that took the initial work for which the IAIMS planning grant laid a foundation, and expanded it. Dr. Eaton spoke of the necessity of technology to meet the UNMHSC missions in advancing education, patient care, research, and partnerships.

To spearhead this “Next Generation Collaboration”, Dr. Eaton called upon PI Holly Buchanan to lead UNMHSC efforts. Similar to her work on this IAIMS planning grant, Dr. Buchanan will help the UNMHSC “continue to build strong partnerships and explore new opportunities for collaboration”. The end result will become a sub-plan, like vantage, to be emphasized over next several years

This “Next Generation” memo is a tangible example that the ideas of collaborations, especially with technology, have secured a place in our campus culture. *See Appendix S* for the memo in its entirety.

This report supports the successful IAIMS planning process at the University of New Mexico Health Sciences Center. Since the awarding of the grant, the simple precept of planning and collaboration on information technology and knowledge management – both internally as a campus, and externally as an organization – has evolved. As evidenced in the above memo, Co-PI Holly Buchanan is now formally recognized as a catalyst in this endeavor, and as someone who can continue the efforts of IAIMS into the operational phases.

The years of the Planning Grant have seen a critical mass of informaticists evolve on the UNMHSC campus. There are six faculty members who are graduates of the NLM Medical Informatics course offered at Woods Hole. The School of Medicine continues to fund and sustain Co-Investigator Hashimoto as its Director of Medical Informatics.

As mentioned in Section 5b(8) above, in spring 2004, Dr. Phillip Kroth joined the UNMHSC as Assistant Director of Health Sciences Informatics Program Development. Dr Kroth will spearhead the integration of informatics into the core curriculum of the School of Medicine, the School of Nursing, and the College of Pharmacy.

In addition, in August 2003, the first UNMHSC informatics fellowship (funded internally) was filled by Randall Stewart, MD. Dr. Stewart is a Visiting Assist Professor involved with the implementation of a new behavioral health system. Using mentors (one of whom is Co-Investigator Fred Hashimoto) and faculty preceptors, Dr. Stewart has been involved in an informatics curriculum of computer and information sciences; cognitive sciences; biomedicine; informatics research, and organization development. In 2004, Dr. Kroth mentored Dr. Stewart in submitting an application to the NLM for an individual informatics fellowship.

In January 2004, Vice President Eaton announced the appointment of IAIMS PI Holly Shipp Buchanan as HSC Associate Vice President for Knowledge Management and Information. This appointment significantly raised the profile of the IAIMS concept and the KMIT program within the HSC.

In 2004, a new behavioral health electronic medical record (EMR) system began to be implemented. This augments the Cerner Millennium® clinical information system in use at the University Hospitals.

By the end of 2004, a UNM-wide interim Chief Information Officer (CIO) had been named by UNM President Louis Caldera. Dr. Buchanan, along with other campus leaders have begun to work with CIO Bill Adkins to identify a new governance and organizational structure to guide campus planning and operations for information technology, which will continue to affirm the IAIMS philosophy and vision of integration move widely into the main campus of UNM.

At the close of five years working with the IAIMS planning process, we believe the institution is well-positioned to continue the work started in February 2000. We believe that various initiatives have the potential to be signature programs and should continue to be explored and enhanced, possibility through other IAIMS projects. These include the areas listed below.

- Tribal connections/4 Corners and other programs to support Native American health information needs
- Medical informatics training programs
- Educational informatics, building upon the SOM's nationally known problem based learning curriculum
- Visualization and imaging, especially related to simulation
- Informatics initiatives supporting the HSC's signature research domains in such areas as: cancer, infectious diseases, diabetes/obesity, and toxicology/environmental health

Appendix

- A:** HSC Strategic Management – A 20-year Plan
- B:** UNM Health Sciences Center 3-Year Strategic Plan for Knowledge Management and Information Technology (FY2005 - FY2007)
- C:** UNM Health Sciences Library and Informatics Center Strategic Plan (2003 – 2005)
- D:** University of New Mexico Department of Facility Planning Information Technology Infrastructure Plan
- E:** Knowledge Management and Information Technology Council and Committee Rosters
- F:** HSC Advisory Council for Knowledge Management & Information Technology (KMIT) Charter
- G:** Executive Vice President's Leadership Forum List
- H:** Vice President's Leadership Forum – Evaluation Form Summaries
- I:** Knowledge Management and Information Technology Survey and Results
- J:** Knowledge Management and Information Technology (KMIT) Health Sciences Center Information Technology Standards for Users
- K:** Faculty Workstation Project Poster
- L:** Web Development Policy
- M:** Electronic Communications Policy
- N:** Clinical Information Systems Integration (Silo) Policy
- O:** HSC Web Graphical Standards
- P:** List of Additional Internet/Intranet Projects
- Q:** WebCT Usage at the UNM Health Sciences Center (FY2004)
- R:** Health Sciences Library and Informatics Center Spring 2002 Library Survey Results
- S:** The Next Generation Collaboration: Telephone-Telehealth-TeleInternet
- T:** HSLIC Online IT survey Results (2004)
- U:** Technology Factors Implementing Informatics Support Tools for RIOS- Net, An AHRQ Practice-Based Research Network Project Poster

20-Year Strategic Directions, 2000-2020	
Vision: Our vision is to identify and solve the most important questions of human health in our communities through education, scholarship and service with commitment to the HSC core values.	
Mission: Our mission is to provide added value to health care through leadership in education, health care, research and partnering. <u>Education:</u> Provide innovative, collaborative education <u>Research:</u> Advance frontiers of science through research critical to the future of health care <u>Health Care:</u> Deliver health care services that are at the forefront of science <u>Partnerships:</u> Facilitate partnerships with public and private biomedical and health enterprises	
Core Values: Our core values emphasize a culture of shared expectations regarding: <ul style="list-style-type: none"> • Integrity, accountability and decisiveness in commitment to excellence; • Compassion and respect in our interaction with students, patients and colleagues; • Diversity in people and thinking; • Effective utilization of our resources; and • Advancement of our institutional mission while supporting professional and personal growth. 	
PROGRAMMATIC GOALS	
Areas of Emphasis: Identify areas of emphasis aimed at meeting our vision to solve problems in human health in New Mexico	
Education: Provide New Mexicans with innovative, collaborative degree-oriented educational programs and models within and across the College of Nursing, College of Pharmacy and School of Medicine	
Research: Advance the foundation of knowledge in pharmacy, nursing and medicine, including translational research that emphasizes bench-to-bedside applications for the health care industry and that advances the health of New Mexicans	
Clinical Care: Provide accessible, highest quality, patient-focused and efficient inpatient, ambulatory and community-level health care by creating and replicating service delivery models for clinical care that focus on the best outcomes for users	
ADMINISTRATIVE GOALS	
Administration: Provide efficient, leading edge, effective management systems to advance and support education, research and clinical care	
Partnerships: Promote partnerships with public and private organizations as a way to extend our value to the State of New Mexico and its citizens	
Marketing/Communications: Enhance our marketing programs to ensure that all stakeholders recognize and can articulate the value this organization provides to the State of New Mexico	
Development: Provide the opportunity for our friends to participate financially in the transformation of our campus	
Knowledge Management and Information Technology: Provide library and knowledge generating resources and services that rival those of nationally recognized peer academic health care centers while employing IT technologies that are cost-effective, leading edge, integrated, and universally accessible	
Institutional Accountability: Continually define and meet or exceed customer, financial and stakeholder expectations and benchmarks for our service and mission areas	
Staff and Faculty Development: Aim to create an environment of professional growth where all staff, faculty, clinicians and investigators are successful and accountable to improved outcomes for our patients, students and partners	
FACILITIES GOAL	
Provide efficient, leading-edge, effective capital equipment infrastructure and facilities to advance and support education, research and clinical care	

PROGRAMMATIC GOALS	3-5 Year Strategic Plans (2005-2010)	Annual Operating Goals (FY'05)
Areas of Emphasis: Identify areas of emphasis aimed at meeting our vision to solve problems in human health in New Mexico	These areas of emphasis are expected to bridge organizational units and relate to the goal areas of education, research, clinical care and partnerships. These signature programs will bring national stature, funding and status to UNM-HSC in ways that will benefit the entire organization.	<ul style="list-style-type: none"> • Raise the visibility of the neurosciences programs • Enhance biodefense and homeland defense initiatives into signature programs • Strengthen our position to achieve comprehensive cancer designation by NCI • Implement cyclotron-based nuclear pharmacy program
Education: Provide New Mexicans with innovative, collaborative degree-oriented educational programs and models within and across the College of Nursing, College of Pharmacy and School of Medicine	<ul style="list-style-type: none"> • SOM Strategic Plan • College of Pharmacy Strategic Plan • College of Nursing Strategic Plan 	<ul style="list-style-type: none"> • Advance IT and patient simulation programs state-wide • Advance plans with UNM College of Arts and Sciences for the BS/MD degree program to help address physician shortages in rural New Mexico
Research: Advance the foundation of knowledge in pharmacy, nursing and medicine, including translational research that emphasizes bench-to-bedside applications for the health care industry and that advances the health of New Mexicans	Strategic plan to be developed in FY'05	
Clinical Care: Provide accessible, highest quality, patient-focused and efficient inpatient, ambulatory and community-level health care by creating and replicating service delivery models for clinical care that focus on the best outcomes for users	<ul style="list-style-type: none"> • Clinical Enterprise Strategic Plan (LarsonAllen)—in process 	<ul style="list-style-type: none"> • Update and advance the 5-year clinical practice strategy (<i>Administrative master plan per RPE list</i>)

ADMINISTRATIVE GOALS	3-5 Year Strategic Plans (2005-2010)	Annual Operating Goals (FY'05)
Administration: Provide efficient, leading edge, effective management systems to advance and support education, research and clinical care	<ul style="list-style-type: none"> • Project LINK: UNM's 5-7 year project to replace its current legacy administrative systems (Finance, Student, Financial Aid, HR/Payroll, Alumni/Development) with new integrated, web-based systems • InfoEd: web-based proposal and project tracking system for researchers and administrators 	
Partnerships: Promote partnerships with public and private organizations as a way to extend our value to the State of New Mexico and its citizens	Economic Development:	<ul style="list-style-type: none"> • Strengthen HSC commercialization and economic development culture
Marketing/Communications: Enhance our marketing programs to ensure that all stakeholders recognize and can articulate the value this organization provides to the State of New Mexico		<ul style="list-style-type: none"> • Extend the "HSC Experience" to communities throughout the state • Increase awareness about HSC programs through communications and marketing
Development: Provide the opportunity for our friends to participate financially in the transformation of our campus	<ul style="list-style-type: none"> • Development Plan, 5-Year 	<ul style="list-style-type: none"> • Launch \$75 million, 5-year development initiative
Knowledge Management and Information Technology: Provide library and knowledge generating resources and services that rival those of nationally recognized peer academic health care centers while employing IT technologies that are cost-effective, leading edge, integrated, and universally accessible	HSLIC Strategic Plan Information Technology (IT) Strategic Plan	(See IT goal under "Education" in "Programmatic Master Plan")
Institutional Accountability: Continually define and meet or exceed customer, financial and stakeholder expectations and benchmarks for our service and mission areas	<ul style="list-style-type: none"> • HSC infrastructure strategic plans (F&A, Legal) • Compliance Program (HIPAA initiative) 	<ul style="list-style-type: none"> • Enhance and refine administrative structure for fiscal management of HSC and clinical operations • Conduct long-term financial planning related to programmatic and facilities goals
Staff and Faculty Development: Aim to create an environment of professional growth where all staff, faculty, clinicians and investigators are successful and accountable to improved outcomes for our patients, students and partners		<ul style="list-style-type: none"> • Improve the "HSC experience" for students, faculty, staff and community

FACILITIES GOAL	3-5 Year Strategic Plan (2005-2010)	Annual Operating Goals (FY'05)
Provide efficient, leading-edge, effective capital equipment infrastructure and facilities to advance and support education, research and clinical care	<ul style="list-style-type: none"> • Ensure consistency/compatibility with UNM master plan • Reflect-respond to goals of programmatic and administrative strategic directions • Create a sense of place/HSC experience in buildings, physical campus environment, access and entry • Design for flexibility and change 	<ul style="list-style-type: none"> • Complete the expansion of Pete and Nancy Domenici Hall • Construct HSC West entrance and Spanish Glorieta • Begin construction of UNMH west wing • Begin construction of Health Education Building Phase 1 and Health Research Institute • Plan HSC Sculpture Garden of Healing, Hall of Achievement and Gallery of Caring • Seek support for HSC intermodal transportation project • Continue planning for CRTC building Phase 2

**UNM Health Sciences Center
3-Year Strategic Plan for
Knowledge Management and
Information Technology
FY2005 – FY2007**

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1.0 Introduction

The purpose of this document is to present the University of New Mexico Health Sciences Center's Knowledge Management and Information Technology (KMIT) infrastructure and goals for FY2005 - FY2007 that support the long-range operational goals of the Health Sciences Center (HSC). Specifically, they support the Infrastructure Goals for Knowledge Management and Information Systems listed in the 1999 HSC strategic plan. They also support the FY2004 Operational Goals in the 20-Year Strategic Plan of the UNM HSC (<http://hsc.unm.edu/about/strategic/>), specifically the development of an IT infrastructure for statewide outreach and the continued development of state-of-the-art technology to enhance educational and research programs.

This document is the result of discussions with committees and stakeholders throughout the HSC. Progress toward IT goals must be routinely aligned with directions stated in this document and communicated to Health Sciences Center faculty, staff and administrators. Communication also must be facilitated between KMIT and the UNM Computer and Information Resources and Technology (CIRT) department with an eye toward university-wide integration and consolidation where appropriate.

The organizational structure supporting HSC-wide IT planning is based on Knowledge Management and Information Technology (KMIT) councils including: the KMIT Leadership Council, the Operations Council and the Advisory Council. The planning process also includes the UNM Hospitals Information Systems Steering Committee and the HSC Information Systems Directors group. These committees include representatives and stakeholders from across the Health Sciences Center.

The goals in this plan are expressed in terms of capabilities as opposed to systems. This differentiation is made in recognition of the fact that this plan addresses the management of information that includes, but is not limited to, information technology and traditional telecommunication services. Not all solutions are automated and not all needs, even when automation is indicated, can be met by a single, monolithic system. In many cases a solution requires a complex combination of automated and manual processes.

1.1 Background

The strategic goals in this document are designed to meet the long-term IT needs of the HSC as a reflection of the institutional mission and purpose. A major component of this document focuses on the implementation of an electronic medical record and the development of site-wide hardware, software and support standards.

1.2 Themes

The information technology management goals discussed in this document will guide the information technology management activities of the Health Sciences Center during FY2005 – FY2007. The key themes of the current goals include:

- delivery of information to the desktop quickly and efficiently
- evaluation and integration of current and emerging desktop, mobile, server and network technologies that collectively provide a powerful set of electronic tools for research, education and clinical care
- training students, faculty and caregivers to use information technologies to their fullest capabilities
- developing an institutional electronic medical record system that supports data mining and warehousing capabilities
- improving collaboration among all IT professionals throughout the HSC and UNM

- developing a robust informatics program
- planning for new HSC buildings and infrastructure projects

1.3 Governance

The University of New Mexico HSC has adopted a centralized governance structure for KMIT with the following features:

Executive Vice President, HSC

- Oversees the academic, clinical, and research components that make up the HSC
- Delegates authority to the Associate Vice Presidents for Finance and Administration and Knowledge Management and Information Technology

Associate Vice-President, HSC, Finance and Administration

- Assures appropriate distribution of funding and new resources
- Serves on KMIT Leadership Council

Associate Vice-President, HSC, Knowledge Management and Information Technology

- Coordinates long-range planning for HSC Academic and Research IT
- Ensures collaboration between HSC, UNM and statewide partners
- Provides budgetary oversight for IT within HSC academic and research components
- Serves on KMIT Leadership Council
- Serves as communication link with main campus entities including High Performance Computing, CIRT, Extended University, University Libraries and Telecommunications, and to the IT structures of the HSC components

Chief Information Officer (CIO), UNM Hospitals

- Coordinates long-range planning for UNM Hospitals and HSC Clinical Operations IT
- Provides budgetary oversight for IT at UNM Hospitals
- Ensures collaboration efforts between the HSC, UNM and statewide partners
- Serves on KMIT Leadership Council
- Provides general oversight for UHNM IT centralized support model
- Ensures managed IT support for all UNM Hospitals and clinics including:
 - clinical applications
 - system operations, network and technology management
 - systems development
 - customer support and project management

Knowledge Management and Information Technology (KMIT) Committees

- **Leadership Council** - Plans and coordinates long- and short-range IT strategic planning and allocation of resources.
- **Advisory Council** - Faculty and administration from HSC components, the VA and UNM main campus provide direct feedback on specific policy and initiatives to help set priorities. Advisory Council members assist in identifying faculty needs in the information/telecommunication technologies and knowledge management resources supporting HSC Strategic Planning goals in education, research, clinical care, and administration. Technologies and resources include those needed to support the curriculum, distance learning, continuing education, patient care and telehealth, research processes, outreach, training and professional development (including simulation), administrative services, workstation and network support, application support, web-based technologies for internet/intranet development, public access computing, classrooms, and audio-visual production.
- **Operations Council** - IT managers from the two centralized IT units (UNMH IT and HSLIC) work together to define specific initiatives and implement IT plans and guidance for the development of policy and procedures.

IS Directors

- The quarterly HSC IS Directors meeting facilitates discussion among IT managers from the major components of the HSC
- Provide direct feedback on policy and initiatives

Information Systems Steering Committee (ISSC)

- Co-chaired by UNMH CIO and the School of Medicine's Director of Medical Informatics
- Approves and prioritizes large projects for HSC clinical operations IT
- Tracks budget and resource allocation
- Monitors progress on implementation of large systems

HSC Department Contacts

- HSLIC Manager of User Support facilitates monthly discussion about operational IT issues among academic/research components. This group works with day-to-day implications of policies and standards.

HSC Research Council

- Similar to the HSC Department Contacts group, the HSC Research Council works with implications of knowledge management policy/standards.

HSC Component IT Structures

- Many HSC departments also fund their own IT support staff to meet first-level user needs within the department. These support staff are invited to participate in the IS Directors and HSC Department Contacts meetings.

1.4 Annual Updates and Evaluation

This plan is formally re-evaluated on an annual basis by the KMIT councils, and changes may also be made on an as-needed basis. The New Mexico Commission on Higher Education receives copies of this plan with legislative requests.

2.0 Mission

The mission of the knowledge management and IT components of the HSC is to meet the information needs of the center in order to facilitate the best possible service to its customers. Specifically, we strive to:

- provide timely, secure, and universal access to data and information for all of our users
- maintain all computer hardware to meet the performance needs of our users
- develop/obtain/maintain software to meet the functional needs of our users
- manage the collection, storage, and retrieval of Health Sciences Center data
- maintain the security, confidentiality, and integrity of data and information
- provide expertise to users in obtaining specialized computer hardware and software
- enable the capable and efficient use of systems with a comprehensive training program
- provide technical help-lines with adequate and timely trouble response

These activities will take place within the framework of the following KMIT guiding principles.

Knowledge management creates a user-centered environment that ensures easy access to and ethical use of appropriate information resources. Effective policy and training, as well as a ubiquitous and unobtrusive information technology infrastructure, are essential to a knowledge management program providing stewardship of the collection, storage, organization, retrieval, archiving and access to data and information.

Information technology supports knowledge management and includes a variety of devices and the connectivity that links them in order to enable all forms of electronic communication.

Accomplishing this mission fosters the creation of a knowledge management environment to maximize the power of information technologies.

Our current direction is shaped by the following intentions:

- Ensure that data gathering takes place once, accurately, and at the original source. Data are integrated and gathered in anticipation of future needs.
- Provide information in a timely, useful, and intuitive way to those with the need to know.
- Make certain that the UNMHSC KMIT environment enriches knowledge-based interactions and decisions and eliminates all process steps that do not add value.

3.0 Goals

HSC information management goals are based on the need to fulfill the mission for information management in the Health Sciences Center. The goals described below are intended to guide the information management activities of the Health Sciences Center during FY2005 through FY2007. They are divided into eight concentrations: planning, technical infrastructure, academic support, research support, clinical support, administrative support, collaborative efforts and evaluation and budgeting.

These goals are met and evaluated through the development and completion of tactical and annual objectives, which are divided by fiscal year. The HSC KMIT strategic goals and Annual Goals and Objectives Matrix (http://hsc.unm.edu/library/kmit/docs/KMIT_3-year_plan_7_8_02.xls) includes a timeline list of resources and ownership for each objective. The status of these objectives is reported to the KMIT councils on a regular basis.

3.1 Planning Goals

- Envision the UNMHSC as the comprehensive, easily accessible, electronic healthcare resource and leader for the state of NM.
- Identify leadership and a planning infrastructure that assures continuous planning, evaluation, and process improvements for information technology, consistent with ongoing UNMHSC planning initiatives and partnering with key constituencies.
- Assess UNMHSC information technology infrastructure/systems readiness, especially those that support desktop collaboration and telehealth, to ensure that they properly support KMIT goals.
- Identify and assess information needs for patient care, research, education and administration.

- Continually update the UNM HSC 3-Year Strategic Plan for Knowledge Management and Information Technology to serve as a guide for implementation and coordination of information technology.

3.2 Technical Infrastructure Goals

- Address current and emerging technologies that enable easy, secure, and universal access to a powerful set of automated tools for information management.
- Create standards (equipment, applications, and network) to reduce cost, improve quality of service and increase the HSC's ability to support users, applications, equipment, and network services.
- Expand technologies to support distance education, public access computing, and instruction using web-based and other interactive electronic curricular resources, including streaming media and electronic learning management systems.
- Continue consolidation of decentralized resources, where feasible and appropriate, to reduce redundancy, take advantage of critical mass, and enable implementation of HSC-wide solutions.
- In collaboration with CIRT, continue network development including management and security, collaborative directory development, and improved in speed and connectivity for campus and remote users.

3.3 Academic Support Goals

- Educate and prepare students, faculty, and health care practitioners to effectively use information technologies to perform their duties in a more cost-effective manner and to improve their utilization of health care resources.
- Incorporate informatics and evidence-based clinical decision-making into HSC curricula.
- Increase the amount of and access to health information resources (especially electronic and other library resources) available for students, faculty, clinicians, researchers, and citizens.
- Encourage the use of distance education and other technologies to provide education (curriculum and continuing education) for students, practitioners, and citizens throughout the state.

3.4 Research Support Goals

- Ensure sufficient computing capability to undertake health outcomes research.
- Create knowledge-based resources to acquire, organize, make accessible, and deliver results of health-related research, especially those related to unique New Mexico populations.

3.5 Clinical Support Goals

- Enable effective use of the clinical patient data repository (data, images, and other media formats) to improve medical management and decision-making, internally to the UNMHSC campus, at telehealth sites, and for other collaborative activities with statewide agencies or organizations.

- Increase breadth of data (e.g., images) available in the electronic medical record through use of technology.
- Increase accessibility to clinical systems from both on and off campus.

3.6 Administrative Support Goals

- In collaboration with other UNM units, incorporate information technologies into business, academic, and research administrative processes and services.
- Use the Internet and Internet technologies as the "mission-critical" tool for the conduct and delivery of HSC services and products.
- Participate in implementation and support of UNM Project LINK.
- Use information technologies to assess HSC processes, services, and products to assure continuous quality improvement.

3.7 Collaborative Efforts Goals

- Increase collaborative efforts within UNM and throughout the state that focus on information technologies and embracing new technology.
- Work collaboratively to ensure progress in the development of an integrated statewide health care information system, reduce redundancy, and ensure a uniform level of patient care throughout the state.
- Increase integration throughout the HSC of library, media, computing, and telecommunications services to better meet user needs.

3.8 Evaluation and Budgeting Goals

- Create evaluation and budgeting processes that align budgeting with priorities, encourage innovation, maximize windows of opportunity, and anticipate user and institutional needs.

4.0 Business Strategies and Guidelines

4.1 Prioritization

With input from the HSC Leadership Council and the KMIT Advisory Council, the KMIT Operations Council establishes HSC-wide priorities using the Knowledge Management and Information Technology Planning Matrix, the Information Technology Management Plan, and the Joint Operational Plan as guides. The KMIT Leadership Council provides general guidance for overall resource allocation.

The KMIT Operations Council addresses administrative strategies, system integration priorities and industry best-practice decisions. The council also reviews strategies for complying with Health Insurance Portability and Accountability Act (HIPAA) IT security regulations.

Within the University of New Mexico Hospitals component an Executive Sponsor serves as champion for projects, delineates objectives, and defines success factors and budgets, ensuring that completed projects meet those factors. When a project is approved, the Administrative Project Sponsor and IT Project Manager responsibilities are established to shepherd the project through contracting or development and implementation.

4.2 Administration

The administrative strategy focuses upon the infrastructure and priorities that will permit integration of administrative objectives across the HSC and UNM enterprises. Among these objectives are standard application software, standard network infrastructure and network management strategy and standardized desktop hardware and software. The centralized HSC IT departments also work with their UNM counterpart (CIRT) to assure that the proper planning and lines of communication are in place.

A major strategy for the HSC is to develop and maintain standardized client interfaces to centralized systems.

4.3 Information Confidentiality & Security

The University of New Mexico Health Sciences Center recognizes information as a vital medical, research, and business resource. Preventative measures necessary to secure the confidentiality, integrity and availability of Health Sciences Center information and to ensure compliance with all state and federal regulations are being taken. HSC administration is committed to the centralized development of campus security best practices so that they are distributed and maintained appropriately. Toward this end, IT security personnel in the academic, research and clinical components are working together to define a layered program that is centrally supported and maintained.

A continuous cycle that utilizes risk, business and impact management is the strategy used to develop, maintain, and improve Health Sciences Center information security. To meet HIPAA requirements, an HSC security official, appointed by the Executive Vice President for the Health Sciences, will ensure that policies are created and kept up-to-date, workforce security training is provided, annual reports of compliance with policies are performed and appropriate sanctions are enforced. This person will work closely with IT management, IT security technicians and departments to ensure compliance.

Clinical information in the medical record, whether it is paper or electronic, must be timely, accurate, reliable, secure, and accessible. All initiatives related to clinical information are evaluated on their ability to fulfill these goals. All state and federal regulations regarding the protection and use of patient data are adhered to. Furthermore, the Health Sciences Center is committed to a fully electronic medical record and strives for a single repository of patient and clinical data.

4.4 Standards

The primary goal of information technology services today are effective management of information. Within the framework of this goal, the desktop computer, whether it is a personal computer as we know it today or a thin client device, should be viewed as a tool for delivery of data and information to people. The desktop environment should be simplified to serve the management of access and authorization for use of data and information efficiently. Desktop access should require minimal resources to maintain for the majority of users.

The key strategies to be used in attaining these goals are:

- provide access to directory-enabled applications and services
- emphasize the use of web-enabled technologies using browsers as clients

- continue supporting and updating a standardized set of tools and applications that can address a variety of needs including a business productivity suite and standard desktop utilities
- provide secure and reliable access to centralized network storage
- utilize an integrated and layered approach to securing and maintaining the integrity of data and information

The HSC Information Technology Standards document

(http://hsc.unm.edu/library/kmit/it_standards.shtml) presents current standards for information technology hardware, software and support.

4.5 Web Site

The HSC web site is a service provided to the HSC community that contains standards for publishing procedures, branding, navigation, graphics and content/application development tools. Responsibilities for development and maintenance of content will be distributed according to the roles defined in the policy. Application development is centrally coordinated to assure consistent use of programming and security best practices as well as full functionality and stability within the HSC environment. The overall goal is to provide several key audiences with a maximally usable and navigable website that presents a consistent message about the HSC and its components. Web site standards will be selected to ensure that departments can be successful in meeting this goal and still have an appropriate autonomy in presenting their site-specific information. This strategy is consistent with the procedures outlined in the HSC Web Policy <http://hsc.unm.edu/library/kmit/policies.shtml>.

4.6 System Support and Maintenance

Every aspect of the information management infrastructure must be supported so that it remains usable and appropriate for the Health Sciences Center. Trained staff support each component of the infrastructure-network, hardware and operating system platforms, office automation tools, clinical information technology, financial and human resources information technology, operations, security, and education. Systems analysts, technicians, and managers monitor and evaluate the status of each component of the infrastructure. Small changes in the infrastructure are handled within the group assigned to that component. Changes that have a more global impact are discussed at staff meetings comprised of representatives from each functional IT unit. Estimates of internal support requirements are made for all system acquisitions and included in the estimated capital and operational cost of the system. User requests for support will be funneled through the Help Desk and passed on to the appropriate group.

Upgrade and maintenance support strategies for application software will be based on input from the customer base for each system. Upgrades, patches, and downtime will be publicized well in advance and downtime procedures should be reviewed prior to any scheduled extended downtime.

The HSC is committed to directory service technologies to aid in the logical grouping of users, resources and information needed to assist the organization in deploying and maintaining services in an orderly, efficient and flexible manner.

4.7 In-House Application Development, Implementation, and Rollout

In-house development will occur only for niche products where no adequate off-the-shelf software exists. A cost-benefit analysis will always be performed before undertaking in-house development. A rapid, iterative prototyping approach will be used for all in-house development. In addition, a user group will be identified to work closely with the developer during all phases of the development.

4.8 Overall Automation

We strive for all information management initiatives to be solution-driven not system-driven and service rather than technology-oriented. An automated IT system must improve current processes and procedures. The system must be compatible with the current hardware and software environment and be executable and maintainable. A new system can be developed internally or purchased from a financially solid vendor. Underlying processes and procedures should be carefully analyzed and improved before an automated solution is sought. Buy vs. build decisions should be based on the possibility of an "off-the-shelf" solution, cost-benefit ratios, timeliness of projected implementation, ability to be integrated into current environment and available resources.

4.9 Network Infrastructure

HSC-wide network management has been consolidated into a single group responsible for clinical, academic, and research areas. The HSC has recently formalized an IT Infrastructure Master Plan that formalizes the physical requirements for network and building connectivity. The Plan is being used as a guide for the nearly 1.7M square feet of new construction planned through 2020. The HSC Network is TCP/IP only on the backbone with only small pockets of non-IP protocols inside buildings. Over 95% of ports are switched with 100 Mb/s to the desktop with gigabit ethernet between floors and buildings. Work is moving forward for the use of high availability technologies to improve uptime on and off campus. We anticipate future goals to include the widespread use of wireless technologies for both academic and clinical purposes as well as the use of multicast technologies in collaborative projects.

4.10 Hardware

Client/server and web-based systems are based on the Windows/Intel platform. The Health Sciences Center supports Novell, Windows, VMS/Alpha and Linux network operating systems.

4.11 Contingency and Business Continuity

The Health Sciences Center has developed a comprehensive Disaster Recovery and Contingency Plan <http://hsc.unm.edu/library/kmit/policies.shtml>. The Plan should cover contingencies for every system housed within throughout the HSC.

4.12 Customer Support

Information technology departments within the Health Sciences Center must provide the level of support necessary to ensure that all system users are able to do their jobs as effectively as possible. User support for IT services is provided by two support centers (HSLIC User Support HelpDesk and UNMH IT HelpDesk). All support and service requests will be directed through these help desks. Procedures are in place to provide seamless customer service supported by a shared, integrated call logging, tracking, and reporting system. Help desk personnel are trained to provide a first level of support and to escalate calls as necessary.

4.13 Training

Training-focused departments at the HSC strive to support the education and performance improvement of employees on an increasing number of applications. This is achieved through consistent, competency-based training programs and end-user consultations. In order to ensure

full use of the systems purchased by the Health Sciences Center, training modules are developed to address basic through advanced levels, as well as special topics to improve employee productivity and efficiency. Training curricula and support documentation, whether on-line or as desk references, are customized to address the applied use of systems within the organization. Training will be centrally coordinated and managed to support both department-specific as well as site-wide needs.

4.14 Programmatic Support for Mission Areas

Programmatic support is also provided to the three general mission areas defined in the HSC Strategic Plan.

Academic: IT support for distance education is no longer a niche service and must be provided centrally with a high level of availability and technical support. WebCT is UNM's standard courseware tool used to support both distance education and traditional classroom coursework. Focused FTE within HSLIC who are expert in the use of Web CT will help HSC faculty transition to using Web CT to augment the classroom experience for students who increasingly expect such tools.

Research: IT in the HSC research community remains highly specialized and will remain somewhat decentralized so that specific, focused solutions are encouraged. HSC administration will ensure that HSC researchers are provided with:

- high speed campus network connections
- access to Internet research networks
- co-location space in data centers for research equipment
- desktop support
- a support bridge with main campus IT research services (e.g. supercomputing, emerging technology evaluation, conferences)

Clinical: The IT strategy for clinical operations is based on the foundation of electronic medical records and the state and federal regulations that keep the information within the records safe and accurate. Of primary importance is to ensure that for clinical providers information within the records is available on demand in a timely manner. An additional strategy is to pursue the integration of clinical decision support into current clinical systems. The end goal is to ensure patient safety. High-speed campus network connections and reliable security mechanisms are required.

HSC KMIT STRATEGIC GOALS and ANNUAL OBJECTIVES MATRIX - "Knowledge Management Information Technology"

HSC KMIT STRATEGIC GOALS	ITEM NUMBER	TACTICAL and ANNUAL OBJECTIVES					Resources / Comments			Owner	Status		Discussed with KMIT	
		FY05					Resources / Comments			Owner	Status		OPS	AD
			CLINICAL (C)	EDUCATION (E)	RESEARCH (R)	ADMINISTRATION (A)								
I. PLANNING														
I. A. Identify leadership and a planning infrastructure that assures continuous planning, evaluation, and process improvements of information technology, consistent with ongoing UNMHSC planning initiatives and partnering with key constituencies.	1	Submit IAIMS implementation proposal				A	IAIMS Planning Office			HB, FH, SBH	Status FY05 Q1		OPS	AD
	2													
I. B. Assess UNMHSC information technology infrastructure/systems readiness to ensure that they properly support KMIT goals. Include current communications systems and networks in the assessment, especially those that support desktop collaboration and telehealth.	3													
I. C. Identify and assess information needs for patient care, research, education, and administration.	4	Plan for implementation of Virtual Tissue Repository (PK)	C		R					PK				
	5	Identify support standards for audio and video conferencing and work into IT Standards		E	R	A	Set up audio/video conferencing task force			RA				
	6	Assess room scheduling software in RIB to see if it can be used campus-wide.		E		A				RA				
	7	Investigate HSC needs for a portal: what technologies are available, portal definitions to assess future needs	C	E	R	A				MC, BM, KW				
I. D. Continually update the UNM HSC 3-Year Strategic Plan for Knowledge Management and Information Technology to serve as a guide for implementation and coordination of information technology.	8													
I. E. Envision the UNMHSC as the comprehensive, easily accessible, electronic healthcare resource and leader for the state of NM.	9	Work closely with other state organizations in the development of state-wide communication networks that can support health related outreach activities and distance interaction. Examples: MAGNet-State CIO office, CHECSnet, VA, DOH, IHS, Connect NM, NM Telehealth Alliance	C		R					DA				
II. TECHNICAL INFRASTRUCTURE														
II. A. In collaboration with CIRT, continue development of network management and security, including improvement in speed and connectivity for campus and remote users as well as collaborative directory development.	10	Improve secured access to HSC systems by upgrading policies and procedures, improving remote access by use of proxy servers and installing VPN, and begin planning for HIPAA and smartcard technologies.				A	Objective carried over from FY01, FY02, new Resources: Secure browser technology. Draft and implement HIPPA security policies. VPN, secure wireless, biometrix, smart card			RM, HB, ES, DG, BM				
	11	Complete deployment of Active Directory for appropriate desktop users	C	E	R	A				RA				
	12	Begin desktop policy management	C	E	R	A				RA				
	13	Bridge the Lomas Divide. Establish Space/building tracking, integrated planning, data sharing and standardization, UNM-wide. (All)	C	E	R	A	Objective carried over from FY03, new Resources: Hold regular CIRT / TECHS mini-retreats to discuss integration issues.			HB, BA				
	14	Develop Enterprise-wide operations center and monitoring including stable funding mechanism and bandwidth.	C	E	R	A	Objective carried over from FY03 as "More Reliable Internet Access."			MB				

HSC KMIT STRATEGIC GOALS and ANNUAL OBJECTIVES MATRIX - "Knowledge Management Information Technology"

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		FY05										
							Resources / Comments		Owner	Status FY05 Q1		
II. D. Continue consolidation of decentralized resources, where feasible and appropriate, to reduce redundancy, take advantage of critical mass, and enable implementation of HSC-wide solutions.	33	Define appropriate use of new technologies, beyond the department level. Common resource / tool / knowledge sharing.	C	E	R	A	Objective carried over from FY03, new Resources: Update and promote IT Standards Document, TECHS web site		RA			
	34	Develop an implementation plan for content management system for HSC	C	E	R	A	Objective carried over from FY03, new Resources: Assure standards for content & information presentation, implement Contribute.		KW			
	35	Implement e. Data Management/storage management	C			A	Objective carried over from FY04, new Resources: implement SAN in HSLIC		BM, MC			
	36	Set up Novitsky Hall as a data hub	C	E	R	A			MB			
	37	Set precedent for the number of redundant points of entry on new wire pulls in new buildings and backfill as appropriate to existing buildings	C	E	R	A	Precedent measured by the percent of redundant points in new buildings		MB			
	38											
	39											
	40	Continue to develop an environment for testing applications available for academic and research components.	C	E	R	A	Objective carried over from FY03, new Resources: Documentation to support development projects.		BM			
	41	Establish mechanism to ascertain end-user needs in regards to products, emerging technology and direction /level of support	C	E	R	A	Objective carried over from FY03: Virtual Suggestion Box		RA, MC, JT			
III. ACADEMIC SUPPORT III. A. Educate and prepare students, faculty, and healthcare practitioners to effectively use information technologies to perform their duties in a more cost-effective manner and to improve their utilization of health care resources.	42	Commission a SOM taskforce to explore integrating distributable virtual reality simulation (e. g. Project TOUCH) into our curricula; UGE, GME and CME. Promote the potential value as a complementary tool to other learning technologies.		E					DA			
	43	Encourage scholarly research and evaluation of distributable virtual reality simulation technologies on learning and performance.		E					DA			
	44	Define how to receive targeted feedback from students on the level of technology support and services needed across		E			Expand Information on TECHS website. Define level of expertise and mechanism of support. Expand Marketing of existing services.		RA, MC,			
	45											
III. B. Incorporate informatics and evidence-based medicine into the HSC curricula. III. C. Increase the amount of and access to health information resources (especially electronic and other library resources) available for students, faculty, clinicians, researchers, and citizens.	46	Commission HSLIC Liaisons to investigate developing department web sites for online resources	C	E	R	A	Carried over from FY03, new Resources: Decide how many portals to create or how we should continue		JT			
	47											
	48											
	49											
III. D. Encourage the use of distance education and other technologies to provide education (curriculum and continuing education) for students, practitioners, and citizens throughout the state, regardless of location.	50								DA			
	51	Develop methods to improve the ability of organizations and individuals to access HSC educational activities from a distance, such as conferences, lectures, grand rounds, case reviews, courses, CME, etc. Develop an information system that allows users to view and schedule interaction during these activities, such as a Web-based "TY Guide" of accessible educational activities.		E								
	52	Purchase and deploy new learning management system.	C	E	R	A	Objective carried over from FY02, new Resource: Plateau		ES, GG			
IV. RESEARCH SUPPORT IV. A. Ensure sufficient computing capability to	53											
	54											

HSC KMIT STRATEGIC GOALS and ANNUAL OBJECTIVES MATRIX - "Knowledge Management Information Technology"

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ITEM NUMBER	FY05	CLINICAL (C)	EDUCATION (E)	RESEARCH (R)	ADMINISTRATION (A)	Resources / Comments	Owner	Status FY05 Q1	OPS	AD				
and services.														
	76	Utilize distance technologies for state-wide administrative and strategic planning that allows broader participation on both HSC based activities, such as the UNMH Board of Trustees, or interaction with other key health-related organizations, such as DOH, HPC, VA, IHS, NMCD. Share our administrative expertise in managing health care facilities, business planning and complying with state and federal guidelines, standards and regulations, such as HIPAA, JCAHO	C		R	A		DA						
	77	Electronic Purchase Requisitions	C			A	Carried over from FY03: Pilot scheduled for Jan. 2005	ES						
	78		C											
	79	Implement InfoEd Electronic Grant Submission, Animal Use module			R		Objective revised and carried over from FY02 with new Resources: Base 10, Animal Resources	KW						
	80	Consolidate data collection for core performance measures for UH and HSC help desks				A	Objective revised and carried over from FY02 & FY03: HEAT Reports, comparative analysis from year to year.	RA, MC						
VI. B. Use the Internet and Internet technologies as the "mission-critical" tool for the conduct and delivery of HSC services and products.	81	Relaunch HSC and UNMH web sites				A		KW, ES						
	82	Convert from FrontPage to Contribute				A		KW						
VI. C. Participate in implementation and support of UNM Project LINK.	83	Participate in Project LINK - Student Module				A	Objective moved from FY01 with new Resource: Student Module	GG, BM						
	84													
VI. D. Use information technologies to assess HSC processes, services, and products to assure continuous quality improvement.	85													
	86													
VII. COLLABORATIVE EFFORTS														
VII. A. Increase collaborative efforts within UNM and throughout the state that focus on information technologies and embracing new technology.	87													
	88													
VII. B. Work collaboratively to ensure progress in the development of an integrated statewide health care information system, reduce redundancy, and ensure a uniform level of patient care throughout the state.	89													
	90													
VII. C. Increase integration throughout the HSC of library, media, computing and telecommunications services to better meet user needs.	91													
	92													
VII. EVALUATION AND BUDGETING														
Create evaluation and budgeting processes that align budgeting with priorities, encourage innovation, maximize windows of opportunity, and anticipate user and institutional needs.	93													
	94													

HSC KMIT STRATEGIC GOALS and ANNUAL OBJECTIVES MATRIX - "Knowledge Management Information Technology"

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								Resources / Comments		Owner	Status FY05 Q1		OPS	AD

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UNIVERSITY OF NEW MEXICO
DEPARTMENT OF FACILITY PLANNING
INFORMATION TECHNOLOGY INFRASTRUCTURE PLAN

Final Report

April 30, 2003

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1. EXECUTIVE SUMMARY

The UNM Information Technology Infrastructure Plan (ITIP) is a strategic initiative that was developed by the UNM Facility Planning Department. The ITIP project emerged from the recommendations of the Campus Strategic Plan originally sponsored by the UNM Provost's office. The ITIP sits alongside other campus strategic planning exercises, including the Campus Master Plan, the Long Range Development Plan, the Health Sciences Center Facility Master Plan and the Five Year Capital Plan. Following a rigorous search process, UNM appointed Vantage Technology Consulting Group to undertake the project.

The aim of the ITIP is to chart a course that will enable UNM to build and maintain an Information Technology Infrastructure that will support the goals outlined in the Campus Strategic Plan, and to promote the Technology Centers of Excellence on the UNM Campus. For the purpose of the ITIP, the infrastructure is defined as the physical spaces, pathways and cable plant that supports the provision of information technology systems (including data, telephone, media, clinical and low voltage systems) throughout the campus. In that context, the infrastructure must meet the following criteria:

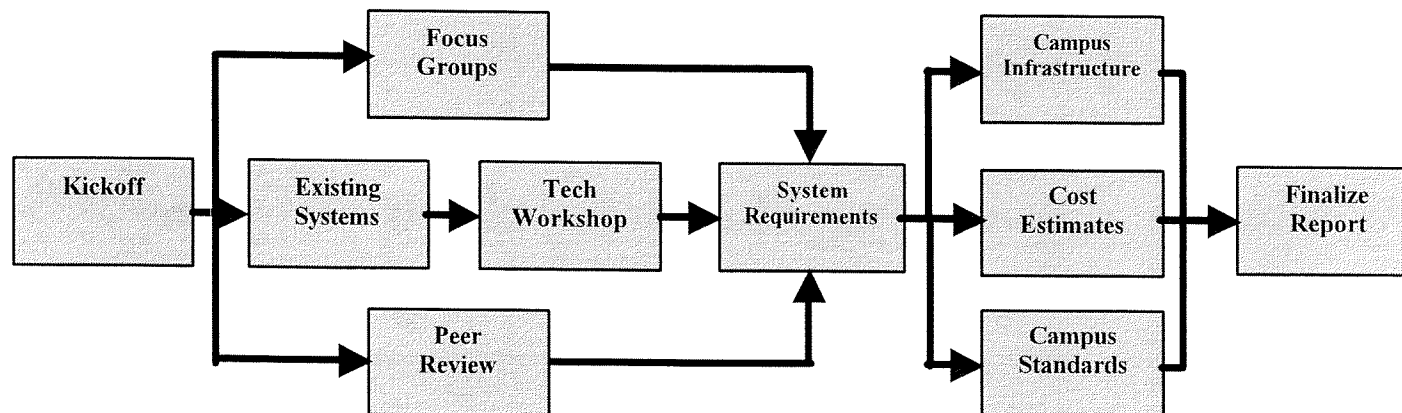
- Capable of supporting today's and tomorrow's technologies.
- Resilient, reliable and easy to manage.
- Ubiquitous, providing access wherever and whenever it is needed.
- Appropriate, cost effective and demonstrating clear return on investment to UNM.

Participation in the ITIP process has involved representatives from all facets of campus life, including campus leadership, faculty, students and staff. A Steering Committee was formed to direct the work and provide feedback throughout the process.

Membership of the Committee includes representatives from the major campus stakeholders, including the Provost's Office, Extended University, Campus and HSC Facility Planning, CIRT, Health Sciences Library and Informatics Center and University Hospital's MIS Department, UNM Telecommunications, Student Life, Campus Police and other constituents.

The ITIP project consisted of the following steps:

- Determine the current state of the Information Technology Infrastructure at UNM.
- Compare technology at UNM with other campuses using a Peer Benchmarking Process.
- Conduct Focus Groups representative of the UNM population to determine internal views toward technology.
- Develop a set of criteria for the design and construction of the next generation infrastructure.
- Produce a series of prioritized recommendations regarding upgrades and replacements for the infrastructure.



The Information Technology Infrastructure Plan Process

There are four major deliverables associated with the Plan. These are:

- Peer Benchmarking
- Feedback from Focus Groups
- Project Recommendations
- Building and Campus Standards

These deliverables are addressed in the following sections.

1.1 Peer Benchmarking

In order to identify UNM's standing in relation to its peers from a technology perspective, the project undertook a Peer Benchmarking Exercise. The Project Team developed a questionnaire that contained a series of technology-focused questions and sent to various Peer Institutions identified by UNM. Responses were gathered and analyzed, and UNM's position relative to the other institutions determined.

1.2 Focus Groups

To assist with the identification of goals for the infrastructure project and to encourage the participation of a wider section of the UNM campus, a series of Focus Groups were held on campus with participation from Campus Leadership, Faculty, Students and Technologists. These interactive sessions encouraged the participants to discuss their opinions of the current state of technology at UNM and to identify a vision for the future of technology on campus.

1.3 Project Recommendations

The current infrastructure supporting technology systems on campus is aging and considered insufficient to support the introduction of new technologies. In addition, the construction of the new Children's Hospital and Critical Care Pavilion encroaches on the existing Telecommunications Building that houses the telephone system that supports the majority of the campus. The ITIP team investigated the current state of the infrastructure and produced (for the first time) a series of coordinated campus drawings showing the existing infrastructure and major cable routes.

Based on this information, the ITIP identified a series of construction projects that are recommended to improve the infrastructure and meet the goals of the Information Technology Infrastructure Project. These construction projects are prioritized (based on need, cost, risk and sequencing with other campus projects, with the following critical projects identified:

1. Audit of existing cable plant and infrastructure.
2. Reinforcement of infrastructure (ductbanks and cabling).
3. Completion of Central Campus Backbone Loop.
4. Provision of a Distributed Telephone System.
5. Construction of a new Technology Building.
6. Upgrade of CIRT.
7. Rerouting of cabling around The Pit.
8. Upgrade of Core Switch Environmental Support.
9. Extension of existing South Campus conduit connections to create second, resilient, connection.
10. Upgrade of Campus Backbone Data Network.

One tangible benefit of this plan and budget process is that individual projects will not have to develop the infrastructure to support the project by themselves.

1.4 Building and Campus Standards

UNM is continuously upgrading and constructing buildings and associated facilities on campus. As a part of the ITIP project, a set of standards were produced to be used by Architects and Engineers as they design and construction of infrastructure to support Information Technology systems. These standards were reviewed and approved by the ITIP Steering Committee and will be used by both Campus and HSC Facilities Planning Departments.

1.5 ITIP Outcomes

The different components of the ITIP development process will provide UNM with several beneficial outcomes. The Peer Benchmarking component gives UNM a fix on its position within the space shared by its peer institutions. There is useful information contained in the Peer Benchmarking results that may be used to shape future policy with respect to UNM's technology direction and comparative level of technology investment. The Focus Groups revealed interesting and surprisingly consistent attitudes and perceptions of UNM's Leadership, Faculty and Students toward technology and levels of technology service at UNM. The execution of the physical ITIP projects will provide resilience, flexibility, expansion capability and redundancy to the technology infrastructure of the UNM Campus. Finally, the ITIP Standards provide UNM with a living document for the consistent implementation of new infrastructure elements that will support future technologies consistent with the ITIP goals of resilience, flexibility, expansion and redundancy.

1.6 Ancillary Benefits

In addition to the four main deliverables outlined above, UNM has received a number of other, more intangible, benefits by undertaking the ITIP project. One of these major benefits has been the increased level of communication that has developed between the various technology Groups on campus. This increased communication has engendered a higher level of trust and common vision. While it is difficult to objectively quantify the benefits of this interpersonal communication and cooperation, there is no doubt that the University has and will continue to benefit from these strengthened relationships

2. PEER BENCHMARKING

2.1 Introduction

To identify UNM's standing with respect to technology, the project undertook a comparison with a series of Peer Institutions identified by UNM. The Peer Institutions were asked to respond to a series of technology focused questions, concerning:

- student and faculty use of technology
- the extent and usage of technology related facilities on campus
- specific technologies in use in the administrative, student services and libraries
- specific technologies in use in the medical schools and colleges (for medical related campuses)

In addition the respondents were asked to describe the campus network backbone specifically to identify the protocols in use and types of information conveyed on the campus network backbone.

Respondents were asked to indicate whether specific technologies were in planning, in pilot program, or deployed in regular use.

The results reported here are derived from 33 distinct sources distributed across 11 institutions.

The broad results derived from the answers to these questions are discussed in this section, with the specific objective of identifying UNM's position relative to the other institutions.

2.2 Overview

As with all investigations of this type, the respondents' interpretation of the questions, inconsistencies in the presentation of their answers, and their inability to answer authoritatively over such a wide range of pedagogical and technology issues, will introduce a degree of uncertainty into the conclusions that can be drawn. Not with standing, the discussion and the conclusions set out in this section of the report are presented as a fair and reliable comparison of UNM's position relative to a range of comparable institutions over a broad range of technologies.

Unsurprisingly, the results represent neither that UNM is way ahead of, nor that UNM is way behind in it's implementation of technology when compared with the Peer Institutions. In the comparison that follows it is clear that UNM has in place a wide range of advanced technologies that are comparable with, and in some areas at the forefront of those in deployed at the Peer Institutions. A limited number of instances where the Peer Institutions have more advanced technology in place are also identified.

With respect to campus IT infrastructure, it appears that UNM is in the middle of the pack in comparison with the Peer Institutions. At several institutions, the protocols in use in the campus backbone are a full generation ahead of UNM's most advanced deployment, and at others the protocols in common use at UNM have been deprecated to a legacy status.

2.3 School and College Data

The initial series of questions related to availability and ownership of computers, access to multimedia presentation classrooms, and charges for use of campus network technology.

UNM is amongst the majority of institutions that do not require, and, as yet, have no plans to require, students to own a computer or to require that students subscribe to an Internet Service Provider (either on or off campus) for individual Internet access. UNM experiences a higher percentage of laptop users than the majority of the Peer Institutions, and UNM 's expectations for number of future laptop users exceed those of the majority of Peer institutions.

UNM is amongst the majority of campuses who do not charge individual students or Faculty for access to the campus network, but UNM is the only institution in the study that provides a distributed funding model to the individual Schools and Colleges for the use of campus network technology.

Overall, UNM is well placed amongst the Peers with respect to the numbers of seats in multimedia equipped classrooms, but it is notable that, at UNM, the distribution of seats varies widely from one School or Department to the next. UNM along with the Peers all see high levels of usage of multi media equipped facilities. UNM is anticipating, and planning for, an increase in the number of seats in multimedia classrooms, but few of the Peer institutions report planning ahead for significant increases in numbers of such seats.

Overall, UNM is well placed amongst the Peers with respect to the number of seats in departmental computer labs, and like the Peers reports high demand for those seats. throughout UNM and throughout the Peers institutions, seats in computer labs are in high demand.

UNM is almost unique amongst the selected Peers in providing seats in simulation rooms and in providing Access Grid facilities.

2.4 Administrative Applications

The second series of questions related to the implementation of specific technologies deployed in the administration, in student services and in the campus libraries.

UNM is comparable with the majority of the Peer Institutions in the deployment of technologies including Online Course Catalogs, Email Support, Web Search and implementation of E-books and Online Journals. Frequent responses to the questions identified the following areas where UNM is either somewhat ahead or somewhat behind the Peer Institutions:

UNM is significantly ahead of the Peer Institutions with respect to the implementation of Online Registration for courses. At the present time, the majority of the Peers have this technology in planning or in pilot programs.

UNM appears to be somewhat behind the curve in it's consideration of planning and trialing Online Grade Posting. Whilst only a few of the Peer Institutions have currently deployed online grade posting on a large scale, the vast majority identify online grade posting as a technology in pilot deployment or in planning, ready for imminent deployment.

A small number of Peer Institutions are implementing or planning to implement advanced applications such as personal search spider technologies and online archiving of student work. UNM is considering these technologies only in very limited areas.

2.5 Medical Facilities

The third series of questions (directed at campuses with a significant medical component) related to the implementation of specific technologies deployed in the medical facilities.

In response to questions concerning the implementation of specific medical technologies UNM is amongst the majority of Peer Institutions that are implementing online patient information, online order entry, online Pharmacy, Online lab reporting, automated transcription, online patient scheduling, and some form of telemedicine. Several Peers referred to systems that had been in place for several years and which are now the target of imminent upgrading and/or replacement.

A few of the Peers may be ahead of UNM in having already implemented clinical decision support, Filmless imaging and PACS, nurse locators, online asset tracking, wireless phones for nurses.

UNM is well placed amongst the majority of the Peers who are planning and / or trialing wireless data at the point of care, but UNM is behind the majority of Peers in not proving online patient education and patient video-on-demand.

2.6 Campuswide IT and Network Administration

The fourth series of questions was directed at campus network IT.

With respect to network protocols:

UNM is on an equal footing with the Peers in listing a mixture of Gigabit Ethernet and 100Megabit per Second Ethernet as the current standard for the campus network backbone. A small number of the Peers report that 10 Gigabit Ethernet is, or is about to become the standard for the campus network backbone and a small number of Peers report that 100 megabit per second Ethernet is now largely eliminated from the campus network backbone and is retained only as a legacy system.

UNM no longer relies on ATM in the campus backbone, and all of the peers are in a similar position, rating ATM as a dead technology or retained only as a legacy system.

UNM is amongst the majority of Peer Institutions that are utilizing, or are planning and close to implementing, IP transmission of data, video, security information and building information or energy management information over the campus network backbone.

UNM is well placed at the forefront of Voice over IP technology, having a working installation in parts of the campus. Other Peers have VoIP technology in planning, with no reported pilot programs in place.

UNM is typical of the peers in NOT yet having implemented universal wireless access network access in classrooms, with the exception of a small number of pilot installations. UNM is typical in continuing to investigate and monitor this rapidly developing technology, and in closely watching the development of secure wireless network solutions.

In line with the majority of the Peer Institutions, UNM reports having a recent campus technology plan in place, or a current campus technology plan in place or in final preparation. And UNM is well placed amongst the few respondents who report also having a technology continuity / disaster recovery plan in place, whilst the majority report have such a plan in final preparation for imminent release.

3. FOCUS GROUPS

As a part of the UNM Information Technology Infrastructure Plan (ITIP), a series of Focus Groups were conducted with various stakeholder Groups from UNM. The Groups consisted of a total of 82 attendees with representation from:

- Campus Leadership
- Faculty
- UNM Technologists
- Students
- The ITIP Steering Committee

The intent of the Focus Groups was to provide a forum for a wide range of UNM campus constituents to participate in the ITIP project. Each Focus Group, which lasted approximately two hours, consisted of an interactive presentation by Vantage that included real-time polling of audience responses. Each member of the audience was given a wireless voting handset that allowed Vantage to collect responses anonymously and display them in real-time to facilitate debate and discussion. Each Focus Group followed the same format and included identical questions asked of each Group to allow comparisons to be made. A copy of the presentation used to structure the session is included in the Appendix of this report.

A list of attendees for each Focus Group is included in the Appendix of this report.

3.1 Focus Group methodology

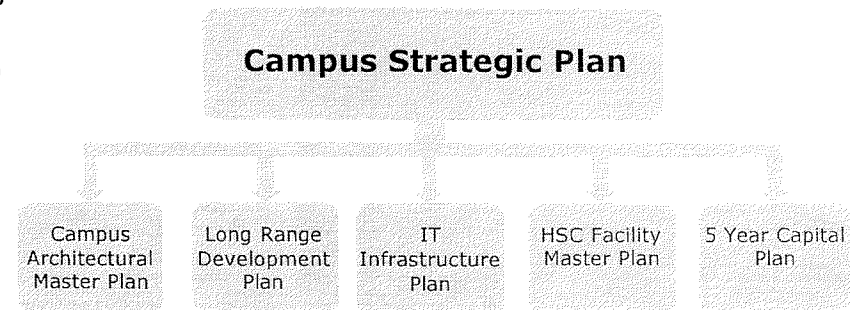
3.1.1 Introduction

Following a brief introduction, the Vantage team gave an overview of the ITIP project, the work completed to date and the next steps that were to be taken. The aims of the Focus Group were discussed, with the audience encouraged to contribute to the upcoming work.

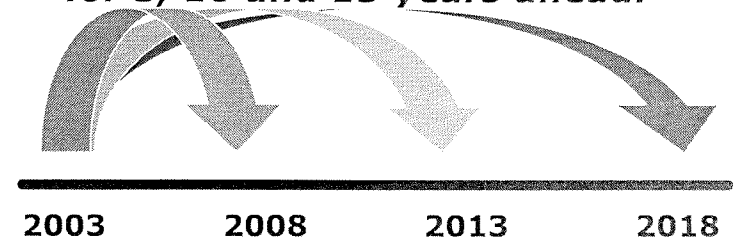
Vantage explained that discussion would center around a prediction of each Group's future reliance on technology systems, which enabled a set of criteria for future infrastructure to be determined. Typical projects that might be included were explained, as was the relationship of the ITIP to the overall Campus Strategic Plan and the other sub-plans (such as the Campus Master Plan, the Long Range Development Plan, the Health Sciences Center Facility Master Plan and the Five Year Capital Plan.) Vantage introduced the timescales for projects, which ranged from near term to fifteen years in the future.

3.1.2 Reliability and UNM's Technological Position

The next phase of the session asked the audience to indicate how reliable their access to technology had been over the previous year and their perception of UNM's position with respect to implementing new applications. Responses were collected (using the wireless handsets) and discussed.



"Plan your technology infrastructure for 5, 10 and 15 years ahead."



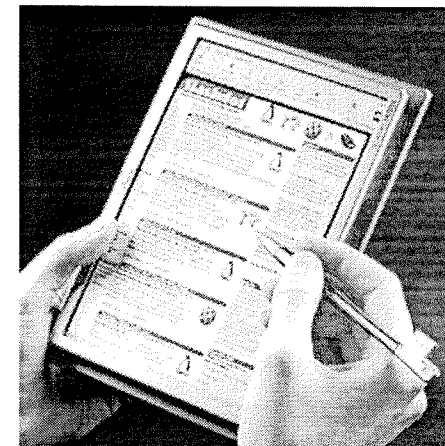
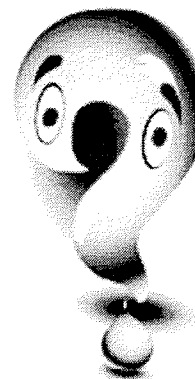
3.1.3 Cutting Edge Technologies and the 'Report from the Future'

Vantage gave a brief presentation on some of the cutting edge technologies being implemented on other campuses similar to UNM. The intent was to encourage the Group to start to focus on the future of technology at UNM and disregard the problems they might currently be experiencing with access to technology on campus. This approach was intensified by Vantage's Report from the Future, which consisted of a report on some real and imaginary technologies and systems that are envisioned to be enjoyed by UNM campus Groups in 2008. Technologies featured in this Report from the Future included:

- The Communicator: Portable device offered in a variety of sizes and types providing wireless access to UNM's technology systems.
- The E-Partner: An Intelligent Agent that stores "My Scholarly Knowledge" (the knowledge and experiences compiled during your time at UNM) and acts as your personalized interface to information.
- Search Spiders: Self-learning search and retrieval systems that sift through the Information Smog and collect highly relevant data.
- Access Grids and Visualization Rooms: Multimedia display and presentation environments supporting Group-to-Group interaction.
- The Information Network: Integrated network supporting all voice, data, media and low voltage systems with high availability and 0% downtime.

The Report from the Future summarized three key milestones that had been reached in 2008. These were:

- 100% of UNM (and Partners) are connected to UNM's technology systems.
- Software has completely eliminated administrative paperwork.
- The percentage of UNM distance learning students climbed above 50% for the first time.



*Above: A prototype Communicator.
Left: Intelligent Agent Avatar.
Below: UC San Diego's Cyber-Bus.*



3.1.4 System Reliability

Following the Report from the Future, Vantage used the wireless voting handsets for a series of questions that revolved around how reliable the Group's access to technology would need to be in 2008. The Groups were asked to indicate the importance of access to a variety of technologies. For each technology, the Groups were asked to indicate its importance in three increasing locations/scales, as listed below:

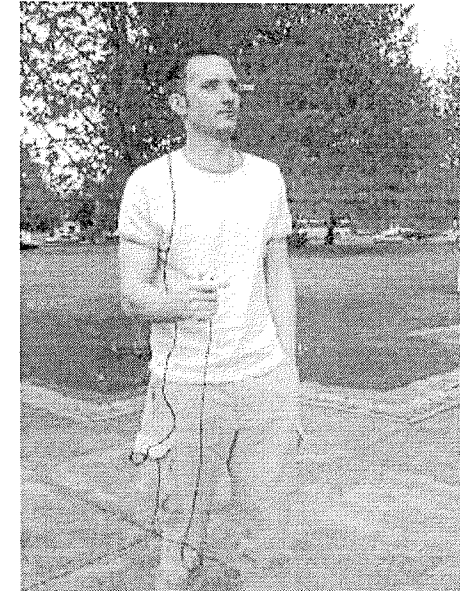
Technologies:	Electrical Power
	Telephone Service
	E-mail
	Internet Access
	Access to UNM Systems
Locations:	Your Personal Workspace
	Your Building
	The UNM Campus

3.1.5 Tools for Information Access

Following these questions and the discussions that arose from them, Vantage asked the Group to choose what type of system they would find most effective in accessing UNM's systems and assisting with their primary task. Choices consisted of:

- A Personal Computer in your workspace
- Open access computers across campus
- A laptop that you plug into the network
- A wireless laptop / tablet / PDA
- A wearable computer
- A cybernetic implant
- Something else not on the above list

Below: Wearable computing at the University of Oregon.



3.1.6 Investment

The last two questions asked the Groups to consider where to assign investment budgets. The first question asked for the Group's opinion regarding which of the following areas UNM should invest in to provide the greatest return:

- Increased Faculty / Staff Salaries
- Increased Faculty / Staff Numbers
- More research / reference materials
- More technology (applications and infrastructure)
- Something else not on the list

This question was followed up by a similar question focused purely on technology. Which of the following technology items should UNM invest in to provide the greatest return?

- More / faster PCs
- More technical support staff
- Better search / file capabilities
- Faster Internet access / more bandwidth
- Improved network reliability
- Fast campus-wide wireless access
- Better software
- Something else not on the list

3.1.7 Wrap-up

The final question, which was not subject to voting, asked the Group what the following groundbreaking technologies had in common:

- Distribution of virtual reality & three-dimensional images for experiential learning environments
- Development of nanoscale quantum computer components
- Telematics - remote monitoring and diagnosis while in the ambulance
- Hi Speed Laser research for wide area telecommunications networks

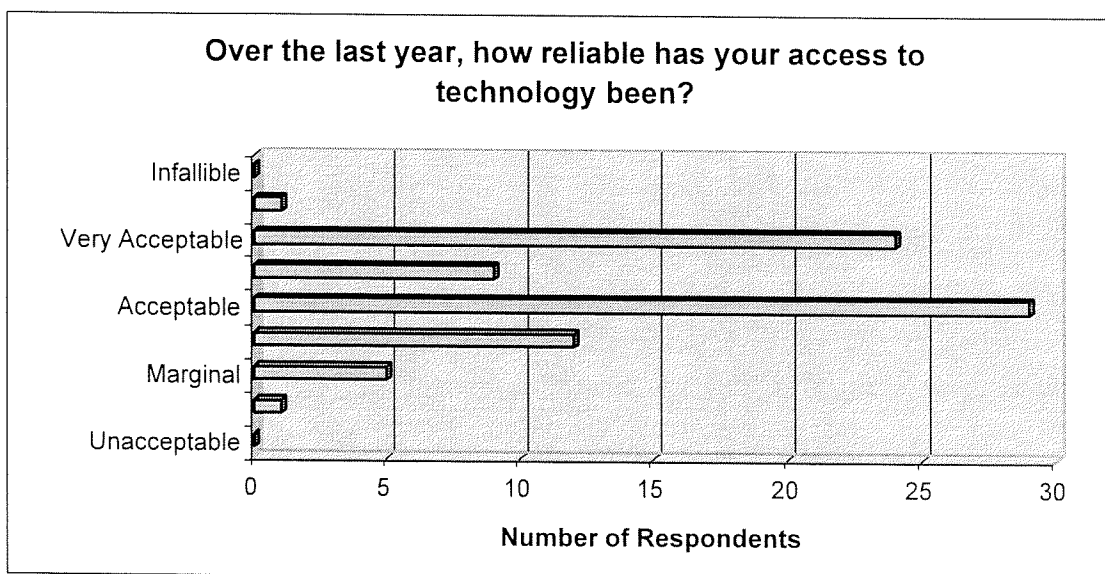
The answer is that they are all in research, planning or in trials at UNM.

3.2 Results

By using wireless voting keypads, Vantage was able to obtain real-time feedback on the questions that were posed to each Group and to initiate discussion regarding each response. **The following graphs and commentary are based on the aggregate totals for all Groups combined.**

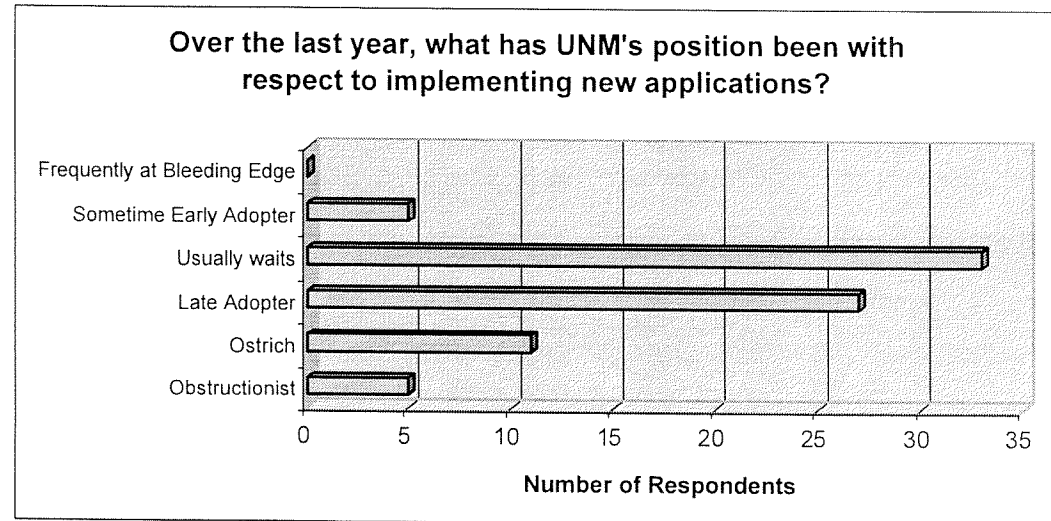
3.2.1 Question 1:

While no one expressed the belief that technology access has been infallible, a large percentage of the Groups appeared satisfied (or, at least, not dissatisfied) with their access to technology on the UNM campus.



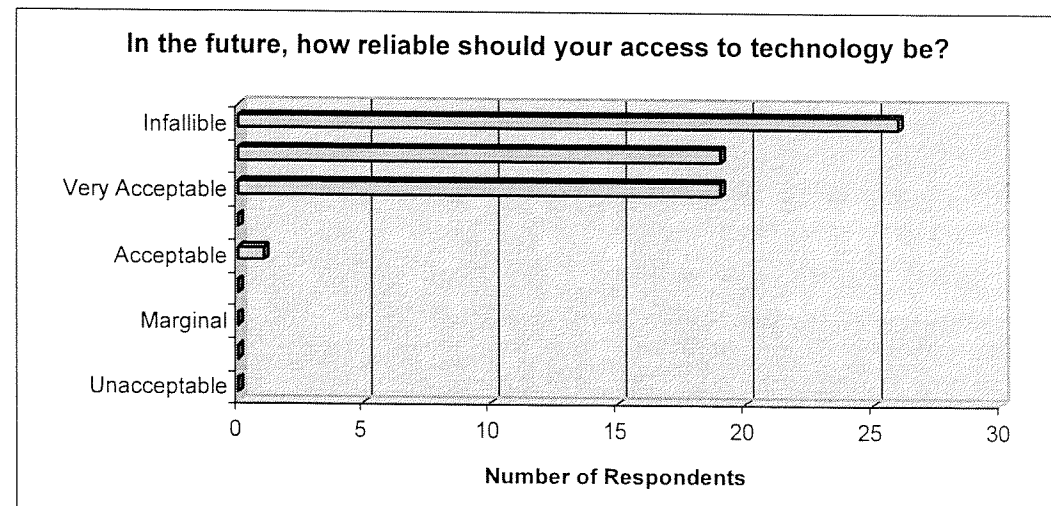
3.2.2 Question 2:

Responses to this question revealed a distinct division between Groups; Faculty and Students scored UNM relatively high in this category, while the Leadership and Technologist Groups scored UNM lower. This is based on each Group's usage of technology and knowledge of the underlying infrastructure supporting it. Interestingly, there was strong sentiment from the Technologist Group that UNM is an early adopter of technology applications, but tends to ignore the requirement for an infrastructure to support the new systems (the 'Ostrich' category).



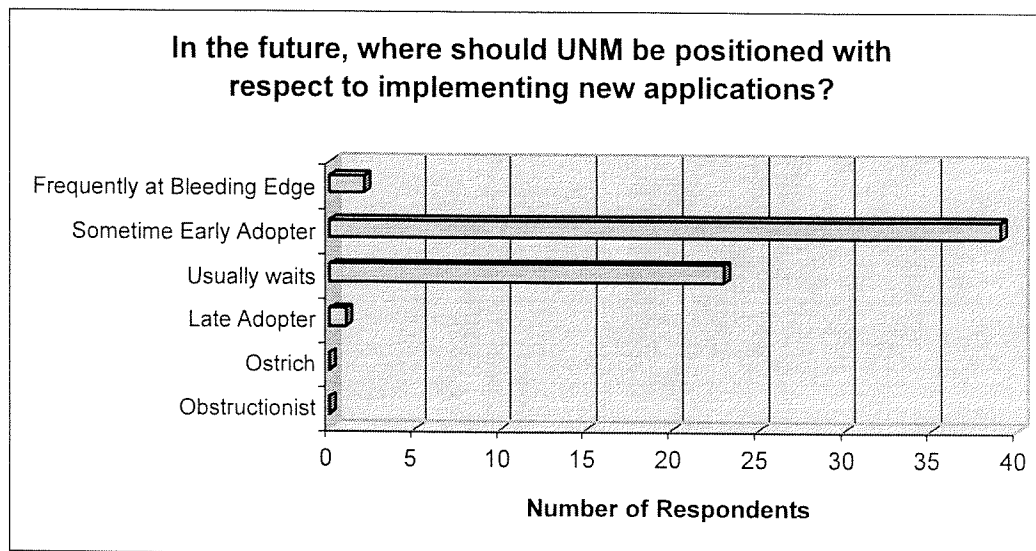
3.2.3 Question 3:

This question, posed immediately following Vantage's Report from the Future, resulted in an expected demand for technology access to become increasingly reliable as campus members become more reliant on the technology systems to be productive.



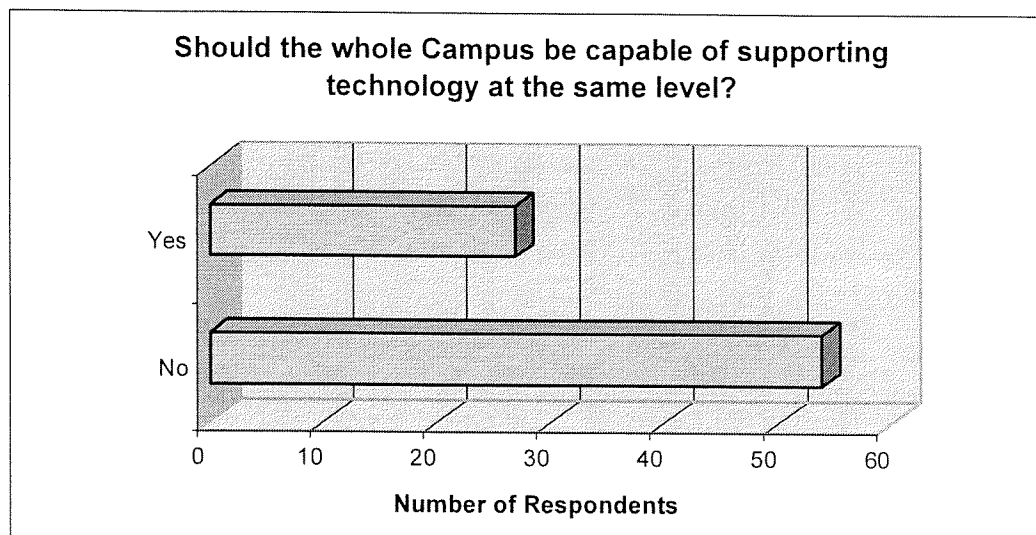
3.2.4 Question 4:

Interestingly, all the Groups agreed that in the future UNM should avoid the Ostrich and Obstructionist categories. A common theme shared by all the Groups was that UNM did not need to be a technologically cutting edge University (like an MIT or Cal-Tech) but instead should approach new technologies cautiously, waiting for systems to become established and picking specific areas where it should extend to providing Technology Centers of Excellence.



3.2.5 Question 5:

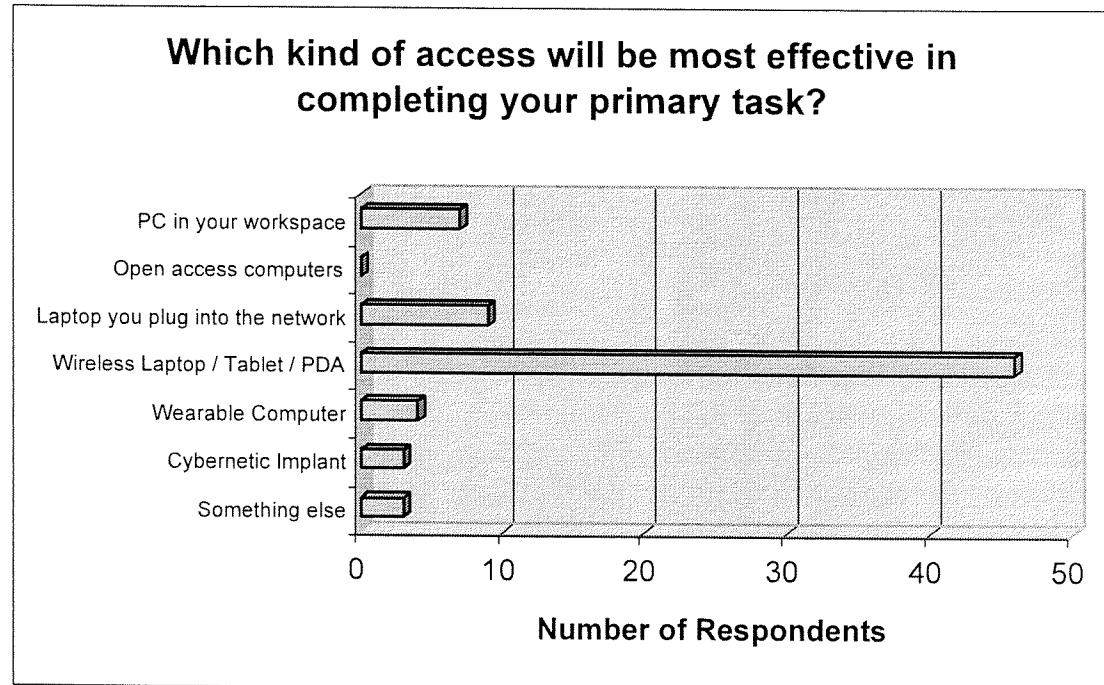
This question sparked vigorous debate within the Groups. While the Student Group leaned towards a common level of technology across campus, significant majorities of the other Groups opined that it was not necessary to provide a uniform distribution of technology across the entire campus.



3.2.6 Question 6:

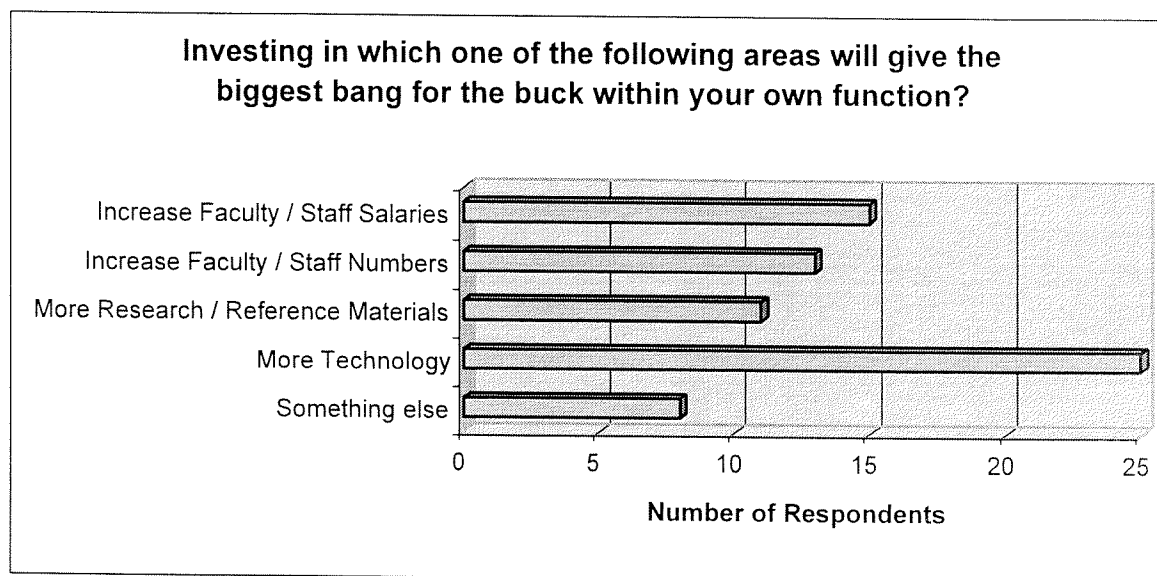
The favorite access device category among all Groups was a wireless-enabled laptop, tablet computer or PDA (Personal Digital Assistant). No votes were made for Open Access Computers deployed in convenient locations across campus, and relatively few votes were made for a PC in an individual's workspace.

The category voted 'most effective' is significantly different from most individual's current experience of technology on campus. This view indicates that the Groups believe greater benefits from technology can be gained from freedom of movement provided by wireless access to information.



3.2.7 Question 7:

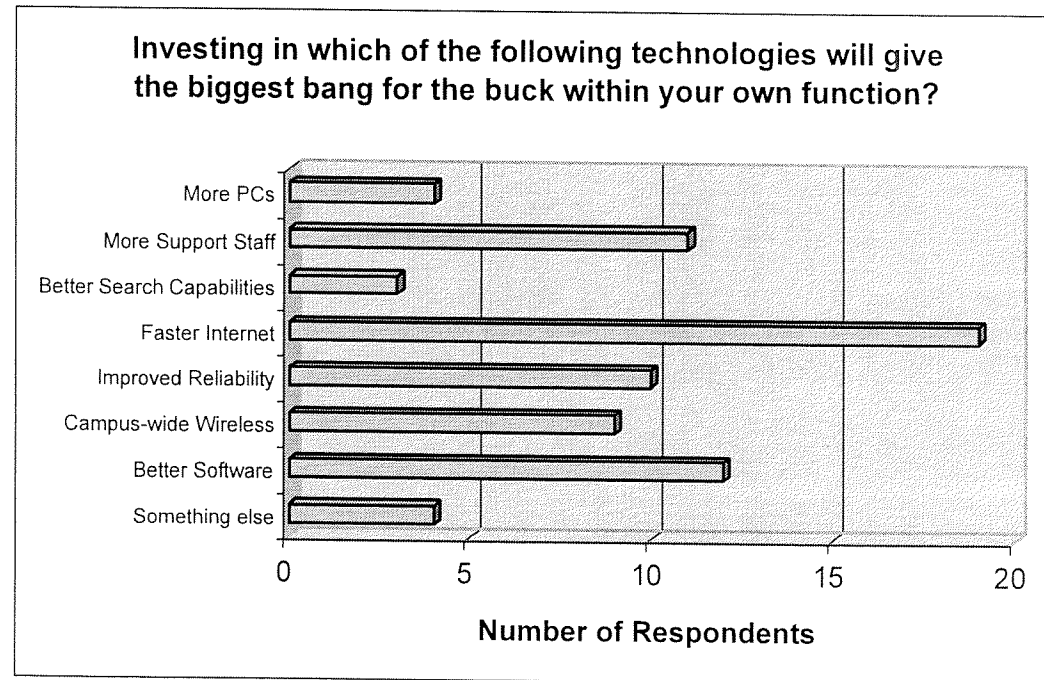
Although the majority of Focus Groups voted for investment in more technology, the Student Group favored more research and reference materials. Their rationale was that technology is of no use if the information it delivers is not there. The students also stated that there was insufficient information available on-line. This emphasized the student belief that there is significant benefit to having immediate, 24-hour access to information. Surprisingly, the students also felt that improved salaries might motivate Faculty and Staff to make more use of technology in the classroom.



3.2.8 Question 8:

Perhaps predictably, when asked to determine which area of technology would provide the best return, the responses were spread among several of the categories. Each Group had its own favorite; Leadership (by a narrow margin) preferred more Support Staff; Faculty requested faster Internet access and more bandwidth; the Technologists suggested better software (reducing the amount of support needed) and the Students sought better Internet access and more reliability.

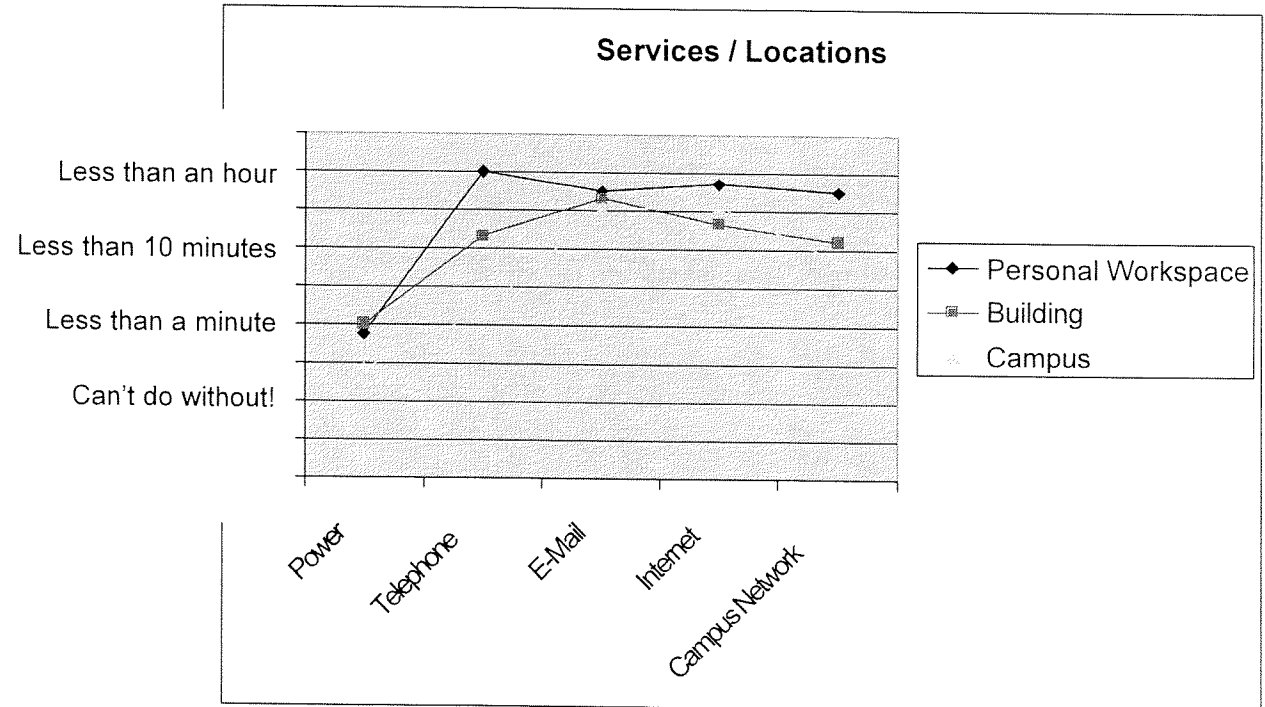
With no consensus, the results suggest that there are no major weaknesses (since no single weakness was clearly defined by any of the Groups) but rather a belief that the 'whole playing field' needs to be raised. This is consistent with an aging infrastructure in need of a comprehensive upgrade to satisfy the varied needs of a wide range of campus constituencies.



3.2.9 Reliability Requirements

These questions asked the Groups to determine how they perceive system reliability requirements change based on the scale of the outage and the system type. The graph below shows the response averaged for all the Groups for each service and location.

Based on the responses from each Group, it is clear that, with the exception of electrical power, there is considerable tolerance for system outages at UNM. It is interesting to see how the distribution changes between Personal Workspace, the Building and the Entire Campus. In addition, taking the worst case, the figures show that the maximum permissible outage is less than one hour.



3.3 Outcomes

The Focus Groups proved to be lively, interactive sessions that stimulated a wide range of ideas and observations regarding technology at UNM. A number of themes arose that were common across all of the Focus Groups:

- Ubiquitous, Reliable Access
- Level of Technology across Campus
- Technology Transparency
- People
- Connections outside of UNM
- Investment

These themes are discussed in the following sections:

3.3.1 Ubiquitous, Reliable Access

Ubiquitous access - the ability to access the campus' technology systems from wherever one is located, either on (or off) campus - was a favorite request from all of the Groups. Based on the results, the vast majority of campus users opted for a wireless-enabled laptop, tablet or PDA device and eschewed more futuristic wearable computers and cybernetic implants. The Student Group was satisfied with a plug-in laptop because they "have to go somewhere to work anyway". Interestingly, no Group expressed an interest in open access computers being provided across campus, which appears to reduce the need for Open Computer Labs, Cyber Cafés and other similar resources.

A relatively significant number of people stated that technology access that was "on all the time" could be perceived in a negative light. "If you can access technology, you're on a 24 hour schedule" and "I won't give access to my calendar for others to schedule me" were common concerns. "No wireless – otherwise I'd work all the time" was a heartfelt sentiment. It is clear that, while ubiquitous access to technology is definitely a requirement at UNM, it is important that the expectation that people are available at all hours does not develop.

Reliability was also seen as being vitally important in the future as users depend increasingly on technology systems to be productive. Although alternative options – “If the ‘phone is out I find another way: I could send a student” – exist and many felt that UNM “does well with limited resources”, there was a definite belief that when introducing new technologies UNM tends to under-invest in or even ignore the underlying infrastructure needs; subsequently, less efficient work-arounds are used to get the job done. The consensus view was that this must change if UNM is to provide an infrastructure that meets the goals of the ITIP.

3.3.2 Level of Technology across Campus:

A question that sparked fierce debate was ‘Should the whole Campus be capable of supporting technology at the same level?’ Given the position that the majority of the Groups felt that currently the campus is “under-provisioned for technology”, there appeared to be reticence to agree that some areas of campus should have more technology than others. A concern that there “has to be a level playing field and distribution of funding” was voiced. After all, in 2008 “everyone has a communicator.”

However, as debate continued in each Group, the view that UNM “will always have higher performance areas” became more accepted. “Technology propagates out from Centers of Excellence” and “People who use it should have access to it” emerged as common themes. Consensus was reached that a standardized ‘State of the Industry’ level of technology was required across the campus but that UNM should identify areas where additional funding or resources could be applied to raise the technology level to ‘State of the Art’.

3.3.3 Technology Transparency

“Technology for technology’s sake” is neither wanted nor needed in the majority of campus spaces at UNM. Strong sentiments for technology to be transparent, to “fade into the background”, were expressed by many Groups, especially the Technologists, who saw transparent technology as a sign that the systems were fully operational and users were able to be productive without technology issues adversely impacting their work.

A prediction of “wearable computing as a fashion statement” was met with skeptical interest from the Groups, as were concerns from the Faculty Group that technology should not “eliminate human access – people still need to get dates!”

Implicit in the provision of technology transparency is that the technology systems are reliable and are self-healing or have backup procedures in place that prevent users from experiencing failures, system downtime or other outages.

3.3.4 People

Recognition that “good people are harder to get than machines” drove discussion during the investment portion of the Focus Groups. The Faculty Group strongly believed that “attracting more quality Faculty would benefit UNM most.” This sentiment was qualified by the realization that having updated technology is also a catalyst for recruiting top talent. Recognition that the technology systems could play a part in distinguishing UNM from its competition was also expressed. Similarly, it was stated that students could be attracted the same way; – we should “replace our static view of campus as +/- 20,000 students with a larger technology-activated student population.” The assertion in the Report from the Future that hypothetically more than 50% of UNM students will be studying remotely raised reactions ranging from resigned acceptance and excitement through vehement disagreement. Clearly, the impact of technology and the opportunity for UNM to attract more students by providing greater facilities for distance learning needs further consideration.

Investment in additional Support Staff was not seen as a top priority. “Support is a down-stream solution” identified the need for more resilient systems that were more intuitive to use rather than solving these problems by adding staff. “More technology equates to more support staff to bring users up to speed” was mentioned as a potential Catch 22 situation.

3.3.5 External Connections

A strong desire exists to reinforce and/or improve connections to people and entities outside of UNM. "Connections to partners anywhere in the world" was a popular request. Recognition that there are many non-UNM individuals in buildings on campus was given. It was felt that UNM was faced with the opportunity to participate in a "global connectivity collaboration with a very wide range of Partners", some of which could be very 'High-Tech' organizations – this could drive the technology infrastructure requirements in a different direction.

3.3.6 Investment:

Predictably, the discussion on where UNM should invest drew a wide range of opinions. Many individuals suggested investment in 'Something Else' when presented with the choices, but made it clear that "the 'something else' must actually be better!" Although no decisive option emerged, several of the Groups voted "for Technology because Under-Graduate teaching will change" and "few people are able to imagine [what this will be like at this time]." An example was cited that "less lectures and better access to interactive online course materials [via technology] improved results by 20%."

"Increasing rate of change will force institutions to adopt earlier" was countered by "but the early adopter cannot be a collaborator." This indicated the tension between those wishing to 'push the envelope' and those wanting to be part of a wider collaborative Group. Both viewpoints are equally valid.

3.4 Conclusion

The ITIP Focus Groups were an unqualified success. The format was very effective and served to ensure that members of each Group were involved. The inventive use of technology (especially the wireless handsets) encouraged interaction and helped 'break the ice' at the beginning of each session.

The presentation that was used to structure each session provoked some interesting results. A number of common themes were expressed across all of the Groups;

- The need for ubiquitous yet reliable access to technology across campus;
- A level, 'state of the industry' platform for technology across campus with the capacity for UNM to invest in Technology Centers of Excellence in key locations;
- Technology transparency where the technologies and systems are so reliable and intuitive that they fade into the background and reduce the need for support personnel;
- A clear understanding of the value of people and the use of technology to differentiate UNM from its competitors; and
- A desire to continue to improve and grow connections to individuals and organizations outside of the UNM campus.

Finally, the Vantage Team received a significant amount of positive feedback from the attendees both directly after each session and subsequent to it. As a key component of the ITIP, the Focus Groups served to involve a wide proportion of the campus community, publicize the fact that UNM was addressing the future of technology on campus and make the entire process fun!

4. ITIP PROJECT RECOMMENDATIONS

The purpose of this section of this document provides an overview of the projects envisioned for the Information Technology Infrastructure Plan (ITIP). The content is primarily focused on a description of the projects and an estimate of their cost and time to complete. It is complemented by the Information Technology Infrastructure Plan Campus Drawings (Exhibits 1 and 2) that indicate the location or route of the proposed projects overlaid upon the UNM Campus maps and the ITIP Project Timeline Gantt Chart (Exhibit 3) that graphically illustrates the estimated time each project, or group of projects, will take to plan and execute when procurement and design time is included in the process.

The Information Technology Infrastructure Plan Steering Committee assisted in the assignment of their priority for completion. The ITIP Steering Committee is a multidisciplinary group of UNM Faculty and Management whose membership includes representatives from the major campus stakeholders, including the Provost's Office, Extended University, Campus and HSC Facility Planning, CIRT, Health Sciences Library and Informatics Center and University Hospital's MIS Department, UNM Telecommunications, Student Life, Campus Police and other constituents reviewed the proposed projects.

The ITIP Projects are not in sequential order but assigned numerical values (1 equals highest) because of the priorities assigned to their perceived urgency. It is not necessary to complete these projects in order, many can be commenced concurrently. There are some steps that should logically be performed before others. An example would be the Campus cable and infrastructure audit (Project 1) which should be performed prior to commencing the design of additional ductbanks or the installation of additional cable. Refer to the ITIP Project Timeline Gantt Chart (Exhibit 3) for a depiction of the duration and suggested completion dependencies of the ITIP Projects.

All 24 of the information technology infrastructure projects proposed are considered important and valuable for the overall goals set forth by the ITIP. The priority scale assigned to the list of projects places *Critical Priority* projects first. Critical projects are those that focus on a particular vulnerability to the present information technology systems, or have a significant cost and lead-time for budgeting and construction. Critical Priority projects are followed by *High Priority* Projects, and those projects that, although subordinate in urgency to Critical and High Priority projects, are still considered key to the success of the Plan, are assigned *Normal Priority*.

In order to quantify the ITIP Information Technology Infrastructure Project list an estimate of the cost and time to complete is provided for each project. It is worth noting that the approximate capital cost for implementation of all projects associated with the Plan is \$39,750,000. If the projects were to be completed in serial order, they would include over 18 years of work effort.

4.1 Background

One of the objectives of the Information Technology Infrastructure Plan was to evaluate the current state of the UNM technology infrastructure and to determine areas where enhancements could be made to prepare UNM for the evolution of technology for the coming decade and beyond. The scope of work for the ITIP is focused primarily on the *interbuilding* level of infrastructure, meaning the physical features, cable plant and electronics which connect campus buildings together.

The project team set out to create a list of construction and technology initiatives for the UNM campus that would provide the following enhancements to the information technology infrastructure:

- Resilience – The ability of the communication system to continue providing service to all or most of the campus should key elements of the infrastructure be damaged or be subject to an unplanned outage.
- Flexibility – The capability of providing a range of information technology solutions through route diversity, or multiple location choices for key communication assets.

- Performance – The provision of multiple points of access to the network and enhanced capacity for data traffic flow which results in faster response time and higher levels of user satisfaction with network services.
- Expansion Capability – The addition of growth capacity which will allow future additions to the system without extensive construction or rework of physical features.

The process that led to the development of the list of information technology projects included the direct observation of the current state of the information technology infrastructure through the study of available records and tours of selected UNM campus facilities. Items of infrastructure information and records that had been maintained for specific purposes by separate campus departments were combined to produce a single, integrated document. When many of these of previously fragmented pieces of information were compiled, the global aspect of the shared documents revealed a number of sometimes surprising realizations regarding the state of the UNM communications infrastructure. For example, they raised awareness of infrastructure vulnerabilities such as single points of failure or potentially serviceable infrastructure elements that presently lay dormant. A lasting beneficial effect of the committee meetings and discussions between technical and facility staff members was to promote a new level of interdepartmental communication and cooperation.

In order to gain an appreciation for the perceived information technology requirements of UNM students, faculty and staff, an extensive series of interviews was conducted with departments and interest groups across the strata of the University population. Focus Groups¹ of similar constituent make-up were convened on campus. The audience for each Focus Group session was presented with a view of future trends in information technology. Throughout each presentation, the Focus Group attendees participated in real-time polls where their views toward technology and technology resource priorities were tabulated. The Focus Group feedback was considered a very valuable contribution when ITIP projects were conceived and prioritized.

¹ For a more complete description of the Focus Group process, please refer to the ITIP Focus Group section of this document.

From these combined sources of information, a host of technology infrastructure projects were conceptualized. These projects range from traditional construction projects to the introduction of communication technologies that are new to the campus. The proposed construction and technology improvement projects were overlaid on the campus map, and high-level cost and work estimates were prepared to provide a scale of cost and time required to accomplish the separate projects. As it is impractical to commence all projects at once, and some projects have been judged to take precedence over others, it was necessary to assign different priorities to each task. Priorities to tasks were not assigned based on the estimated cost or time to complete.

The scope and cost estimates associated with the ITIP Projects acknowledge, but do not fully account for, other UNM technology initiatives that are currently contemplated or even underway. There may be some duplication of investment or effort as a result. An example of this overlap is the EMIS Project (Electronic Management Information System) which is in progress at the time of this writing. Some of the equipment or enhancements provided by the EMIS Project may mitigate or eliminate the impetus to initiate a Project on the list.

The project priorities are divided into three classifications: *Critical*, *High*, and *Normal*.

Critical priority is defined in this case as projects that will help prevent inadvertent service outages either due to damage (such as from accidental construction damage) or from foreseeable and imminent capacity limitations of media or equipment. These projects must be initiated in the near term because of significant factors of cost and lead-time for planning and procurement that could cause the project cycle to last several years.

A *High* priority classification indicates that the projects listed are very important to the overall plan, and should be funded and completed once those defined as *Critical* are underway or complete. In some instances, the *Critical* priority projects must be completed in order for those projects with lower priority to be effective or even possible.

Normal priority projects are also significant to achieving the overall goal of a cohesive and integrated Campus technology infrastructure. Although *Normal* priority projects fall in line behind or under those assigned *Critical* and *High* priority, these projects should not be interpreted as being unimportant, or that the projects have minor value or utility. *Normal* priority projects are, however, subordinate to the *Critical* and *High* priority projects in terms of resource commitment.

4.2 Project Assumptions

The estimated cost and time to complete the projects are shown to provide a magnitude of the resources necessary to complete the work. Some of the projects are described as alternatives for each other, and therefore the total cost estimate would not be accurate if all the project costs were added together.

Several assumptions were made while preparing cost estimates for the individual projects. These assumptions should be considered when evaluating the cost estimates for each project.

- Each project includes a 25 percent contingency allowance² for UNM procurement costs, unknown conditions, and an allowance for design and management fees typical with contracts not designed and executed with internal resources.
- Costs for construction projects are assumed to use private contracting firms, as opposed to internal UNM human resources and equipment, who provide all labor, materials, tools, and special equipment required to complete the work.
- UNM personnel or overhead costs for worksite project management, quality assurance, etc., are not included in the estimates. The plan assumes that normal operational responsibilities will preclude extensive involvement of UNM staff in the execution of the projects. The role of UNM staff in all projects is envisioned be limited to executive project supervision and budget control, coordination with user groups, and assistance with internal UNM policies, procedures, and access.

² The figure of 25 percent was discussed and agreed by the ITIP Steering Committee during discussions of the estimating process.

- Labor rates for construction cost estimates are based on local regional cost data.
- Construction costs estimates include allowances for site preparation and restoration of the work area to original conditions once work is completed.
- Design concepts and methods are consistent with the ITIP Design Guidelines for Infrastructure Technology Facilities.

4.3 Information Technology Infrastructure Project Descriptions

The Information Technology Infrastructure Projects are described with respect to their purpose and contribution to the overall Infrastructure Technology Infrastructure Plan. A physical description of the project location and route, if applicable, is also included to provide a geographical frame of reference.

Table 1, *University of New Mexico Information Technology Infrastructure Projects List*, shows all projects ranked in priority assigned by UNM, the campus area affected and a brief description of the work. In the body of this section, an expanded description of each project and its component subprojects follows, presented in the order of Critical, High and Normal priority. Each project description also indicates the estimated time and cost to complete the work, as well as a valuation of the project's contribution to Information Technology Infrastructure's resilience, flexibility, performance and expansion.

<p>Table 1</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p>									
Project Number	Priority	Area Affected	Project Description	Resilience	Flexibility	Performance	Expansion	Estimated Time to Complete	Estimated Cost to Complete

<p>Table 1 University of New Mexico Information Technology Infrastructure Projects List</p>									
Project Number	Priority	Area Affected	Project Description	Resilience	Flexibility	Performance	Expansion	Estimated Time to Complete	Estimated Cost to Complete
1	Critical	All Campus	Audit of existing cable plant and infrastructure for all of campus.	X	X	X	X	180 Days	\$125,000
2	Critical	All Campus	Design reinforcement of cable system upgrade of ductbanks where required, and installation of new cable where required to support a distributed information technology topology.	X	X	X	X	720 Days	\$3,250,000
3	Critical	Central Campus	Complete Central Campus Backbone Loop by connecting HSSB to CIRT	X	X			5 Days	\$1,250
4	Critical	All Campus	Develop a distributed telephone system for the UNM Campus.	X	X	X	X	720 Days	\$10,000,000
5	Critical	All Campus	Select location, design and build a new Technology Building and incorporate a new KNME Building.	X	X	X	X	930 Days	\$13,500,000
6	Critical	All Campus	Upgrade CIRT to accommodate a telephone node and improved office facilities.	X	X	X	X	360 Days	\$2,500,000
7	Critical	South Campus	Rerouting of cable pathway around the Pit.	X				90 Days	\$160,000
8	Critical	All Campus	Upgrade the environmental support of Core Switch Rooms.	X		X		210 Days	\$325,000

<p>Table 1 University of New Mexico Information Technology Infrastructure Projects List</p>									
Project Number	Priority	Area Affected	Project Description	Resilience	Flexibility	Performance	Expansion	Estimated Time to Complete	Estimated Cost to Complete
9	Critical	All Campus	Extend South Campus conduits from Yale Avenue/Redondo Avenue to the Utility Tunnel and from Cesar Chavez Avenue/University Boulevard to the existing ductbank.	X				60 Days	\$62,500
10	Critical	All Campus	Upgrade Campus Backbone Data Network.	X	X	X	X	480 Days	\$1,875,000
11	High	All Campus	Establish additional Internet connections from the North Campus/Hospital and South Campus.	X	X	X		90 Days	\$220,000
12	High	All Campus	Upgrade environmental support of building Service Entrances on Campus as applicable	X		X		530 Days	\$1,500,000
13	High	All Campus	Establish Wireless Campus Area Network (CAN).	X		X		600 Days	\$2,000,000
14	High	South Campus	Create secondary pathway for Dikewood Hall.	X	X	X	X	60 Days	\$45,000
15	High	North Campus	Extend pathway from ASIC to 1650 University Boulevard and Elks Club building.	X	X		X	150 Days	\$475,000
16	Normal	All Campus	Integrate Low Voltage Systems onto Campus IP backbone.	X	X	X		555 Days	\$625,000

<p>Table 1</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p>									
Project Number	Priority	Area Affected	Project Description	Resilience	Flexibility	Performance	Expansion	Estimated Time to Complete	Estimated Cost to Complete
17	Normal	North Campus	Build out infrastructure in Lands West area.	X	X	X	X	150 Days	\$475,000
18	Normal	North Campus	Close East end of North Campus Loop along Lomas Boulevard.	X	X		X	150 Days	\$410,000
19	Normal	South Campus	Close backbone loop near the Stadium.	X	X			60 Days	\$50,000
20	Normal	South Campus	Convert aerial link to South Campus to underground infrastructure.	X				180 Days	\$562,500
21	Normal	South Campus	Implement secondary backbone link to Main Campus via University Boulevard.	X				250 Days	\$965,000
22	Normal	North and Central Campus	Create pathway from CIRT to new Children's Hospital and Critical Care Pavilion.	X	X		X	90 Days	\$250,000
23	Normal	All Campus	Create a secondary backbone link from North and South Campus to Main Campus via a Wireless connection.	X				90 Days	\$320,000
24	Normal	Central Campus	Create a secondary pathway along University Boulevard for High Performance Computing Center.	X		X		30 Days	\$45,000
Totals:								18.75 Yrs.	\$39,750,000

4.4 Information Technology Infrastructure Project Expenditure Classifications

The list of Information Technology Infrastructure Projects spans a range of expenditures from Operational Expenses, to Long Term Capital Investments. The Projects listed in Table 1 are roughly classified by type of expenditure in Table 2, *University of New Mexico, Information Technology Infrastructure Projects List, Classified by Expenditure Type*. The actual treatment of project funding and accounting are subject to the practices of the University.

- Operational Expenses are defined here as those that have either a one-time cost with a completion time of approximately one year or less; or initiatives which having a recurring cost that impacts the cash flow of the University on a periodic basis, or some of both. Examples would be the costs associated with the Infrastructure Audit (Project 1), or a contract with an Internet Service Provider for additional circuit bandwidth, (Project 11) paid on a monthly basis. Design and management fees associated with the completion of the Short and Long Term projects may be expensed, or rolled up into long term project costs to be depreciated with the primary asset.
- Short Term Capital Investments include expenditures that have a service life of three to five years, are fully depreciated over this short time period and must be replaced. Technology equipment that becomes obsolescent, such as network electronics and Personal Computers fit into this category.
- Long Term Capital Investments are projects of a durable, permanent nature which will last for between five and twenty years (or more) and depreciated accordingly. An example of this type of project would be the installation of concrete-encased ductbanks and manholes necessary to support communication cable distribution across the UNM Campus.

<p>Table 2</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p> <p>Classified by Expenditure Type</p>								
Project Number	Priority	Area Affected	Project Description	Operational Expense	Short Term Capital Investment	Long Term Capital Investment	Estimated Time to Complete	Estimated Cost to Complete
1	Critical	All Campus	Audit of existing cable plant and infrastructure for all of campus.	X			180 Days	\$125,000
2	Critical	All Campus	Design reinforcement of cable system upgrade of ductbanks where required, and installation of new cable where required to support a distributed information technology topology.	X		X	720 Days	\$3,250,000
3	Critical	Central Campus	Complete Central Campus Backbone Loop by connecting HSSB to CIRT			X	5 Days	\$1,250
4	Critical	All Campus	Develop a distributed telephone system for the UNM Campus.			X	720 Days	\$10,000,000
5	Critical	All Campus	Select location, design and build a new Technology Building and incorporate a new KNME Building.			X	930 Days	\$13,500,000
6	Critical	All Campus	Upgrade CIRT to accommodate a telephone node and improved office facilities.			X	360 Days	\$2,500,000

<p>Table 2</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p> <p>Classified by Expenditure Type</p>								
Project Number	Priority	Area Affected	Project Description	Operational Expense	Short Term Capital Investment	Long Term Capital Investment	Estimated Time to Complete	Estimated Cost to Complete
7	Critical	South Campus	Rerouting of cable pathway around the Pit.			X	90 Days	\$160,000
8	Critical	All Campus	Upgrade the environmental support of Core Switch Rooms.			X	210 Days	\$325,000
9	Critical	All Campus	Extend South Campus conduits from Yale Avenue/Redondo Avenue to the Utility Tunnel and from Cesar Chavez Avenue/University Boulevard to the existing ductbank.			X	60 Days	\$62,500
10	Critical	All Campus	Upgrade Campus Backbone Data Network.		X		480 Days	\$1,875,000
11	High	All Campus	Establish additional Internet connections from the North Campus/Hospital and South Campus.	X	X		90 Days	\$220,000
12	High	All Campus	Upgrade environmental support of building Service Entrances on Campus as applicable			X	530 Days	\$1,500,000

<p>Table 2</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p> <p>Classified by Expenditure Type</p>								
Project Number	Priority	Area Affected	Project Description	Operational Expense	Short Term Capital Investment	Long Term Capital Investment	Estimated Time to Complete	Estimated Cost to Complete
13	High	All Campus	Establish Wireless Campus Area Network (CAN).		X		600 Days	\$2,000,000
14	High	South Campus	Create secondary pathway for Dikewood Hall.			X	60 Days	\$45,000
15	High	North Campus	Extend pathway from ASIC to 1650 University Boulevard and Elks Club building.			X	150 Days	\$475,000
16	Normal	All Campus	Integrate Low Voltage Systems onto Campus IP backbone.		X		555 Days	\$625,000
17	Normal	North Campus	Build out infrastructure in Lands West area.			X	150 Days	\$475,000
18	Normal	North Campus	Close East end of North Campus Loop along Lomas Boulevard.			X	150 Days	\$410,000
19	Normal	South Campus	Close backbone loop near the Stadium.			X	60 Days	\$50,000
20	Normal	South Campus	Convert aerial link to South Campus to underground infrastructure.			X	180 Days	\$562,500

<p>Table 2</p> <p>University of New Mexico</p> <p>Information Technology Infrastructure Projects List</p> <p>Classified by Expenditure Type</p>								
Project Number	Priority	Area Affected	Project Description	Operational Expense	Short Term Capital Investment	Long Term Capital Investment	Estimated Time to Complete	Estimated Cost to Complete
21	Normal	South Campus	Implement secondary backbone link to Main Campus via University Boulevard.			X	250 Days	\$965,000
22	Normal	North and Central Campus	Create pathway from CIRT to new Children's Hospital and Critical Care Pavilion.			X	90 Days	\$250,000
23	Normal	All Campus	Create a secondary backbone link from North and South Campus to Main Campus via a Wireless connection.		X		90 Days	\$320,000
24	Normal	Central Campus	Create a secondary pathway along University Boulevard for High Performance Computing Center.			X	30 Days	\$45,000
Totals:							18.75 Yrs.	\$39,750,000

4.5 Critical Priority Infrastructure Projects

Many of the projects categorized as Critical must be completed in sequence. This is necessary to prepare for projects that are dependent on having other facilities in place in order to be effective or even practical. For example, Project 1, *The Campus Cable Audit*, must be completed in order for the enhancements provided in Project 2, *Reinforcement of the Campus pathway and backbone cable systems*, to be reasonably commenced. Projects that layer new communication electronics such as Project 4, *Development of a distributed telephone system on Campus*, cannot be effectively implemented without starting Project 2 (although Project 2 does not need to be completed prior to these other projects). Please refer to the Exhibit 3, The ITIP Project Timeline, for a graphical representation of these project timeframes and their interdependencies.

4.5.1 Critical Project Number: 1

Abbreviated Project Description: Audit of existing cable plant and infrastructure for all of campus.

Campus Area Affected: All Campus

Estimated Cost: \$125,000

Estimated Time to Complete: 180 days

Description: The existing telephone and data campus cable plant on the UNM campus is aging and accurate records of actual cable sizes, routes and spare capacity are out of date. Prior to beginning construction of new underground infrastructure and reinforcement of the cable backbone, this project will benchmark the state of the entire interbuilding cable plant, tunnel system, manholes, and ductbanks. This audit will identify areas where cable and infrastructure requires repair, replacement or needs to be expanded to provide new capacity and clear cable routes. The ultimate goal is to prepare the interbuilding cable infrastructure to support a decentralized network. One of the first steps in this initiative is to modify the present Star Topology to a distributed Ring and Star configuration.

The Star Topology in Figure 1 is a representation of a group of buildings on the campus served by the present cable distribution system on the UNM Campus. The direct links from individual buildings to the central hub are also known as “home runs”. The Star diagram also reflects the centralized voice communication system that serves the majority of the Campus from the Telecommunications Building. The diagram depicts the potential single point of failure to which a Star Topology is susceptible.

The Star/Ring Topology in Figure 2 is a representation of the same group of buildings served by a modified interbuilding cable system as recommended for implementation across the UNM Campus. Note the addition of new voice telecommunication nodes in the ring, represented by the colored boxes, reflecting the movement away from the monolithic star topology and toward a distributed network. Certain key buildings will serve as the hubs of smaller star-type distribution schemes. The Ring/Star topology will provide the benefits of resilience, flexibility, performance and growth capability, while reducing the dependence on the Telecommunications Building as the central telephone hub for the Campus.

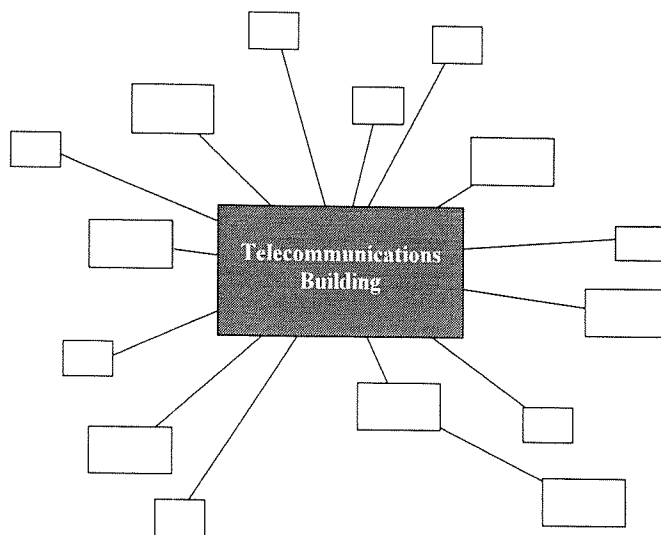


Figure 1 Star Topology Diagram

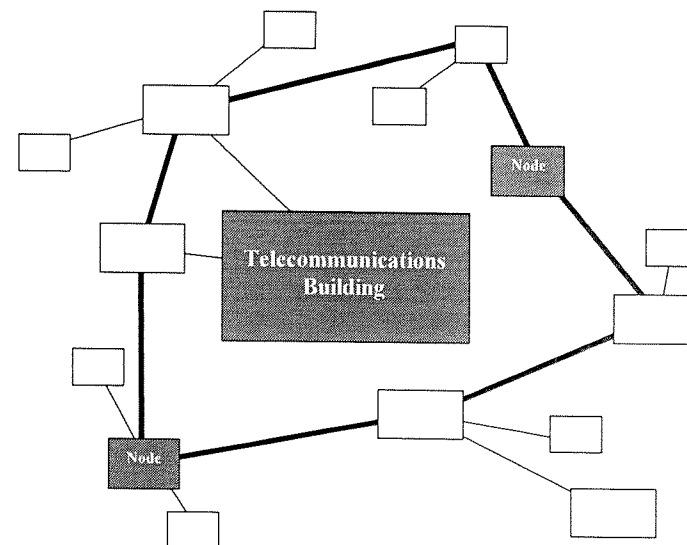


Figure 2: Ring / Star Topology Diagram

4.5.2 Critical Project Number 2

Abbreviated Project Description: Design reinforcement of the communication cable system, upgrade and modification of ductbanks where required, and installation of new cable where required, to support a distributed information technology topology.

Campus Area Affected: All Campus, primarily Central Campus.

Estimated Cost: \$3,250,000

Estimated Time to Complete: 720 days

Description: This project will primarily reconfigure the pathway and cable infrastructure on the Central Campus area where the concentration of campus buildings is most dense. A large percentage of the present UNM interbuilding cable plant is not suited to support a distributed network architecture. This new network topology will significantly enhance the provision of technology services to the Campus. Much of the optical fiber backbone cable and multipair copper backbone cable serving the UNM Campus is routed through utility tunnels and directly linked to the CIRT building. Cable in the tunnel system is difficult to access and the tunnels lack capacity for additional cable due to congestion with the other utilities in the tunnels themselves. The UNM Facilities and Plant Engineering Departments have expressed the desire to migrate communication cables out of the tunnel system into its own set of dedicated pathways.

Approximately ten years ago, a limited system of communication ductbanks was constructed on Campus. This relatively recent infrastructure enhancement did provide some relief, but they did not fully solve the problem of cable in the tunnels, nor provide sufficient capacity to support significant cable modifications. Using the information gathered during the audit of the existing cable plant, it is assumed that some percentage of pathway capacity can be reclaimed by identifying and removing cable which is not being fully utilized or that which has been abandoned and left in place.

Culling unused cable from pathways and spaces will free some capacity, however, this process alone will not be sufficient to provide the capacity and routes necessary to support a fully distributed network system. The ductbanks need to be expanded in capacity and extended to both new and existing buildings on Campus. Underground transition structures such as manholes and handholes will also need to be added and existing structures repaired or upgraded to accept additional ducts.

Of prime importance to the infrastructure reconfiguration is to provide entrance conduits to buildings that will provide dedicated pathways and allow these buildings to connect directly to backbone cabling. This enhancement is necessary to correct the incidence of backbone fiber and copper cables that pass through buildings enroute to the next building "downstream", and prevent outages to these buildings should the cable "upstream" be damaged inadvertently due to fire, construction or another event. The ITOP recommends that some buildings on Campus be provided with a minimum of two separate communications service entrances (ducts) that follow completely separate pathways into the building. The multiple entrances are a means of providing redundancy in the event of a cable cut or damage to one set of entrance cables serving critical operations. Examples of this type of building are UNM Hospital, the CIRT building and the proposed new Technology Building (see Critical Project 5).

Once the new cable pathways are in place, this project will design and install new optical fiber and multipair copper cable in a topology that creates several physical rings that will facilitate a decentralized and distributed network scheme. An example of this work is the creation of a campus backbone loop by extending the fiber connection at the Electrical Engineering (EECE) building on Central Campus.

4.5.3 Critical Project Number 3

Abbreviated Project Description: Completion of Central Campus Backbone Loop by connecting HSSB to CIRT with optical fiber cable.

Campus Area Affected: All Campus

Estimated Cost: \$1,250

Estimated Time to Complete: 5 days

Description: This project can provide substantial improvement to campus resilience and redundancy without a significant investment of resources. This work is an exception to the other projects on the list of proposed projects, as it can be accomplished by UNM's own technicians. There are two endpoints of different fiber optic cable runs that terminate in UNM Hospital. One cable runs from Health Science and Services Building (HSSB) whose cable plant serves the Health Sciences buildings and North Campus, while the other fiber cable connects CIRT to the Hospital. Connecting these two cable systems together in the Hospital will create a secondary connection between Central and North Campus and thus provide a redundant pathway between critical Core Network Hubs. See Figure 3 for a depiction of the area where this work will take place.

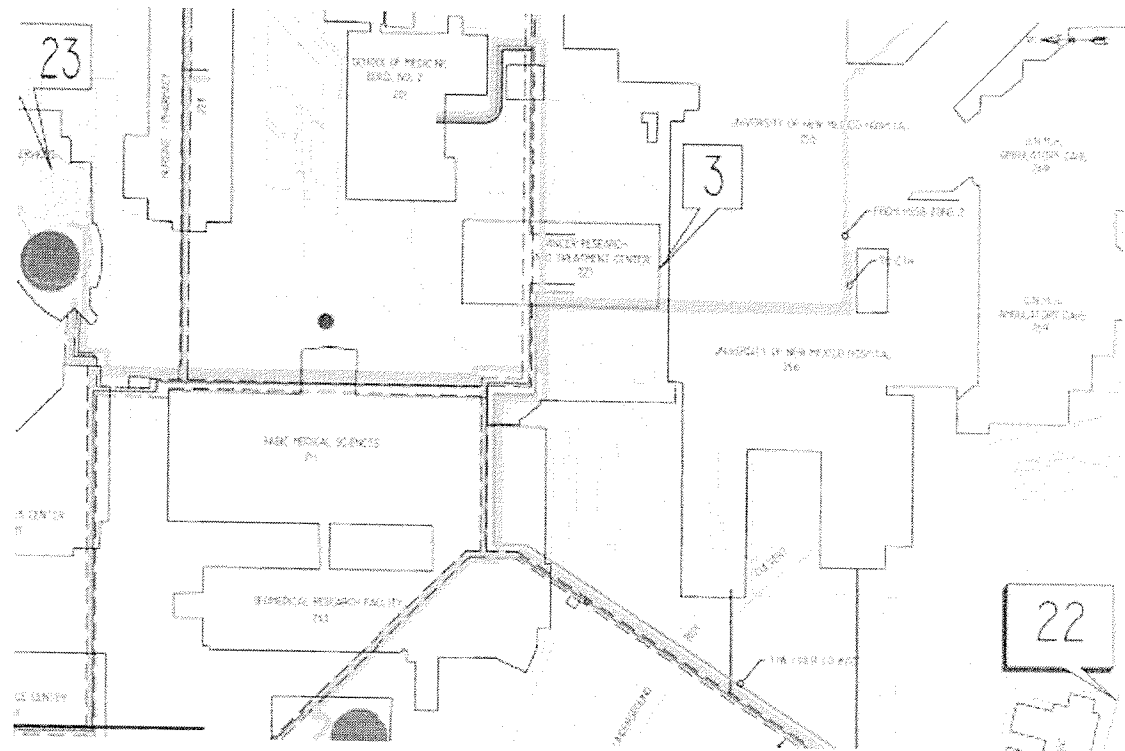


Figure 3: Completion of central campus backbone loop.

4.5.4 Critical Project Number 4

Abbreviated Project Description: Develop a distributed telephone system for the UNM Campus

Campus Area Affected: All Campus

Estimated Cost: \$ 10,000,000

Estimated Time to Complete: 720 days

Description: This is a critical project for the survivability and expansion of the voice telephony system on Campus. At present, the majority of Campus telephone service is provided by the main Private Branch Exchange (PBX, "switch") located within the Telecommunications Building adjacent to the UNM Hospital. Campus telephone services are dependent on the multipair copper cable that emanates from this building to provide connectivity to each building and to the outside world.

There are a limited number distributed telephone system nodes operating on Campus which provide service to limited areas, including the PBX in the UNM Hospital Cancer Center, a node located in Popejoy Hall, and one in the Stadium on South Campus. These are subordinate systems and depend upon the main switch in the Telecommunications Building for connection to the outside world, meaning that should the main PBX be out of service, these nodes will not be able to operate in a standalone mode for other than intracampus calls.

This project will create a number of new voice nodes (expected to be between 7 and 10) to be co-located with new or existing core data network electronics to create a more diversified distribution scheme. This project will also position UNM for migration toward a converged voice and data network, consistent with the trend in information technology. This is a follow-on project to Project Number 2, Modifications and upgrade of the Campus underground and backbone cable infrastructure, which must be substantially accomplished beforehand.

4.5.5 Critical Project Number 5

Abbreviated Project Description: Select the location for, design and build a new Technology Building, incorporating a new facility for KNME.

Campus Area Affected: All Campus

Estimated Cost: \$ 13,500,000

Estimated Time to Complete: 930 days

Description: This project creates a new Technology Building to act in concert with the existing UNM CIRT facility. The Technology Building would be configured to provide a substantial Equipment Room (Data Center) where core telephone and data network equipment would be housed³. The new Technology Building would incorporate a network operations center, administrative and technician offices as well as potentially provide classroom and computer lab space for technology education.

The construction of the new Children's Hospital and Critical Care Pavilion addition to the UNM Hospital provides much of the drive for the immediacy of this project. The present Telecommunications Building is within the footprint of the new Pavilion, and the plan is for the Pavilion to be built over and around the Telecommunications Building as the Pavilion is constructed. The Telecommunications Building not only houses the main telephone switch for the UNM Campus, but perhaps more important, it is the terminus for the overwhelming percentage of copper backbone cable which serves the University, as these cable connections distribute dial tone to most Campus buildings.

³ These components will be purchased with other project funding. The Technology Building Project Cost does not include the cost of voice and network electronics.

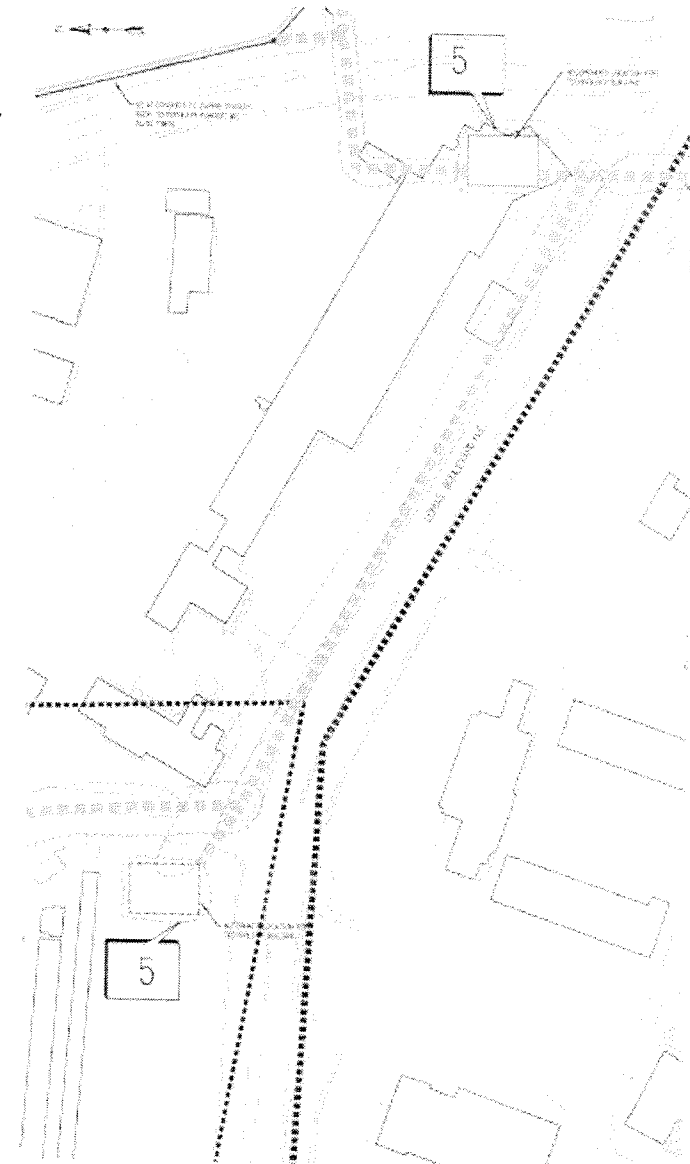


Figure 4: Proposed location of new Technology Building.

It is absolutely critical that the operation of the existing Telecommunications Building be uninterrupted during this complex process. Since the sensitive electronic components within the building will be susceptible to damage during construction, it further points toward the Telecommunications Building's position as a potential single point of failure, a vulnerability that the ITIP strives to mitigate through a distributed network architecture.

In addition to the new Technology Building, a new television production facility is necessary to house the overcrowded KNME television studio structure. KNME could be collocated within the Technology Building, or be built adjoining this site⁴. This project consists of the design and construction of this combined facility.

The proposed location for the new Technology Building is in the vicinity of the Lomas Boulevard and University Boulevard intersection, shown in Figure 4. The work associated with this project also includes the construction of ductbanks to connect the new Technology Building with the main arteries of the campus infrastructure as shown in Figure 5.

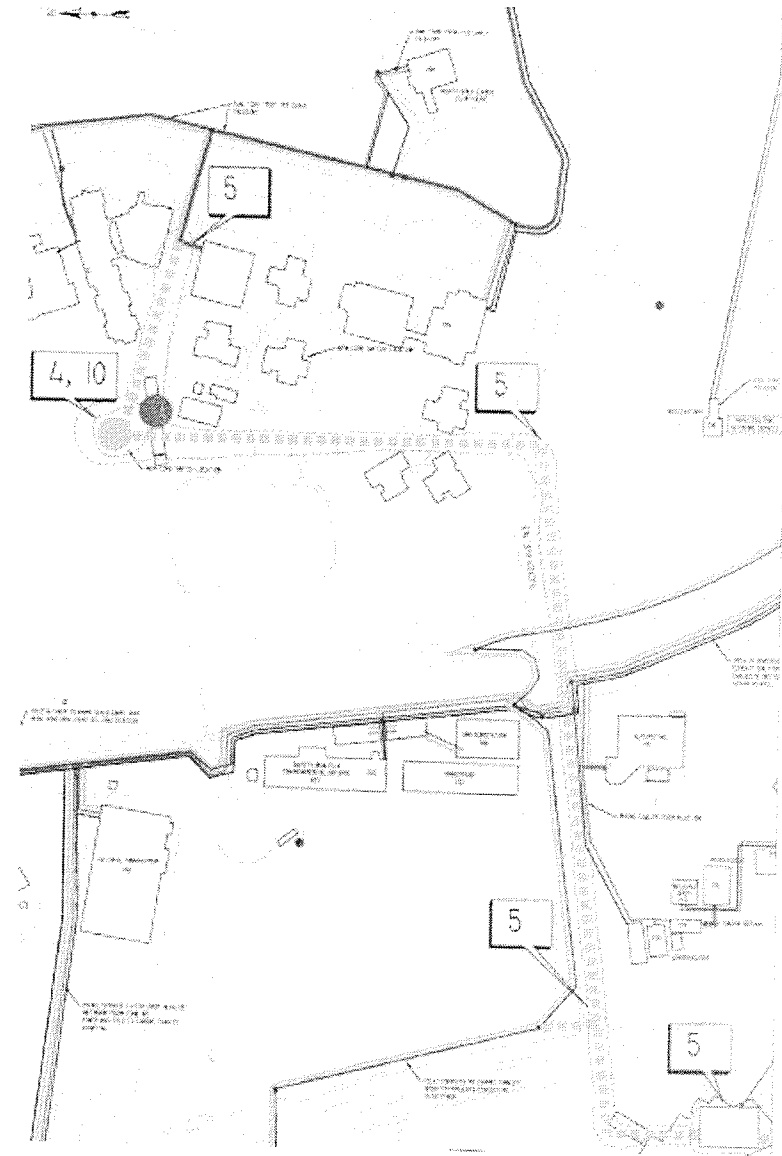


Figure 5: Campus ductbank connections to new Technology Building.

⁴The expenditures for new television production equipment, lighting, cameras, etc, likely to be necessary for the operation of KNME are outside the scope of this project, only the base building cost would be provided by the construction of the new Technology Building.

Abbreviated Project Description: Upgrade the CIRT Building to accommodate a telephone node and improve office facilities.

Estimated Cost: \$2,500,000

Description: The existing CIRT facility is well suited to house electronic equipment, yet it falls short when accommodating the needs of administrative and support personnel. The building is still serviceable as a central data center, and it will be able to support the addition of telephone node equipment consistent with the direction toward a distributed technology architecture. This project consists of the design and construction of modifications and expansion of the CIRT Building for the migration of management and technical staff from the data center environment into more suitable office spaces. The area affected is shown in Figure 6.

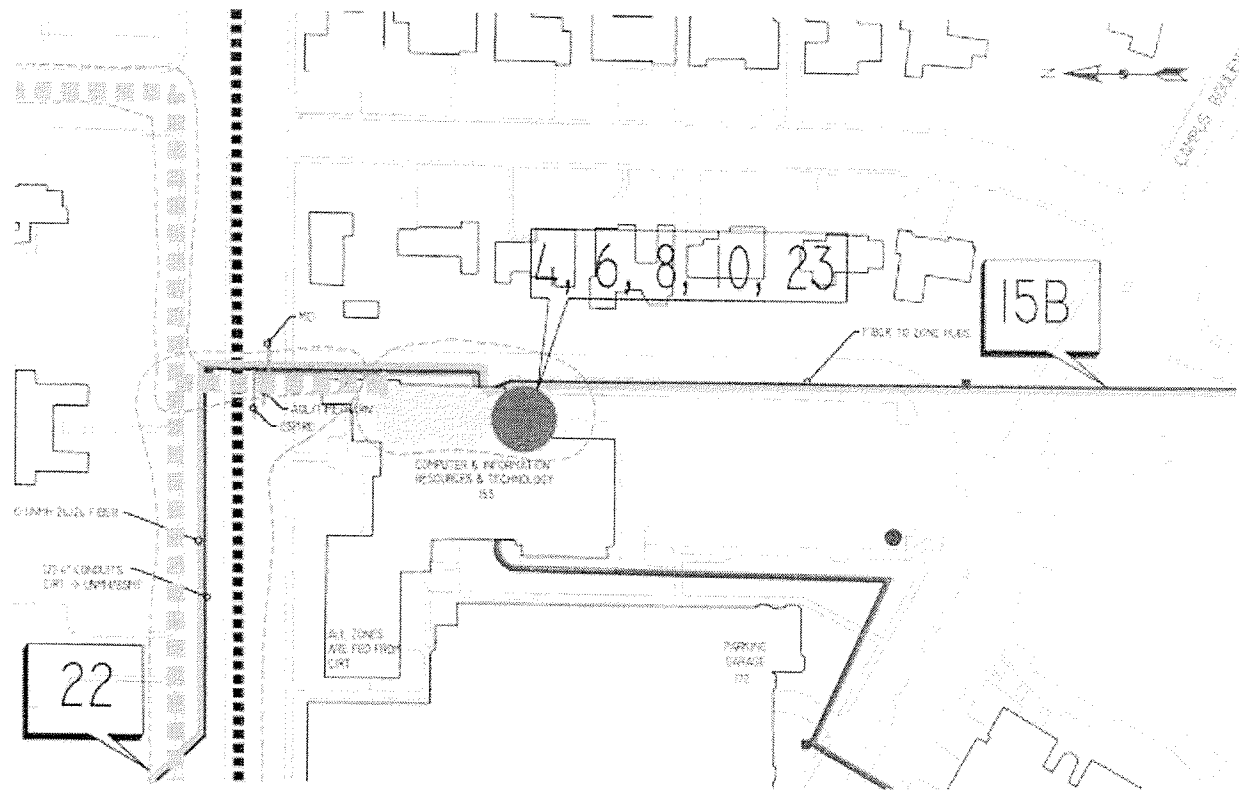


Figure 6: Upgrade of CIRT Building.

4.5.7 Critical Project Number 7

Abbreviated Project Description: Rerouting of cable pathway around The Pit.

Campus Area Affected: South Campus

Estimated Cost: \$160,000

Estimated Time to Complete: 90 days

Description: In the very near future, the UNM Arena, known as The Pit, will be undergoing remodeling and other modifications. The backbone cable that serves the South Campus presently runs through conduits installed across the ceiling of the Arena. These conduits will be removed as part of the remodeling construction with the great potential for severing the backbone cable in the process. Cutting this cable will disrupt voice and data connectivity to many of the buildings on South Campus with no estimate for the time required to reinstate service. See Figure 7 for the area affected.

This project involves a relatively minor amount of underground ductbank construction to reroute the pathway around The Pit. The urgency surrounding this issue, however, elevates the project to Critical Priority. It should be noted that routing this new pathway around buildings instead of through them is consistent with the ITIP Design Guidelines for Infrastructure Facilities, a recommendation intended to prevent situations such as this from occurring in future construction projects.

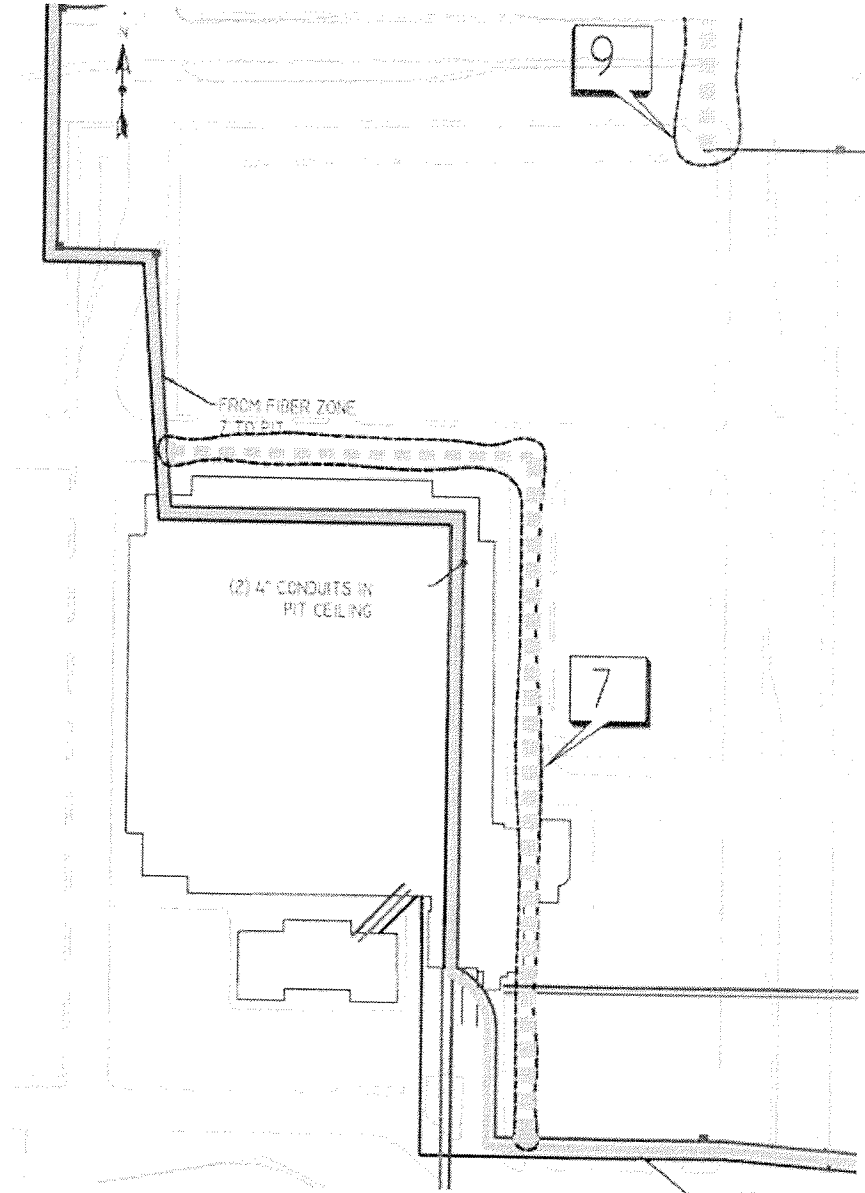


Figure 7: Rerouting of cabling around The Pit.

4.5.8 Critical Project Number 8

Abbreviated Project Description: Upgrade of Environmental Support in Core Switch Rooms across Campus

Campus Area Affected: All Campus

Estimated Cost: \$325,000

Estimated Time to Complete: 210 days

Description: The Core Switch Rooms are the spaces on Campus where core network switches are located. There are seven such locations on campus at present, and these equipment rooms will increase in their strategic importance as voice nodes and other technology equipment is collocated with the core switches and new backbone cable is placed. Additional or enhanced power, air conditioning, grounding, fire suppression, lighting and perimeter security equipment is necessary in most existing Core Switch Room locations to ensure that they will provide stable and robust facilities for key technology equipment.

This project will also provide for the construction of up to three new Core Switch Rooms. The additional Core Switch Rooms are needed to ensure balanced distribution of service across the Campus, and to provide new hub locations for areas of continued Campus expansion and development.

The Core Switch Rooms are also the hubs for subsidiary backbone cable and provide UNM network connectivity to the surrounding buildings. Critical Project Number 2 will also reroute much of the Campus cable plant to terminate within the Core Switch Rooms that will require space modifications in some rooms to facilitate the termination of added backbone cable.

This project includes the survey, engineering, design and construction associated with the upgrade of these important spaces. Upgrading these rooms will also bring them in line with the Equipment Room Standards included within the new ITIP Design Guidelines for Infrastructure Technology Facilities.

Work on this project may be commenced concurrently with the projects already described, however, completion of this project prior to the installation of new cable infrastructure and electronics will provide only marginal benefits until the other interdependent projects such as are completed as well.

4.5.9 Critical Project Number 9

Abbreviated Project Description: Extension of South Campus conduits from the intersection of Yale and Redondo to the utility tunnel, and from the intersection of Cesar Chavez Boulevard and University Boulevard.

Campus Area Affected: All Campus

Estimated Cost: \$62,500

Estimated Time to Complete:
60 days

Description: According to UNM cable records, there is an incomplete communications ductbank that runs along Redondo Avenue between the intersection of Yale and Redondo to the intersection of Cesar Chavez Boulevard and University Boulevard. This pathway was constructed in conjunction with trenching done by a local utility company several years ago. Apparently there were insufficient funds in the original project to complete the connections to other ductbanks, or the tunnel at each end during the time of construction. This work will construct ductbanks necessary to connect the short segments at each end of this run to complete a pathway between Main and South Campus.

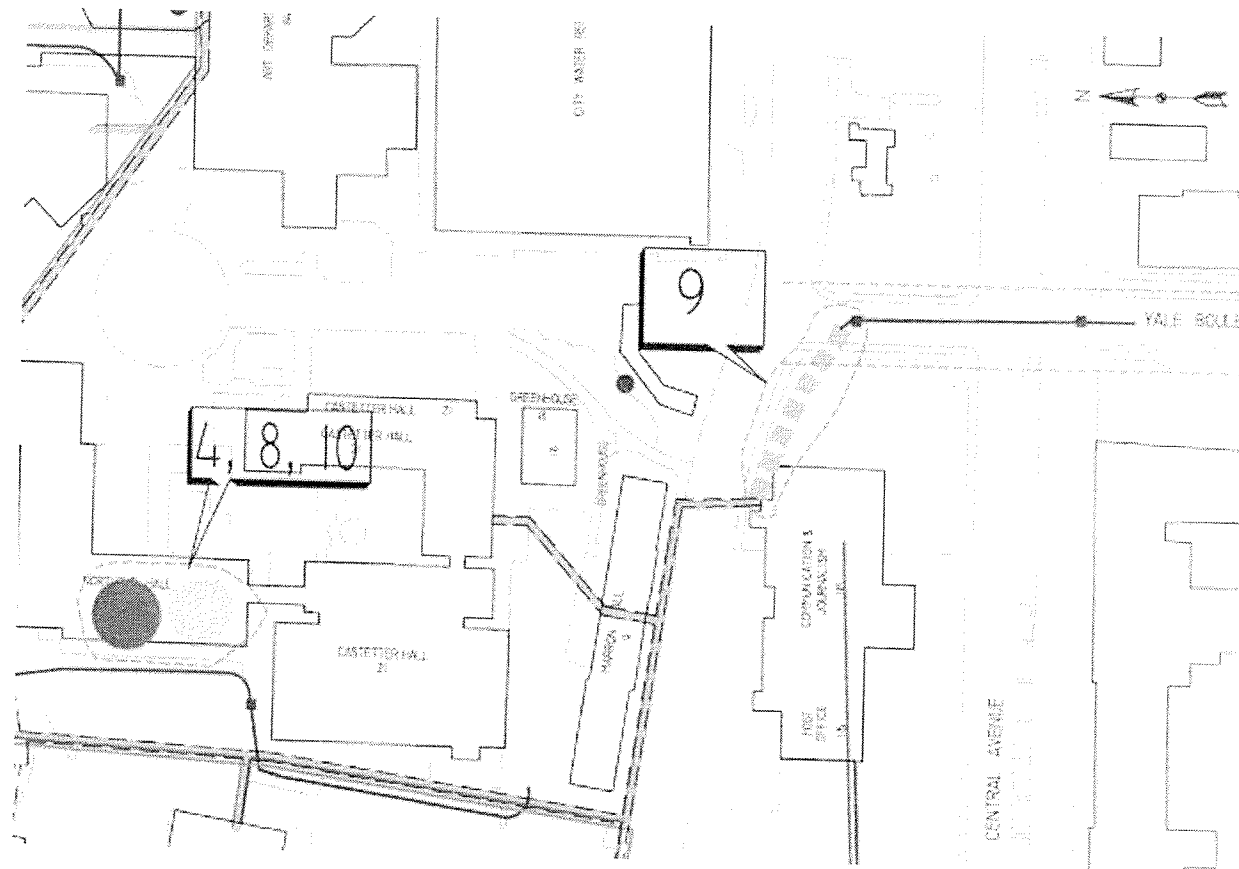


Figure 8: Extension of South Campus conduits at Yale and Redondo.

The primary benefit of this project is to facilitate the placement of a secondary backbone connection between Main and South Campus via an underground route. The present connection is provided by aerial cable mounted on utility poles along a busy thoroughfare, which is vulnerable to damage from vehicles and acts of violence against the University. Both locations for this proposed construction activity are shown in Figures 8 and 9.

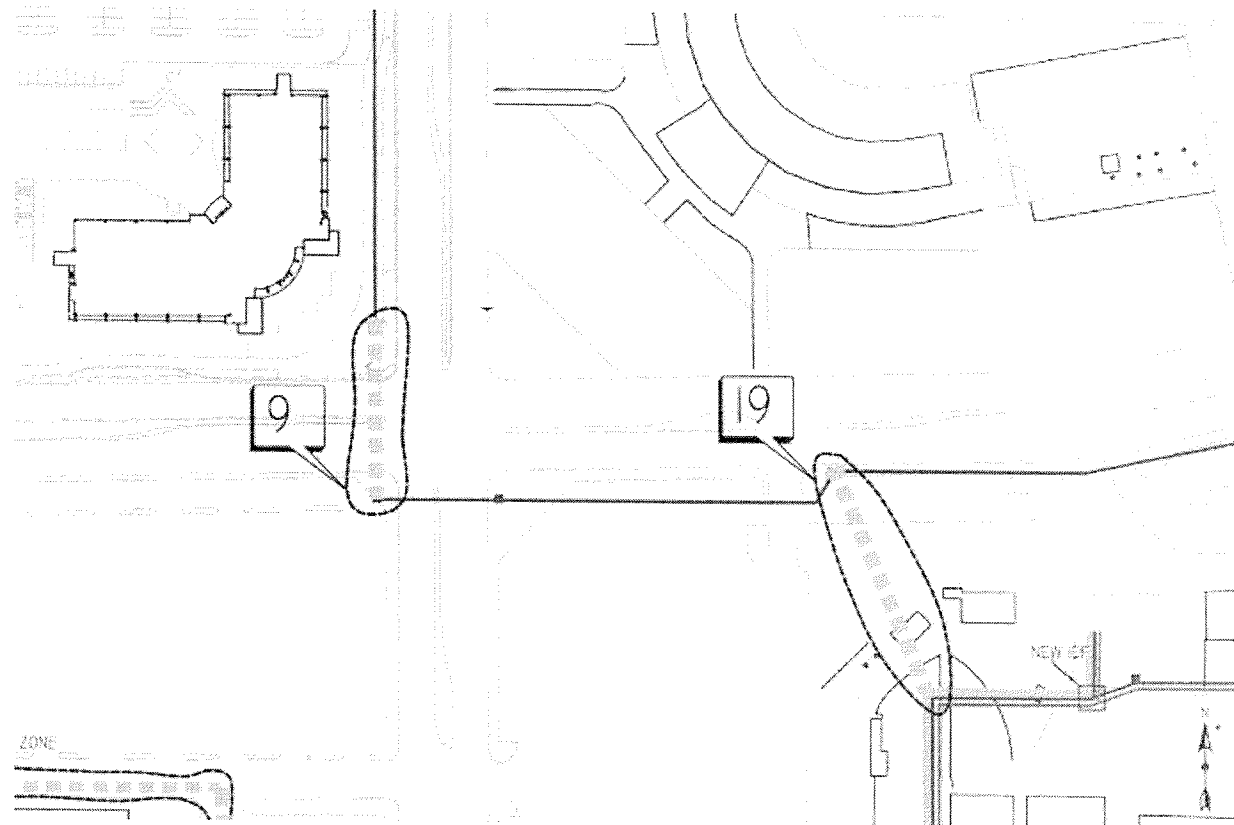


Figure 9: Extension of South Campus conduits at Cesar Chavez and University.

4.5.10 Critical Project Number 10

Abbreviated Project Description: Upgrade of the Campus Backbone Network.

Campus Area Affected: All Campus

Estimated Cost: \$1,875,000

Estimated Time to Complete: 480 days

Description: The Core Switches now in use on the UNM Campus are well into their service life, and they will need to be upgraded or replaced within the next few years. The present Core Switch locations are:

- CIRT (Computer & Information Resources & Technology) Building
- Health Sciences Service Building (HSSB)
- Electrical Engineering/Computer Engineering Building (EECE)
- Dikewood Hall
- Northrup Hall
- Student Services Center Building (SSB)
- Scholes Hall
- Physical Plant Service Building (PPD)

The ITIP also proposes that more Core Switch locations be implemented, increasing the number of the Core Switch Rooms from 8 to 10.

These enhancements are necessary in order not only to support the steady increase in network traffic that is predicted to impact the system due to changes in technology, but the trends for continuing UNM Campus growth. At the present time, the Core Switches provide the Campus with a 1 Gigabit (1 billion bits per second) Ethernet backbone, and this bandwidth is barely able to handle the current data and Internet traffic.

10 Gigabit Ethernet (10 Billion bits per second) switches are now readily available and this technology will significantly enhance the capacity of the backbone if implemented. The direction of technology points toward convergence where packetized voice and video signals will also rely upon the network backbone as the medium for transmission. These technologies require more sophisticated switching hardware, as voice and video traffic requires priority in the backbone data stream to ensure conversations and video images are intelligible and error-free.

The network will become more fault tolerant and self-healing, meaning that it will be able to automatically sense breaks in the physical cable pathway, or failures of a peer switch in the network, and reroute traffic through redundant paths planned for such events. All of these reconfigurations will be invisible to the user, and service levels will be maintained at very high levels in the event of a malfunction somewhere in the network. It is very probable that upgraded or even newly acquired network hardware will be required to support these functions.

The sequence of this project places it behind the completion of cable and Core Switch Room enhancements, in order to provide proper physical connectivity in the new distributed network topology and to ensure that these costly assets are housed in suitable environments provisioned to maintain their recommended operating parameters.

4.6 High Priority Infrastructure Projects

High Priority Projects are considered very important to the overall achievement of ITIP goals. In most cases these projects are subordinate to the projects assigned Critical Priority simply because execution of these High Priority Projects may not be practical or even possible unless other infrastructure project work is completed beforehand. Please refer to the ITIP Project Timeline, (Exhibit 3) for the proposed sequencing of High Priority Infrastructure Projects in relation to the other work associated with the ITIP.

4.6.1 High Priority Project Number 11

Abbreviated Project Description: Establishment of additional Internet connections from North Campus/Hospital Complex and/or South Campus.

Campus Area Affected: All Campus

Estimated Cost: \$220,000

Estimated Time to Complete: 90 days

Description: From the information gathering completed in the early stages of the ITIP, user groups consistently mentioned slow Internet access as a network service complaint. According to traffic analysis reported by CIRT, Internet access appears to peak in the late afternoon when response time slows to a crawl. This is caused by more users on line at one time than the bandwidth of the Internet circuit (also referred to as a "pipe") can effectively support. At present, the Campus Internet connection is routed through the CIRT building to the Internet Service Provider (ISP) serving the University. Internet access from all points on Campus is provided over the Campus backbone to CIRT and then onto the Web.

While there are possible network architecture factors that contribute to bottlenecks and slow response time, the single Internet connection poses the most obvious chokepoint. Implementation of controls and filtering of Websites that offer music and media downloads which consume large amounts of bandwidth have been successful in relieving some of the congestion, but growth in Internet usage is projected to continue. The Internet continues to offer “legitimate” data in the form of media clips and other high-bandwidth filetypes that congest the pipe when downloaded. UNM students, faculty and staff are expected to rely heavily upon the Internet for academic as well as recreational uses, and Internet congestion for UNM Campus users will remain a problem.

A viable solution to this problem will be the creation of two additional Internet portals on Campus. An additional Internet router and additional circuit connections emanating from South Campus will relieve the pressure on the backbone connection between Central and South Campus. Growth and expansion of the Campus north of Lomas Boulevard will continue into the next decade and include significant additions to the Health Sciences Campus. A second Internet router and circuit connection dedicated to the Northern Campus areas will also remove a considerable amount of Internet traffic from the backbone between North Campus and the CIRT Internet connection.

This project will require the purchase of at least two high-end routers. Other significant tasks will be reconfiguring the network and negotiations with the ISP to allow more than one ISP connection on Campus. Finally, it should be noted that leased Internet circuits are an integral part of this implementation and that there will be an impact to operational budgets for the circuit subscriptions themselves.

4.6.2 High Priority Project Number 12

Abbreviated Project Description: Upgrade of building Service Entrance facilities across the UNM Campus as applicable

Campus Area Affected: All Campus

Estimated Cost: \$ 1,500,000

Estimated Time to Complete: 480 days

Description: As the UNM Campus network becomes more distributed, a greater amount of network electronic equipment will be installed in many of the individual buildings on Campus. The locations chosen are likely to be based on building size and density of occupancy. This will provide higher service levels to user groups, but the network switches and other equipment will require that the environmental support systems within many Service Entrance facilities be upgraded to support active electronics rather than simply passive equipment. This project includes the survey, design and installation of enhancements necessary to improve power, grounding and air conditioning systems in the Service Entrances of selected buildings on Campus.

4.6.3 High Priority Project Number 13

Abbreviated Project Description: Establishment of a Wireless Campus Area Network (WCAN) across the UNM Campus

Campus Area Affected: All Campus

Estimated Cost: \$ 2,000,000

Estimated Time to Complete: 600 days

Description: Information networking technology is moving toward the increased deployment of wireless user devices. Many campuses are implementing wireless Local Area Networks (LANs) within buildings and their immediate surroundings such as courtyards, to allow students and faculty to access campus networks without a cable connection. The project requires the installation of wireless transceivers in carefully selected locations to serve the selected areas. Several transceivers are usually required to provide adequate coverage in most buildings and placement of the wireless transceivers requires a survey to determine signal strength and interference factors. Each of the transceivers themselves must have a hard wire connection (using high performance communication cable) to the host building's LAN for eventual connection to the Network. This project is comprised of two subprojects for the creation of the indoor and outdoor portions of the Wireless Campus Area Network (WCAN).

The first part of the WCAN project would create wireless LANs within selected buildings, providing LAN services to students and faculty without the need for hardwired cable connections. This is particularly useful in large and small lecture halls, libraries, and places such as the student union, where students congregate and traditional network cable connections are either insufficient in number or not conveniently located to serve the demand. Technology trends indicate that an increasing amount of educational applications are being used to augment traditional teaching methods in the classroom. The WCAN would position UNM to integrate these applications into the mainstream of the curriculum.

The second portion of this project will implement wireless LAN equipment in common areas outside of buildings, to allow users to access the Campus network away from the traditional areas such as wired carrels in libraries or computer labs.

As the wireless network will be available around the clock, this service offers the student or faculty member greater flexibility and access to the network when other facilities are closed or otherwise unavailable. Groups of students will also be able to work collaboratively in an outside setting and have network access to retrieve information as needed. This type of work has been traditionally conducted in meeting rooms or as discussions without the benefit of access to information resources.

4.6.4 High Priority Project Number 14

Abbreviated Project Description: Complete a secondary backbone pathway for Dikewood Hall

Campus Area Affected: South Campus

Estimated Cost: \$ 45,000

Estimated Time to Complete: 60 days

Description: Dikewood Hall functions as a core data switch location for South Campus. At present, there is only one pathway into the building that provides backbone connectivity to Dikewood Hall from Central Campus. This pathway also serves to distribute backbone connectivity from Dikewood Hall to South Campus. Should this pathway and the cable it contains be damaged, there could be a considerable disruption of service to South Campus. This project would create a secondary pathway into Dikewood, and provide a cable connection to be used in a failover situation should it be necessary. Figure 10 depicts the proposed route for this new pathway.

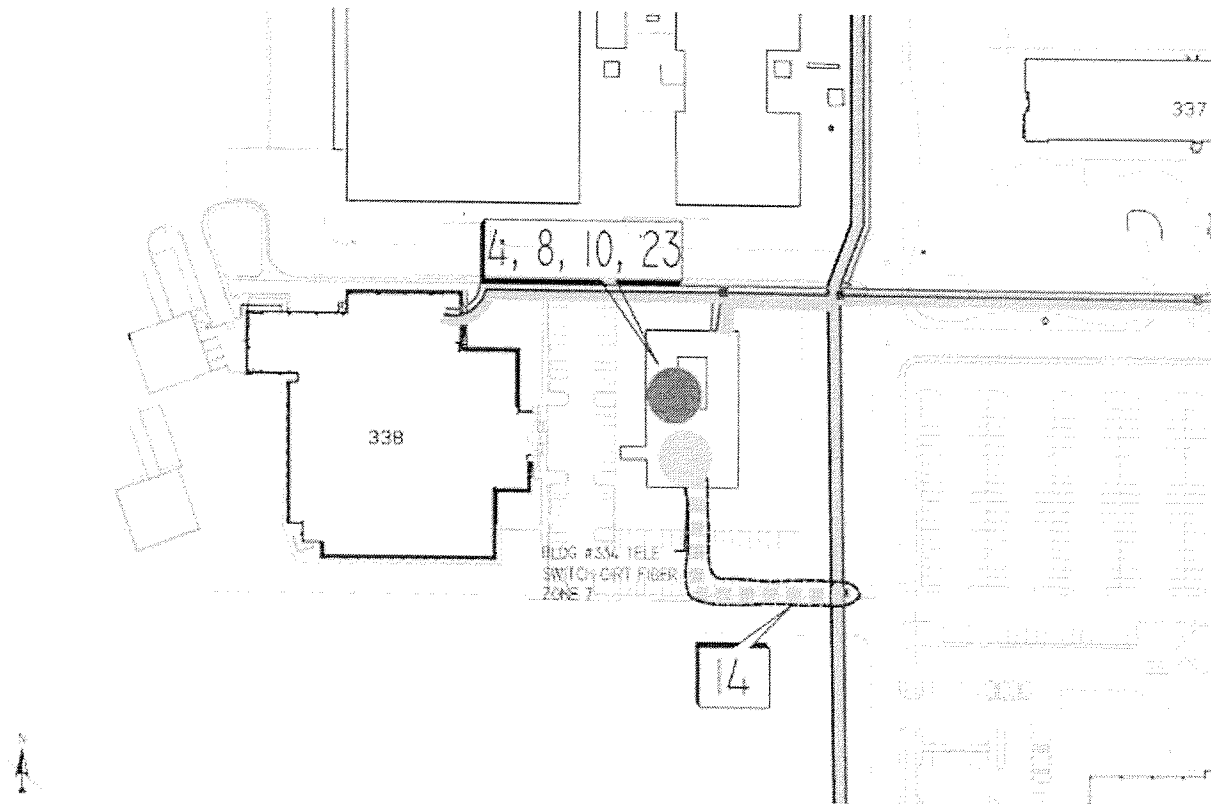


Figure 10: Secondary backbone connection for Dikewood Hall.

4.6.5 High Priority Project Number 15

Abbreviated Project Description: Extend and reinforce the underground pathway and backbone along Northern University Boulevard to support 1650 University, the Elks Club Building and the Ambulatory Surgery and Imaging Center (ASIC).

Campus Area Affected: North Campus

Estimated Cost: \$ 475,000

Estimated Time to Complete: 150 days

Description: The UNM Campus Master Plan indicates that growth of the Campus will continue in the area North of Lomas Boulevard and along North University Boulevard. 1650 University Boulevard is under lease to the University housing portions of the Health Sciences Department. This building marks the Northern extent of the Campus. Data network and voice communications connectivity to 1650 University is provided by optical fiber and multipair cable that extends from the UNM Hospital. The cable system that supports 1650 University is not well suited to provide additional connectivity to other buildings that are planned for addition to the Campus.

The University has made several property acquisitions along University Boulevard that may be developed over the next decade. These include the former Elks Club facility, and the new Ambulatory Surgery and Imaging Center (ASIC) building pending construction. ASIC is located in an

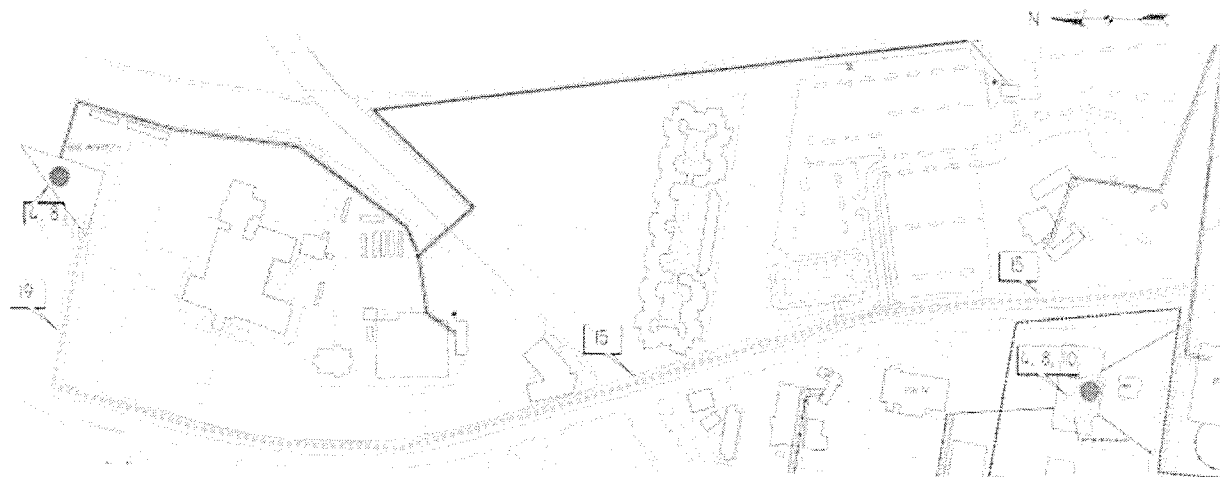


Figure 11: Extension of North Campus infrastructure along University.

undeveloped area along University Boulevard that has been dubbed “Lands West” by University Officials and promises to be an area that will contain several new University construction projects in the future.

This project will construct a new ductbank and cable backbone along University Boulevard terminating at 1650 University. This ductbank and cable system will be provisioned to support the extensive growth that is envisioned for this area of the Campus. Transition spaces such as manholes and handholes will be placed at strategic points along the route. These will be positioned to ensure that there are locations to splice in tributary cables that will be necessary to tie the new facilities into the Campus backbone. Reference Figure 11 for the proposed addition to the underground infrastructure system.

4.7 Normal Priority Infrastructure Projects

Normal Priority Infrastructure Projects include a number of projects of considerable cost and duration. These should not be minimized as being unimportant or low priority to the success of the ITIP. A number of these will be less urgent as other higher priority projects since many of the Normal Priority Projects complete or reinforce the functionality provided by higher priority Projects accomplished beforehand.

4.7.1 Normal Priority Project Number 16

Abbreviated Project Description: Integrate low voltage systems onto the Campus IP (Internet Protocol) backbone.

Campus Area Affected: All Campus

Estimated Cost: \$625,000

Estimated Time to Complete: 555 days

Description: There are a number of proprietary low-voltage signaling systems in use on the UNM campus providing monitoring and alarm functions for environmental and power systems. IN addition, newer buildings have automated building control systems that allow management of heating and air conditioning, lighting and building security functions. Although several UNM buildings have stand- alone Building Management Control Systems (BMCS) remote monitoring systems are not widely in place. Those BMC Systems that are in use on Campus typically require proprietary cable systems and signal schemes for their operation and do not allow different systems to integrate seamlessly.

Building automation manufacturers are increasingly producing controls and monitoring systems that are Ethernet and IP based, allowing them to be transmitted over common data backbones with other data traffic. This project would provide the cable and network interface for BMC Systems in each building, and integrate IP signals to a control center in a designated area on Campus. It does not convert the various control and sensor devices in each building to be IP compatible. This process could be part of an evolutionary

process where new buildings that are constructed on the Campus be specified to include IP-based BMC Systems and become a Campus standard.

Campus security is a potential beneficiary of an integrated low-voltage system, where security monitoring devices and sensors could be aggregated from across the Campus into a single monitoring station.

Fire alarms have special codes and requirements which preclude them from sharing the same signal media, however, the pathways and spaces made available through other ITIP Projects will allow them to share these facilities as may be appropriate.

4.7.2 Normal Priority Project Number 17

Abbreviated Project Description: Build out Infrastructure in Lands West area.

Campus Area Affected: North Campus

Estimated Cost: \$ 475,000

Estimated Time to Complete: 150 days

Description: There is an undeveloped area along University Boulevard, West of Carrie Tingley Children's Hospital that is slated for near term development according to the Campus Master Plan. This area is now known as "Lands West" among University planners. Lands West may eventually house ten or more new construction projects.

Current UNM construction budget policy includes the funding for the basic buildings themselves, but it does not allow for the complete connection of underground infrastructure from existing service junctions to the facility entrances of the new buildings. This project would fill that gap, creating a system of underground pathways and spaces needed to support the entire range of future construction programmed for the Lands West area. These ductbanks and transition structures would be located among and between building sites on Lands West and tie them into the ductbank proposed to run North and South on University Boulevard. (See High Priority Project Number 14) This infrastructure would ensure that Lands West would be cabled to integrate with the distributed architecture proposed as a product of the ITIP. Refer to Figure 12 for the area represented for this work.

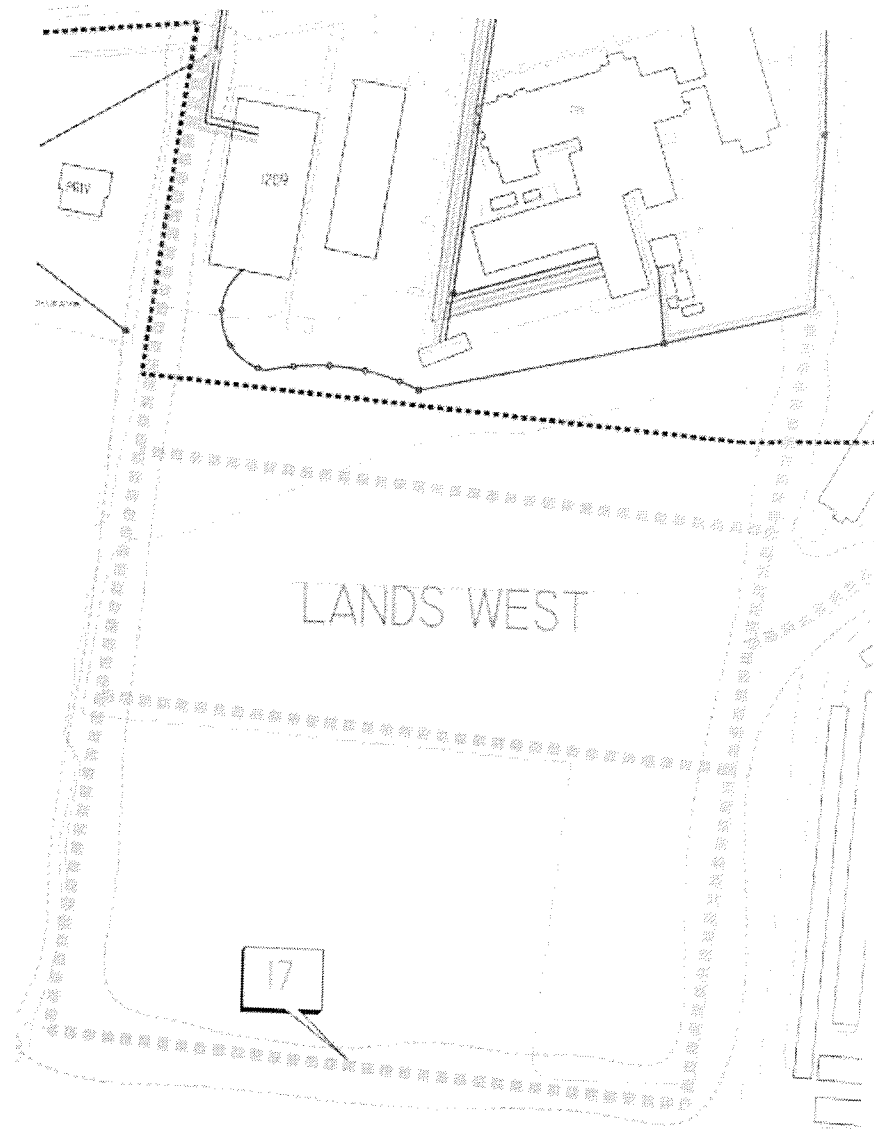


Figure 12: Infrastructure Development at Lands West.

4.7.3 Normal Priority Project Number 18

Abbreviated Project Description: Close the East end of the North Campus Loop along Lomas Boulevard.

Campus Area Affected: North Campus

Estimated Cost: \$ 410,000

Estimated Time to Complete: 150 days

Description: In the area on the Northeast end of campus along Vassar Drive north of Lomas Boulevard there are a group of Mental Health buildings that are associated with the UNM Hospital Complex. As part of the Campus Master Plan, it is envisioned that future expansion plans will further the development of this area, bounded on the north by Marble Avenue and on the east by Vassar Drive. This project would create an underground ductbank system along these streets. The ducts and manholes would run roughly from the CIRT building north to the corner of Vassar Drive and Marble Avenue, and then turn west along Marble Avenue. The east end of the new ducts would connect to the existing ductbank in the vicinity of the School of Medicine. Completion of this underground infrastructure would create another loop in the Campus backbone system and provide connectivity for existing and future buildings constructed in this area. See Figure 13 for the area affected by this project.

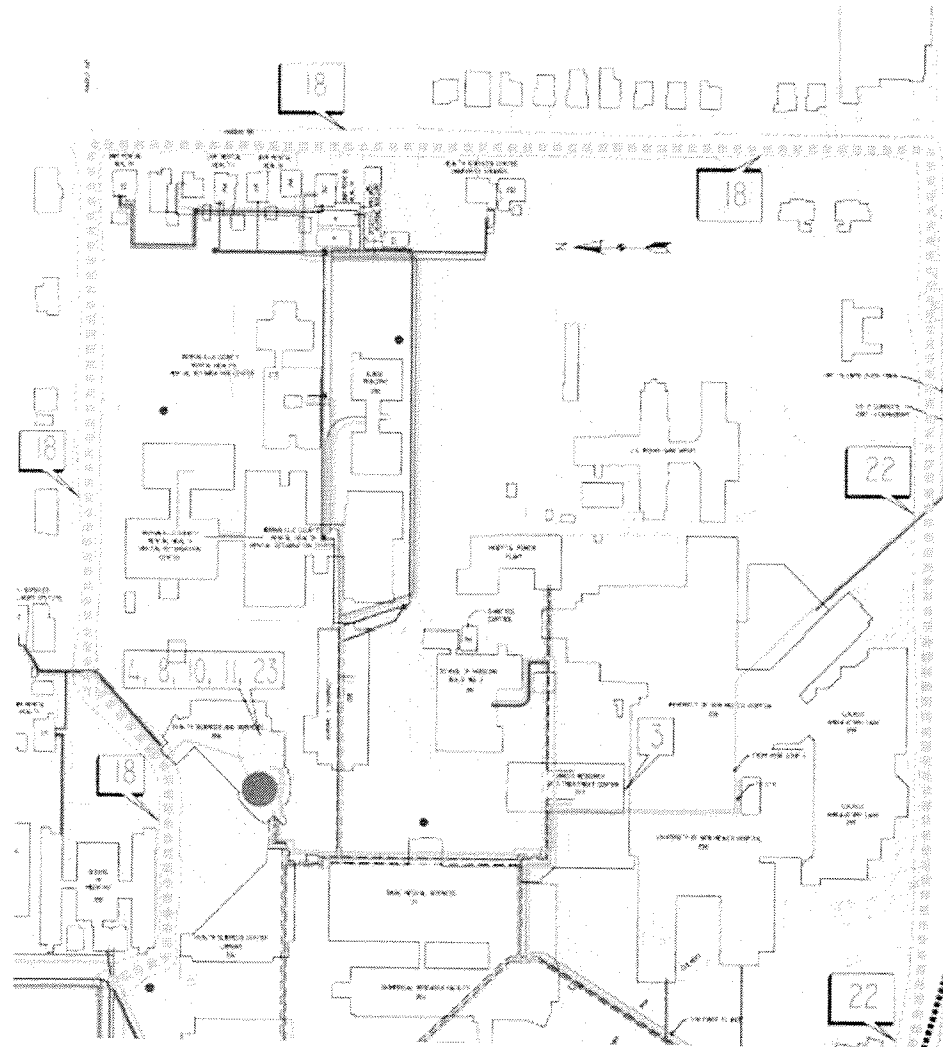


Figure 13: Closing of east end of North Campus Loop.

4.7.4 Normal Priority Project Number 19

Abbreviated Project Description: Close the backbone loop near the Stadium.

Campus Area Affected: South Campus

Estimated Cost: \$50,000

Estimated Time to Complete: 60 days

Description: The low density of buildings on South Campus may have predisposed this area to be cabled with a star configuration. This is typical in low-density geographies where cable is added as needed without a long-range plan. Newer buildings are connected to the nearest existing building that can offer connections to the network and voice systems, daisy-chain style.

South Campus promises to be an area for continued development of UNM facilities, where the buildings will require a full range of network services. Construction that facilitates the completion of a backbone loop in the South Campus area will provide a strategic growth plan for the Information Technology Infrastructure. It will have the added benefit of creating a redundant pathway for network connectivity as more demands are made on the South Campus backbone. Figures 14 and 15 show the proposed pathways for this backbone loop extension.

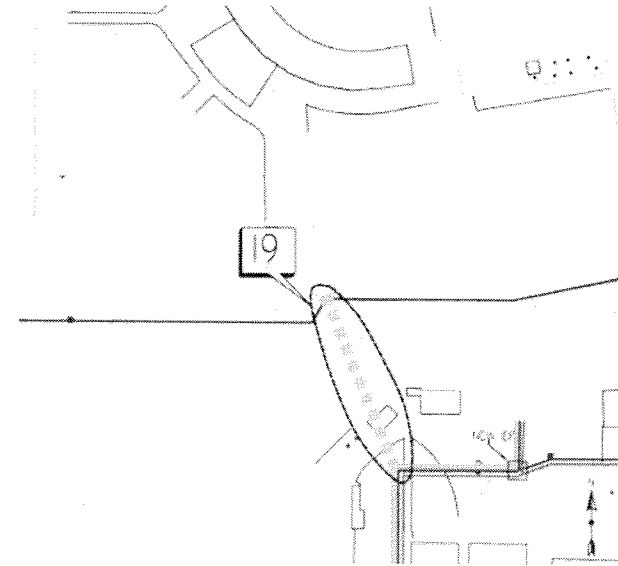


Figure 14: Closing of Stadium backbone Loop, Part 1.

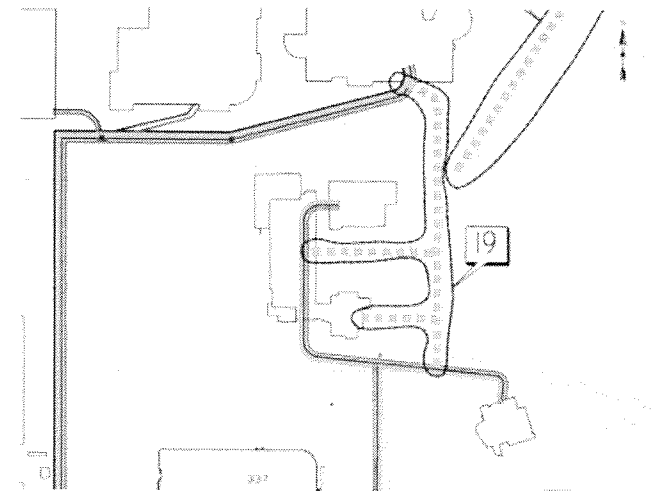


Figure 15: Closing of Stadium backbone Loop, Part 2.

4.7.5 Normal Priority Project Number 20

Abbreviated Project Description: Convert the aerial link to South Campus to underground infrastructure.

Campus Area Affected: South Campus

Estimated Cost: \$ \$562,500

Estimated Time to Complete: 180 days

Description: Currently, the single optical fiber connection to all of South Campus is provided by an aerial cable line that follows Stanford Drive South to Kathryn Avenue. This cable route follows Kathryn Avenue to Buena Vista and transitions underground before proceeding to other points on South Campus. This single cable connection is vulnerable to damage from vehicular traffic impacts to poles, as well as to acts of violence that may be perpetrated against the University. This project's urgency is mitigated as long as Critical Project Number 9 is completed.

Critical Project Number 9 completes an underground pathway that conceivably could become the primary link between North and South Campus. This project can also be considered as an alternative to Normal Priority Project Number 20, which should be considered concurrently when determining a course of action. Conversion of the aerial segment would create a second underground pathway for redundancy, and it could be used to create a backbone loop serving South Campus. See Figures 16 and 17 for the route of this pathway.

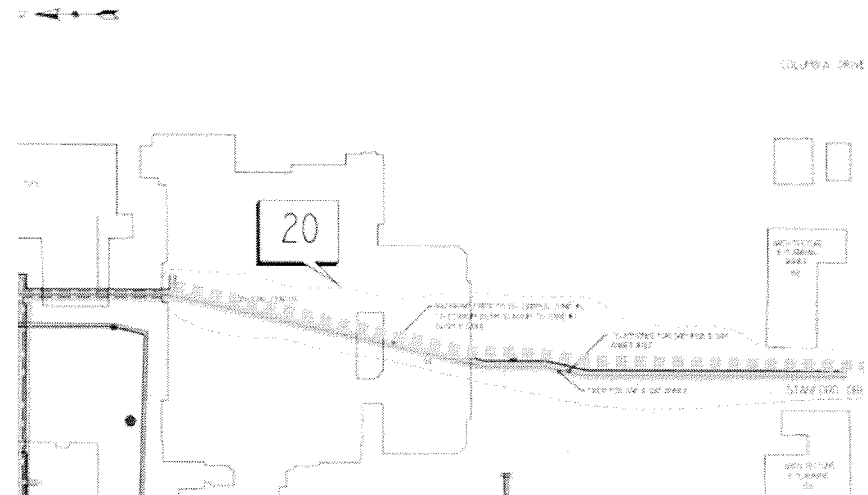


Figure 16: Conversion of South Campus aerial connection to underground (Main Campus end).

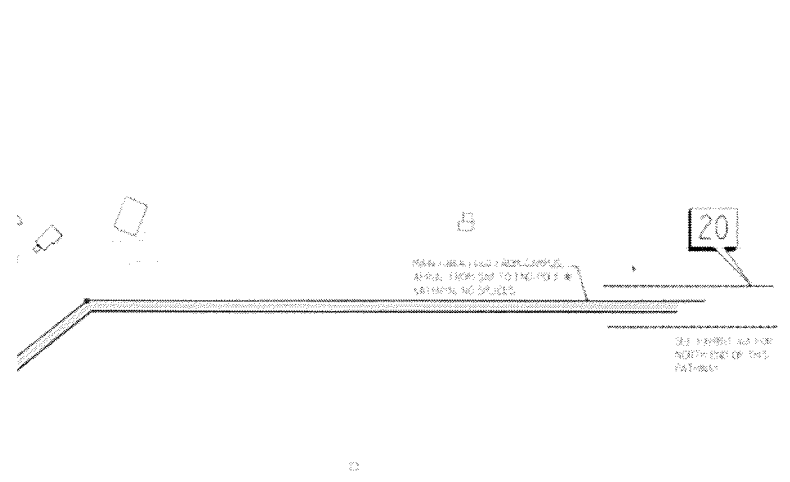


Figure 17: Conversion of South Campus aerial connection to underground (South Campus end).

4.7.6 Normal Priority Project Number 21

Abbreviated Project Description: Implement secondary backbone link to Main Campus via University Boulevard.

Campus Area Affected: Central and South Campus

Estimated Cost: \$ 965,000

Estimated Time to Complete: 250 days

Description: Implementation of a secondary underground backbone link to Central Campus is a prudent plan. This facility could be provided by the completion of Critical Project Number 9, or Normal Priority Project Number 19. This project is virtually identical to Project Number 19, but the route between Central and South Campus follows University Boulevard. This project will have the same benefits as Project Number 19, as it will provide a redundant underground backbone link and allow the creation of a backbone loop. One notable benefit of this route is that it provides access to the structures along University Boulevard between Las Lomas and Lomas Boulevard. Engineering, construction cost, and coordination issues with the City of Albuquerque over Right of Way, may make the University Boulevard route a better choice over following the present aerial route along Stanford Drive as proposed for Project Number 19. Figures 18 and 19 indicate the proposed route for this pathway.

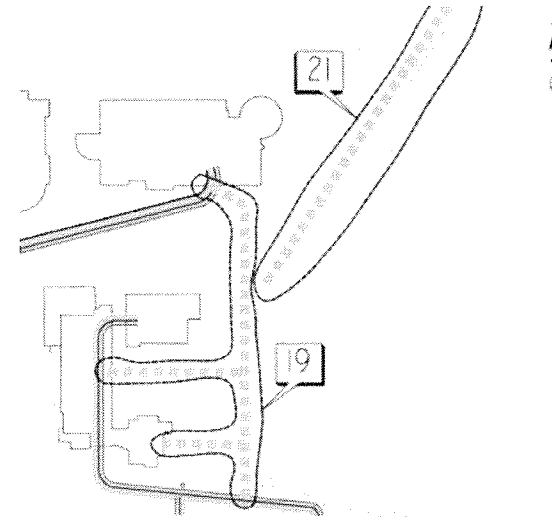


Figure 18: Secondary backbone connection between Main and South Campus.

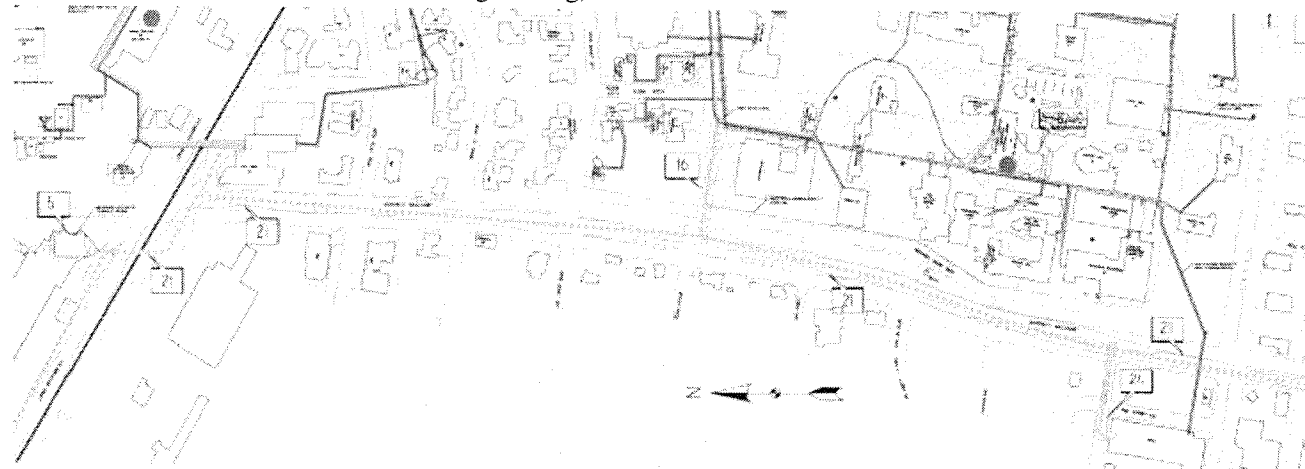


Figure 19: Route for secondary backbone connection between Main and South Campus.

4.7.7 Normal Priority Project Number 22

Abbreviated Project Description: Create pathway from CIRT to the new Children's Hospital and Critical Care Pavilion.

Campus Area Affected: North and Central Campus

Estimated Cost: \$ 250,000

Estimated Time to Complete: 90 days

Description: This project will complete a permanent pathway between CIRT and the new Children's Hospital and Critical Care Pavilion. The present backbone cable serving the majority of North Campus cable passes through the Hospital enroute to its other connection points. This new ductbank would replace the present backbone cable route to follow the perimeter of the UNM Hospital and connect to a manhole just outside of the Children's Hospital and Critical Care Pavilion, and follow the established pathway through existing ducts to North Campus. Routing the backbone around, rather than through buildings is consistent with the ITIP Design Guidelines for Infrastructure Technology Facilities. Figure 20 details the existing and proposed routes for this new pathway.

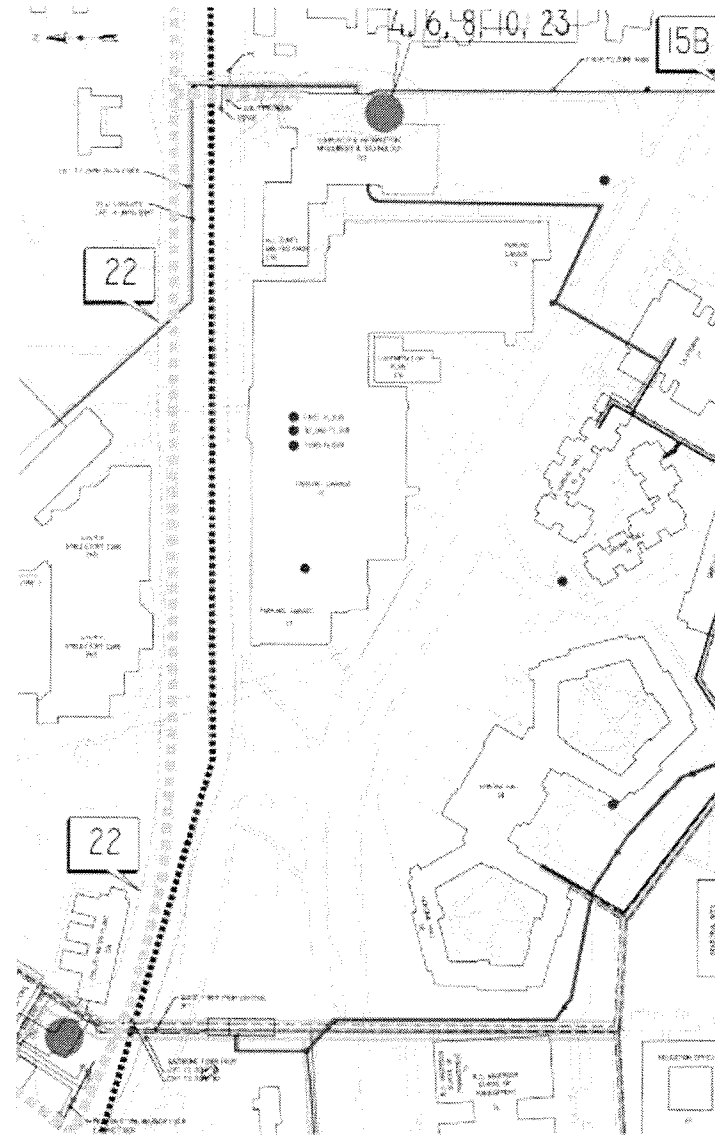


Figure 20: Pathway from CIRT to new CH&CCP.

4.7.8 Normal Priority Project Number 23

Abbreviated Project Description: Create a secondary backbone link from North and South Campus to Main Campus via a Wireless connection.

Campus Area Affected: All Campus

Estimated Cost: \$ 320,000

Estimated Time to Complete: 90 days

Description: The first project is to create a wireless point-to-point backbone network that connects North and South Campus areas to the Central Campus, most likely the CIRT building and the new Technology Building when it is completed. This wireless system would provide a redundant backbone with limited bandwidth between key areas in the event of a major outage caused by damage to the physical pathways⁵. A wireless backbone system would ensure that some level of data connectivity remains effective in the event of such a catastrophic incident that disables multiple segments of the primary optical fiber backbone.

⁵ Optical fiber backbones are now capable of supporting a bandwidth of up to 10 Gigabits (10 Billion bits) per second. Wireless networks are capable of substantially less throughput.

4.7.9 Normal Priority Project Number 24

Abbreviated Project Description: Create a secondary pathway along University Boulevard for High Performance Computing Center.

Campus Area Affected: Central Campus

Estimated Cost: \$ 45,000

Estimated Time to Complete: 30 days

The feasibility of this project is contingent upon the completion of Project Number 20, the construction of a new ductbank connecting North and South Campus along University Boulevard. The segment of ductbank from High Performance Computing Center (HPCC) will connect to this main trunk. HPCC is a facility considered to have strategic importance to the UNM campus, and a secondary connection to this building would provide a redundant pathway. A secondary connection would ensure continuous service in the event of a break in the primary cable connection to HPCC which presently connects to the tunnel system outside of the Farris Engineering Center. Figure 21 indicates the proposed route of this new underground infrastructure.

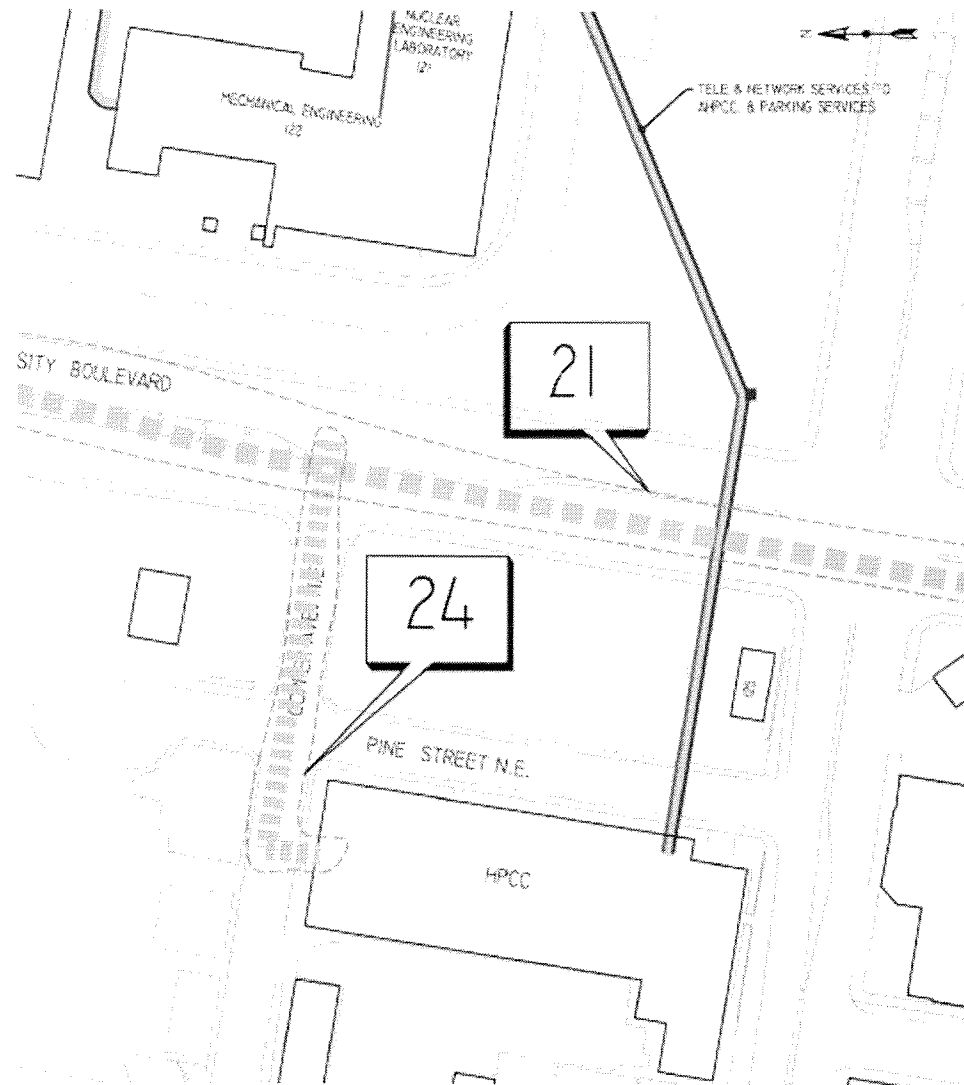


Figure 21: Secondary backbone connection for HPCC.

5. BUILDING AND CAMPUS STANDARDS

The University of New Mexico has identified the need to incorporate a structured approach to the integration of Information Technology Infrastructure facilities within the planning and programming of new construction projects and retrofit of existing facilities on the Campus. The University has embraced the need to actively support the technology environment of today as well as decades into the future. Key to this mandate is the necessity to integrate the budgetary, engineering, and architectural implications of a standards-based Information Technology Infrastructure system of pathways and spaces *within* and *between* the buildings of the Campus.

Interbuilding Communication Infrastructure is designed for a useful life of 20 to 50 years. Intrabuilding pathways and spaces have the approximately the same useful life, and are intended for reuse when cable media is replaced. Cable media and equipment for Inter-and Intrabuilding distribution should be planned for a range of 5 to 15 years, which varies based on developments and changes in technology.

5.1 Purpose and Scope

To provide requirement standards and guidelines to budgetary planners, designers and architects, for inclusion in the construction programming of information technology infrastructure facilities. These guidelines apply to the physical aspects of new construction projects, as well as retrofit and upgrades of existing communication infrastructure facilities on the University of New Mexico (UNM) Campus.

This document provides descriptions and general specifications for the components that encompass the pathways, spaces, and cable media for both Interbuilding and Intrabuilding information technology infrastructure systems. UNM has a published set of specifications for the Campus Data Communication Network that includes information for infrastructure, which these guidelines are intended to complement.

The application of the Guidelines vary from building to building, based on the building's purpose and layout. There are suggested minimums for the infrastructure features described within this document, however, these may be

subject to specific exception and modification according to the complexity and purpose of an individual building. In the case where the requirements set forth within this document expand upon or exceed those provided by UNM in their existing specifications, the more stringent requirement shall prevail.

When applying these Guidelines to retrofit projects in existing building, the designer should consider that some of the requirements, particularly for space, may not be practical or even possible to achieve.

This document includes guidelines for the planning and construction of Information Technology Infrastructure Facilities. Note that they are arranged in order starting with Intrabuilding infrastructure and media components for placement *within* buildings, and moving outward to the Interbuilding physical communication infrastructure. These are features created *between* buildings necessary to coherently connect them together.

Intrabuilding Spaces

- Service Entrances
- Equipment Rooms
- Technology Rooms

Intrabuilding Pathways

- Conduits
- Cable Tray
- Pull Boxes

Intrabuilding Cable Media

- Equipment Racks and Cabinets
- Optical Fiber Backbone Cable
- Multipair Copper Backbone Cable
- Coaxial Cable
- Horizontal Copper UTP Cable

Interbuilding Spaces (Transition Structures)

- Communications Vaults/Maintenance Holes
- Hand Holes

Interbuilding Pathways

- Ductbanks
- Utility Tunnels

Interbuilding Cable Media

- Optical Fiber Backbone Cable
- Multipair Copper Backbone Cable
- Coaxial Cable

Infrastructure Hardening Guidelines

5.2 Life of these Guidelines

This set of Guidelines is a living document and intended for review and update by UNM periodically as warranted by changes in building construction techniques and communications technology.

5.3 Standards

The specifications included within these Guidelines, incorporate generally accepted communications infrastructure practices described in Standards documents (and addenda) published by recognized standards bodies and organizations. These include standards published by the Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) and Building Industry Consultant Services International (BICSI).

- ANSI/TIA/ EIA 568B, *Commercial Building Telecommunications Cabling Standard*

This prescribes the requirements for Intrabuilding copper and optical fiber cable performance, installation and testing.

- ANSI/TIA/EIA 569A, *Telecommunication Standard for Pathways and Spaces*

This standard includes specifications for the design and construction of pathways and spaces within buildings required to support information technology equipment and cable media.

- ANSI/TIA/EIA 607, *Commercial Building Grounding and Bonding Requirement*

This document includes the components of an effective grounding system for communication systems within public and commercial buildings.

- ANSI/TIA/EIA 758, *BICSI Customer Owned Outside Plant Telecommunications Cabling Standard*

This standard provides specifications for Interbuilding communication facilities that include cable media, pathways and spaces.

- ANSI/TIA/EIA 862, *Building Automation Systems Cabling Standard for Commercial Buildings*

This standard describes the generic cable system for building automation systems (BAS) that are intended to support a multi-product, multi-vendor automation environment within public and commercial buildings.

- Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual, 9th Edition*

This is a manual of proven design guidelines and methods accepted by the telecommunications industry.

- ANSI/NFPA 70, *National Electrical Code, (NEC) Current Edition*

In addition to standards related to electrical safety, the NEC has several sections which specifically address low voltage cable installation.

5.4 Definitions

These definitions are arranged to present the logical order of their relationships to each other in an overall infrastructure topology.

Pathways – Structures or hardware which provide a permanent and reusable route for housing and the protection of cable media installed between two points. These facilities also provides a permanent enclosure or mechanism that facilitates the addition or replacement of cable over time. Intrabuilding Pathways include cable tray and conduit, which may be used for horizontal or vertical routing of cable. The *Intrabuilding* communication cable system infrastructure includes the pathway and support hardware that concentrates, supports and protects horizontal cable media between its origination point in the Equipment or Technology Room and the workstation outlet location. Horizontal support hardware is further defined as *continuous*, (e.g. Conduit, Cable Tray) and *non-continuous* (e.g. J-Hooks, Bridle Rings).

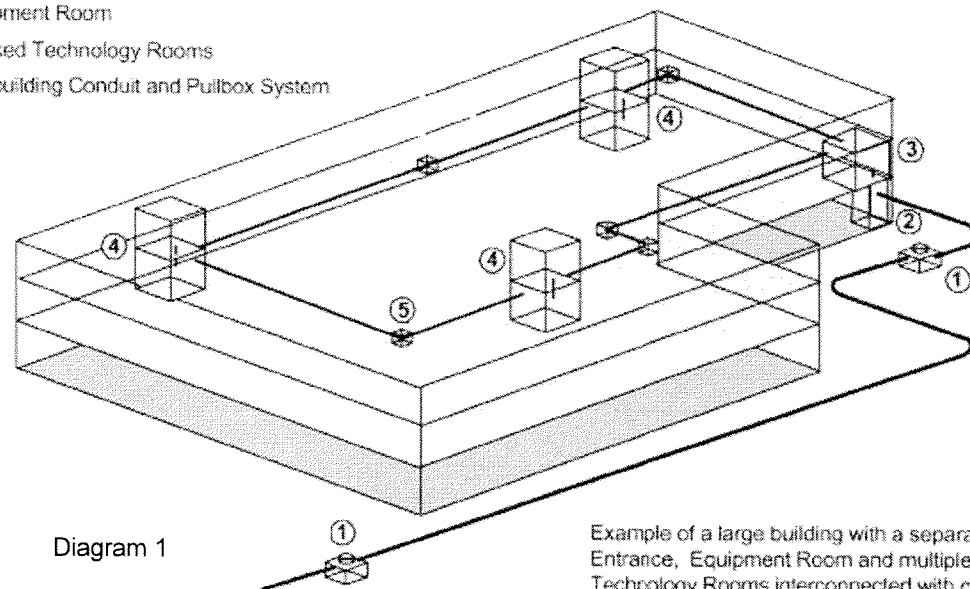
Interbuilding pathways include direct buried and concrete encased ducts as well as the existing utility tunnel system that is now in use for the routing of the majority of the University's legacy communication cable system. Aerial cable routes are also examples of Interbuilding Pathways, however, underground pathways will be constructed wherever possible, and Aerial Pathways shall only be used when buried or concrete encased facilities are not an option.

Spaces—Permanent structures that provide a protected area for the termination of cable and placement of equipment, allow for the dispersion and distribution of cable and worker access to facilitate the placement of cable. Intrabuilding Spaces include Service Entrances, Equipment Rooms, Technology Rooms, and Pull Boxes. Interbuilding Spaces include Transition Structures such as Underground Communication Vaults (Maintenance Holes), Hand Holes and Termination Spaces such as Pedestals. See Diagram 1, *Typical Large Building With Separate Service*

Entrance, Equipment Room and Multiple Technology Rooms; and Diagram 2, *Typical Building with Equipment Room/Service Entrance and Multiple Technology Rooms*; for an illustration of the relationship of Intrabuilding Spaces.

Service Entrances – These are rooms typically located in building basements or on the ground floor of a building where there is no basement, and are the terminus of Interbuilding conduits. Service Entrances are often the location where unrated Interbuilding backbone cable is spliced to rated cable and/or electrical protector units for distribution within the

- ① Interbuilding Manholes
- ② Service Entrance
- ③ Equipment Room
- ④ Stacked Technology Rooms
- ⑤ Intrabuilding Conduit and Pullbox System



building. There is no need for significant environmental support in these rooms other than what is provided in a standard office, since they do not contain sensitive electronic communications equipment. Convenience power, normal ventilation, adequate lighting and a secured entry door are usually sufficient for these facilities. See Diagram 3, *Typical Service Entrance Detail* for an example of an a Service Entrance Room layout.

Equipment Rooms (ERs) – These facilities are also referred to as MDF (Main Distribution Frame) Rooms or BDF (Building Distribution Frame) Rooms, and they are special-purpose rooms that provide space and maintain a suitable operating environment for the termination of backbone and campus cabling and house centralized communications and/ or computer equipment (such as Core Switches and Servers). The Equipment Room is considered the demarcation point within the building itself, the location where the Interbuilding and Intrabuilding communication distribution systems interface. Equipment Rooms differ from Technology Rooms in that Equipment Rooms are generally considered to serve a building, whereas Technology Rooms serve a floor area of a building. See Diagram 4, *Typical Equipment Room Detail* for an example of an Equipment Room layout.

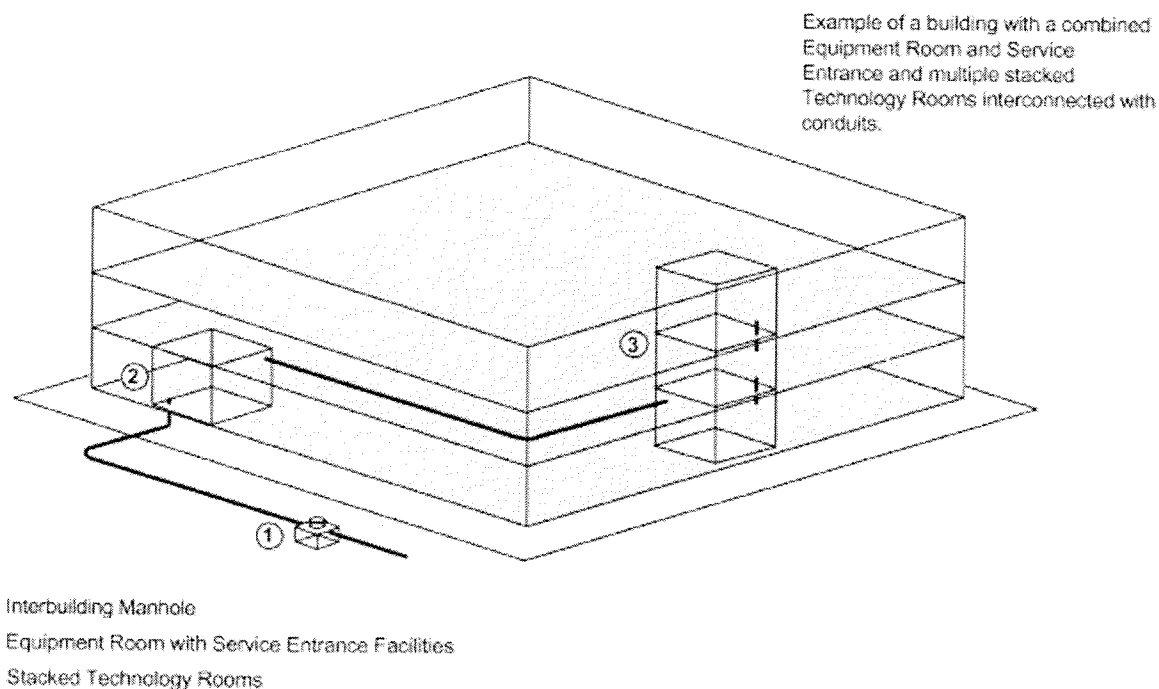


Diagram 2

Equipment Rooms may also include other building information systems such as community antenna television [CATV], fire alarm, security, building management systems (BMS) and other building signalling systems. In some cases, an Equipment Room may also contain the service entrance facility (for campus backbone, access providers, or both) and serve as a Technology Room (TR). The Equipment Room is the recognized termination point for all backbone cabling in a building.

Technology Rooms (TRs) --, Also known as Wire Centers, IDF Closets, Telecommunications Closets or Tele/Data Rooms, differ from Equipment Rooms (ERs) and entrance facilities in that they are generally considered to be floor-serving (as opposed to building or campus-serving) spaces that provide a connection point between backbone and horizontal distribution pathways. Technology Rooms provide an environmentally suitable and secure area for installing cables, cross-connects, rack- and wall- mounted hardware and technology equipment. The Technology Room is the recognized connection point between the backbone and horizontal pathways. See Diagram 5, *Typical Technology Room Detail* for an example of a Technology Room layout.

Intrabuilding Backbone Cable – This cable is used to connect the Equipment Room to the respective Technology Rooms, primarily to carry signals to and from the edge and core communication electronics equipment. Multipair Copper Backbone Cable may also be used to concentrate alarm and building control system signals distributed throughout a building. Typically, Intrabuilding Backbone Cable consists of Multipair Copper, High Strand Count Fiber Optic and Coaxial Trunk cables.

Interbuilding Backbone Cable -- Interbuilding Backbone Cable is used to connect buildings together, in order to concentrate and distribute aggregated signals to and from Zone Hub-Level Core Electronic Systems. Interbuilding Backbone is typically Multipair Copper (hundreds to over one thousand pairs), High Count Optical Fiber Cable (up to hundreds of strands), and Coaxial Trunk Cable. Interbuilding Backbone Cable is constructed to withstand the elements of cold, heat and moisture as well as the harsh external installation environment. The cable is manufactured with heavier jackets and sometimes even “armor” where rodent damage to cable is common. With few exceptions, it is not rated for installation within buildings, and must be spliced to riser or plenum-rated

cable for continuation within buildings. These splices normally are housed in the Service Entrance, or in smaller buildings, co-located within the Equipment Room.

Horizontal Cable – This is predominantly 4-pair, high performance Unshielded Twisted Pair (UTP) cable which is run from the Technology Room to the workstation. In limited applications, Optical Fiber and Coaxial cable is also installed in the horizontal environment. Generally, one UTP cable is required to support each user device, (e.g. PC, printer, telephone) and dependent upon the projected equipment density, several UTP cables are usually installed in each workstation faceplate.

Industry standard practices usually dedicate Horizontal Cable to a particular floor, although in some cases Horizontal Cable may serve more than one floor from a single Technology Room. Total cable length limitations of 90 meters⁶ or 295 feet dictate the reach of Horizontal Cable from the Technology Room, and often, floor plate areas require the provision of more than one Technology Room per floor to conform to cable distance limitations. UTP cable has different performance ratings or *Categories*, with Category 6 currently the highest level of performance. UTP cable is rated by the NEC for installation in plenum and non-plenum environments⁷, however, it is recommended that plenum-rated cable be used exclusively in all new and retrofit installations.

⁶ ANSI/TIA/EIA 568B-2.1, Commercial Building Telecommunications Cabling Standard; *Part 2, Balanced Twisted Pair Cabling Components; Addendum 1 Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling* Table 1, p.3

⁷ ANSI/NFPA 70, *The National Electrical Code*, Article 800.51

CATV Media Cable – In many locations on campus, coaxial cable is used for television signal distribution. In general, where this is required for legacy CATV (Community Antenna Television) distribution, a system of RG-6 and RG-11 cable should be installed. RG-6 will typically be sufficient for station or “drop” cable, whereas RG-11 is better suited for backbone cable use. Coaxial cable distribution systems require individual engineering for each building location which includes the placement of active and passive components (amplifiers, splitters and taps) at specific points in the system to ensure proper signal levels. As with UTP cable, plenum-rated coaxial cable should be installed wherever practical.

5.5 Design Criteria for Service Entrances

5.5.1 Requirements

The following provides general requirement for Service Entrances.

5.5.2 Size and Location of Service Entrance

A separate Service Entrance may be required in large buildings where a separate Equipment Room is to be built. In buildings of 10,000 sq. ft., or larger, a room size of 80 sq. ft. is a minimum size with a minimum dimension of 8 feet.⁸ The Service Entrance shall be dedicated solely to telecommunications and related facilities. Equipment that does not support the Service Entrance (e. g.,

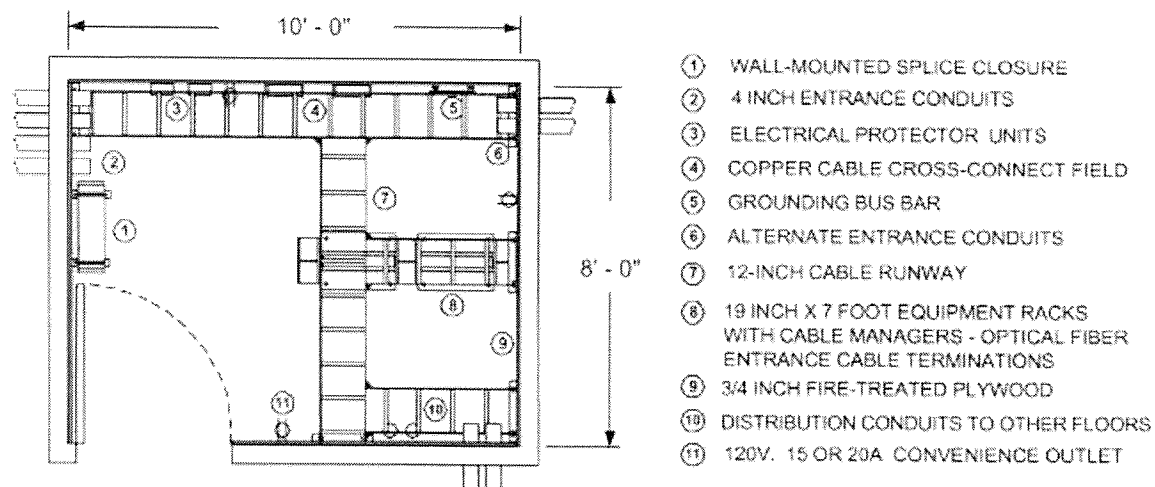


Diagram 3: Typical Service Entrance.

⁸⁻⁶ Building Industry Consulting Services International, *Methods Manual*, 9th Edition Chapter 7, p. 7-3 –7.

pipes, duct work, distribution of building power) shall not be located in or pass through the Service Entrance. Do not locate Service Entrances in any place that may be subject to water infiltration, steam infiltration, humidity from nearby water or steam, heat (e. g., direct sunlight) or any other corrosive atmospheric or adverse environmental conditions. Avoid locations that are below water level unless preventive measures against water infiltration are employed. Locate the Service Entrance far enough away from sources of EMI to reduce interference with the telecommunications cabling, including EMI from electrical power supply transformers, motors, generators, Magnetic Resonance Imaging (MRI) and X- ray equipment, radio transmitters, radar transmitters, and induction heating devices.

5.5.3 Ceiling Clearance

The minimum ceiling clearance shall be 8.5 ft.⁹ above the finished floor with ceiling protrusions (e. g., sprinkler heads) placed to assure a minimum clear height of 8 ft. clear of obstructions, to provide space overhead for cable runway or cable trays and conduits. To permit maximum flexibility and accessibility of cabling pathways, suspended ceilings are not allowed in Service Entrances.

5.5.4 Doors and Access Control

Service Entrances shall have electronic access controlled doors that are at least 3 ft. wide and 7 ft. tall.¹⁰ Doors should be equipped with sweeps, however, door sills are not recommended because they impede the movement of equipment. NOTE: Doors that open outward unless prohibited by Code, provide additional usable space and reduce constraints on the Service Entrance layout.

5.5.5 Flood Prevention

If possible, locate Service Entrances above any threat of flooding. Avoid locations that are below or adjacent to areas of potential water hazard (e. g., restrooms and kitchens).

5.5.6 Wall Requirements

Service Entrance walls should extend from the finished floor to the structural ceiling (e. g., the slab), be covered with two coats of fire-retardant white paint and be fire-rated for a minimum of one hour.¹¹ Service Entrance walls should not have windows installed, nor is it desirable to locate Service Entrances on perimeter/curtain walls where windows comprise the entire surface of the wall.

5.5.7 Backboard

Provide AC-grade plywood, 8 ft. high with a minimum thickness of 0.75 in. around the perimeter of the room. Plywood shall be fire-rated and treated on all sides with at least two coats of white latex, or preferably, white, fire resistant paint.¹² The bottom of the plywood shall be mounted 18 in. AFF (above finished floor).

5.5.8 Lighting

Provide adequate and uniform lighting that provides a minimum equivalent of 50 foot-candles when measured 3 ft. above the finished floor level. Locate light fixtures a minimum of 8.5 ft. above the finished floor. Locate light switches near the entrance to the Technology Room.¹³

5.5.9 Environmental Control

The Service Entrance should be provided with ventilation, heat and cooling which is similar to a standard office to prevent extremes in temperature and humidity. Unless active electronic components are present, separate, 7 x 24 hour environmental control is not required.¹⁴

12-10 Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual*, 9th Edition Chapter 7, p. 7-3 –7-21.

5.5.10 Power and Grounding

Provide 120 V., 15A or 20A, 60 Hz, non-switched, convenience power receptacles (NEMA 5-15R, 5-20R) on perimeter walls.¹⁵ Outlets should be recessed in walls, surface-mounted outlets and conduits are not acceptable. A ground bus, connected directly to the building ground shall also be provided, using a conductor sized as required to provide no greater than 2 Ohms of resistance. Provide labeling which states: "DO NOT DISCONNECT".

5.5.11 Fire Control and Detection

The Service Entrance should be equipped with a standard pressurized fire sprinkler system as required for general office and common spaces. Smoke detectors connected to a central fire alarm panel within the building shall also be provided.

5.6 Design Criteria for Equipment Rooms

5.6.1 Requirements

The following provides general requirements for all Equipment Rooms.

5.6.2 Size and Location of Equipment Room

The Equipment Room may be as large as 400 sq. ft. in size, with a minimum dimension of 15 ft. in one direction¹⁶. If the Equipment Room supports the outside cabling connections, it shall be located so that it can support two physically separate points of entry. The Equipment Room shall be accessible for the delivery of large equipment throughout its useful life.

5.6.3 Unacceptable Locations

The Equipment Room shall be dedicated solely to telecommunications, campus backbone cabling, centralized computer equipment and other related infrastructure. Equipment that does not support the Equipment Room (e. g., pipes, duct work, distribution of building power) shall

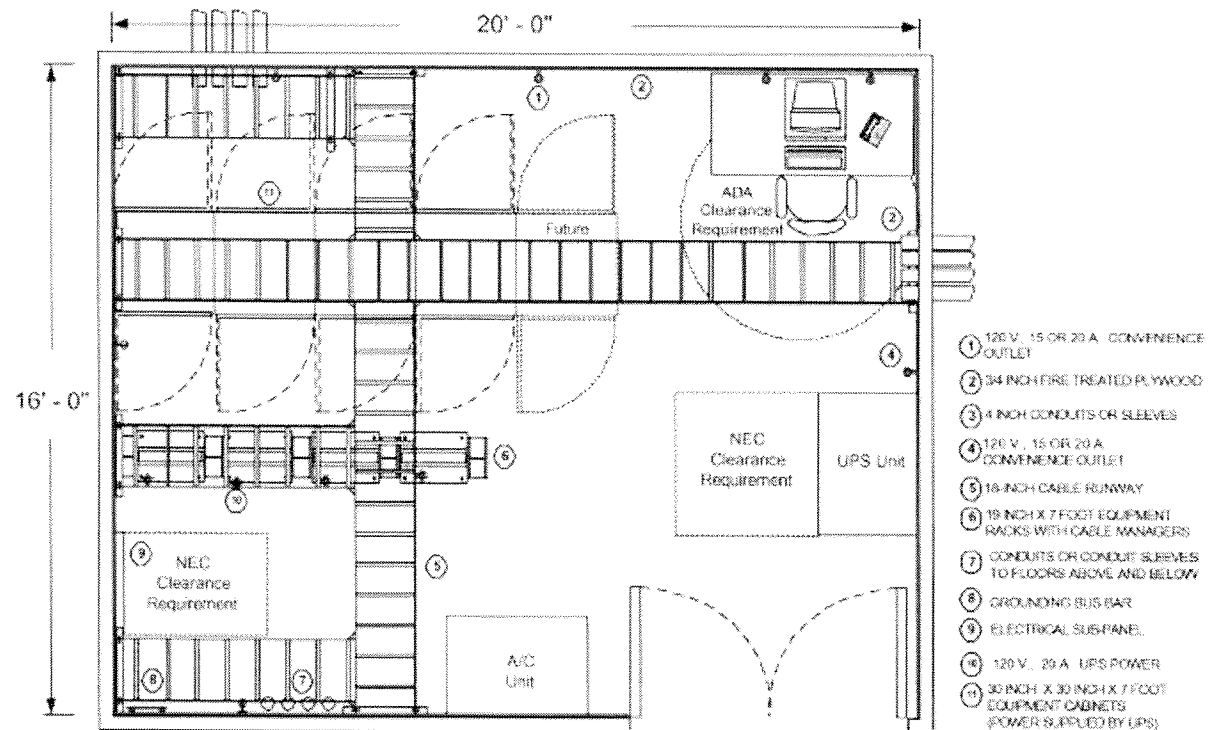


Diagram 4: Typical Equipment Room

¹⁶Vantage Technology Consulting Group, Inc., *TR and ER Standards, 2002*. Additional guidance for the sizing of Equipment Rooms may be found in Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual, 9th Edition* Chapter 7, p.7-12

not be located in or pass through the Equipment Room. Do not locate Equipment Rooms in any place that may be subject to water infiltration, steam infiltration, humidity from nearby water or steam, heat (e. g., direct sunlight) or any other corrosive atmospheric or adverse environmental conditions. Avoid locations that are below water level unless preventive measures against water infiltration are employed. Locate the Equipment Room far enough away from sources of EMI to reduce interference with the telecommunications cabling, including EMI from electrical power supply transformers, motors, generators, Magnetic Resonance Imaging (MRI) and X- ray equipment, radio transmitters, radar transmitters, and induction heating devices. As Equipment Rooms are frequently occupied by working technicians and sensitive electronic equipment, the room location should not be adjacent to sources of constant, excessive, low or high frequency noise, such as air-handling equipment, pumps, generators, and the like.¹⁷

5.6.4 Architectural Requirements

5.6.4.1 Clearances:

The following clearances shall be maintained for equipment racks and cabinets in the Equipment Room:¹⁸

- A minimum of 3 ft. of clear working space from equipment and cross-connect fields.
- A minimum of 6 in. depth off wall for wall- mounted equipment.
- Aisles shall be a minimum of 42 in. wide.

¹⁷ Vantage Technology Consulting Group, Inc., *TR and ER Standards, 2002*, and Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual, 9th Edition* Chapter 18.

¹⁸ Vantage Technology Consulting Group, Inc., *TR and ER Standards, 2002.*, (Modified from *NEC and American Disabilities Act Standards*)

5.6.4.2 Cable Pathways Within the Equipment Room

The cable pathways commonly used to route cables within an Equipment Room are:

- Overhead cable trays— Cable tray systems may be provided for routing equipment and backbone cables between cross-connects, equipment, and backbone pathways. Tray shall be coordinated with lighting, air-handling systems, and fire extinguishing systems so that fully loaded trays will not obstruct or impede their operation.
- Access floor systems— Access floors may be provided to route equipment cables to cross- connects in large Equipment Rooms. Access floor systems (often called “raised floors”) are often recommended by equipment manufacturers and are frequently used for telecommunications cabling when the Equipment Room serves multiple applications (e. g., both computer and PBX equipment).

5.6.4.3 Ceiling Clearance

The minimum ceiling clearance shall be 8.5 ft. above the finished floor with ceiling protrusions (e. g., sprinkler heads) placed to assure a minimum of 8 ft. clear of obstructions, to provide space over the equipment frames for cables and suspended cable trays. To permit maximum flexibility and accessibility of cabling pathways, drop ceilings are not allowed in Equipment Rooms.

5.6.4.4 Doors, Security and Access Control

Equipment Rooms shall have doors that are at least 3.5 ft. wide and 7 ft. tall equipped with a door sweep. Since large equipment is often located in the Equipment Room, a double door 6 ft. wide by 7.5 ft. tall is recommended. Door sills are not recommended because they impede the movement of equipment. NOTE: Doors that open outward (unless prohibited by code) provide additional usable space and reduce constraints on Equipment Room layout.

5.6.4.5 Security and Access Control

Equipment Rooms will typically house high-value and mission critical electronic equipment. Electronically controlled access systems (proximity readers, card swipe, etc.) shall be provided to ensure restricted access. Planners may consider the addition of security surveillance systems to record ingress and egress occurrences for Equipment Rooms that are not frequently occupied by technicians.

5.6.4.6 Dust and Static Electricity

Bare concrete floors are a considerable source of dust, and conventional vinyl floor tile promotes the generation of static electricity. Anti-static floor tiles should be provided in each Equipment Room. Imbed 2 in. copper tape between the anti-static tile and the conductive adhesive 1.5 feet from the wall. Leave 12 in. of copper tape exposed above the anti-static tile for grounding to copper signal ground busbar in each Equipment Room.

5.6.4.7 Flood Prevention

If possible, locate Equipment Rooms above any threat of flooding. Avoid locations that are below or adjacent to areas of potential water hazard (e. g., restrooms and kitchens).

5.6.4.8 Wall Requirements

Equipment Room walls should extend from the finished floor to the structural ceiling (e. g., the slab), be covered with two coats of white latex or fire-retardant white paint and be fire rated for a minimum of one hour. Equipment Room walls should not have windows installed, nor is it desirable to locate Equipment Rooms on perimeter/curtain walls where windows comprise the entire surface of the wall.

5.6.4.9 Backboard

Provide AC-grade plywood, 8 ft. high with a minimum thickness of 0.75 in. around the perimeter of the room. Plywood shall be fire-rated and treated on all sides with at least two coats of fire-resistant paint. The bottom of the plywood shall be mounted 18 in. AFF (above finished floor).

5.6.5 Structural Requirements

The floor rating under distributed loading must be 4.8 kPa – 12kPa(100-250 lbs/sq.ft.) and the rating for concentrated loading must be greater than 8.8 kN (2000 lb/sq.ft) in areas that will support telecommunications equipment such as batteries and UPS equipment. If access flooring is used in the Equipment Room, it must be rated accordingly.¹⁹

5.6.6 Mechanical System (HVAC) Requirements

5.6.6.1 Environmental Control

Provide Equipment Room with either dedicated HVAC equipment, or access to the main HVAC delivery system. Thermostatic controls should be located within the room itself to prevent setting changes by unauthorized personnel. Telecommunications equipment requires the HVAC system to function 24 hours per day, 365 days per year. If a building's HVAC system cannot ensure continuous operation (including weekends and holidays), provide a stand- alone HVAC unit with independent controls for the Equipment Room. If an emergency power source is available in the building, connect the HVAC system that serves the Equipment Room to it.

The HVAC system that serves the Equipment Room should be tuned to maintain a positive air pressure differential with respect to surrounding areas with a minimum of one air change per hour in the Equipment Room. Provide equipment to control humidity and air quality if needed.

¹⁹ Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual*, 9th Edition Chapter 8, p. 8-20.

Provide HVAC that will maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). The system shall include a manual thermostat within the room for override control as required. Maintain positive pressure with a minimum of one air change per hour in the Technology Room. Provide:

- Temperature 65 degrees F +/- 10 degrees
- Relative humidity 30% - 55% ²⁰

Estimated Heat Loads: 5,000 to 7,500 BTU per equipment cabinet or rack. UPS and stand-alone air conditioning systems produce additional heat, if present.

5.6.7 Electrical System Requirements

5.6.7.1 Lighting

Provide adequate and uniform lighting that provides a minimum equivalent of 50 foot-candles when measured at the finished floor level, properly distributed throughout the room. Locate light fixtures a minimum of 8.5 ft. above the finished floor. Locate light switches near the entrance to the Equipment Room. Emergency lighting systems which operate on trickle-charge storage batteries are required as a safety precaution in the event of an inadvertent power outage or emergency power shutdown.²¹

Coordinate the lighting layout with the equipment layout— especially overhead cable trays— to ensure the light is not obstructed. Power for the lighting should not come from the same circuits as power for the telecommunications equipment.

²⁰ Vantage Technology Consulting Group, Inc., *TR and ER Standards*, 2002. (Modified from the *BICSI Standard*)

²¹⁻¹⁷ Vantage Technology Consulting Group, Inc., *TR and ER Standards*, 2002. (Modified from *BICSI Standard*)

5.6.7.2 Power

Provide individual branch circuit serving a single load from the feeder panel directly to a branch circuit receptacle (for cord- and- plug connected equipment), or equipment power terminal (for hardwired equipment). Provide branch circuits for equipment power that are protected and wired for 110V, 30A (NEMA L5-30R) and 208V, 20A (NEMA L6-20R) as shown on the drawings. If the Equipment Room houses RF generating equipment, power should originate from an isolation transformer. The room shall include a dedicated power panel that support both voltages to allow for future addition of circuits.²²

5.6.7.3 Emergency Power Off Switches (EPO)

The Equipment Room shall have an Emergency Power Off Switch (EPO) located in the corridor adjacent to the entrance of the Equipment Room. EPO switches control power to all equipment within the particular room and allow a complete power shutdown in the event of a fire or other extreme emergency. The EPO switch shall also have a hinged, clear plastic cover installed over it to prevent accidental power shut down.

5.6.7.4 Convenience Power

Provide separate duplex 120 V AC convenience outlets (NEMA 5-15R) for tools, test sets, etc., located at least 15 in. above the finished floor, placed at approximately 6 ft. intervals around perimeter walls and identified and marked as such.

5.6.7.5 Dedicated Power Feeders

Provide Equipment Rooms with a power supply circuit that serves only the Equipment Room and terminates in its own electrical panel. The feeders that supply the power for telecommunications equipment in Equipment Rooms should be dedicated only to supplying that equipment. More than one dedicated feeder may be required for large installations with a wide variety of telecommunications equipment. Power required for other equipment in the room (e. g., fluorescent lighting, motors, air conditioning equipment) should be supplied by a separate feeder, conduit, and distribution panel.

5.6.7.6 Backup Power

Because of the “mission-critical” nature of the Equipment Room, it is strongly recommended that backup power be provided, allowing a controlled shutdown of the equipment in the event of a power failure. A single module UPS with parallel (maintenance) bypass, 100% isolation from raw utility power and 30 minute (expandable to 60 minute) battery capacity at full load shall be provided. Any outlets in the Equipment Room that are protected by UPS or generator power shall be terminated on red receptacles for ease of identification.

5.6.7.7 Bonding and Grounding

Provide a copper signal ground busbar in each Equipment Room. The ground conductor shall be copper cable sized as required to provide less than 2 Ohms of resistance. The conductor shall be cad-welded directly to the Ufer Ground, Main Building Entrance Ground, or building steel. Provide labeling which states: “DO NOT DISCONNECT”.

5.6.8 Fire Suppression System Requirements

5.6.8.1 General

Coordinate the layout of fire protection systems with the equipment layout to avoid obstructing sprinklers, access to the alarm, or other protective measures.

5.6.8.2 Preaction Sprinkler Systems

Provide a fire alarm system with heat and smoke detectors and multi-zone, pre-action, dry pipe fire suppression system. A manual fire suppression “hold-off” shall be installed adjacent to the main entrance to the data center. Locate a phone and data connection in the Equipment Room in order to contact emergency response personnel. Provide sprinkler heads in wire cages to prevent accidental operation.

5.6.8.3 Gas Fire Suppression Systems

Dependent upon the density and criticality of electronic equipment housed in the Equipment Room, planners should consider the installation of a gas fire suppression system. An example of where this may be appropriate is Core Network Hub Rooms. Gas fire suppression systems employing agents such as Argon, require construction of an air-tight envelope, provision of space for tanks and manifold equipment as well as special discharge annunciator systems. For this reason, planners must weigh the acquisition costs of these systems versus the risk of extended service outages that could be caused by a catastrophic fire in the most critical Equipment Rooms.

5.6.8.4 Portable Fire Extinguishers

Mount portable fire extinguishers (with appropriate ratings) in the Equipment Room as close to the entrance as possible.

5.7 Design Criteria for Technology Rooms

The following provides general requirements for all Technology Rooms.

5.7.1 Size and Location of Technology Rooms

5.7.1.1 Floor Space Served

There must be at least one Technology Room per floor. Multiple rooms are required if the cable length between the Technology Room and the telecommunications outlet, including slack, exceeds 295 ft.

5.7.1.2 Size Requirements

Technology Rooms shall be approximately 100 to 120 sq.ft. in size, depending on the systems they will contain. The rooms shall be roughly square, with a minimum clear dimension of 8 ft. in one direction.

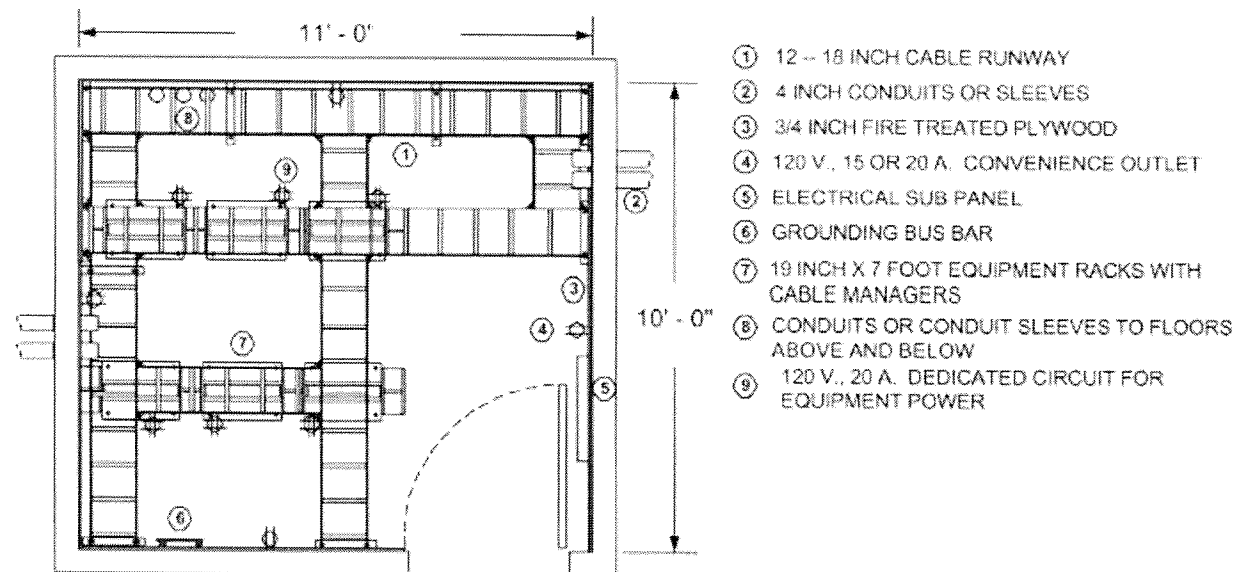


Diagram 5: Typical Technology Room

5.7.1.3 Clearances

The following clearances shall be maintained for equipment and cross-connect fields in the Technology Room:

- A minimum of 36 in. of clear working space in front of and behind equipment and patch panels.
- A minimum of 6 in. depth off wall for wall-mounted equipment.
- Aisles shall be a minimum of 42 in. wide.

5.7.2 Architectural Requirements

5.7.2.1 Ceiling Clearance

The minimum ceiling clearance shall be 8.5 ft. above the finished floor. To permit maximum flexibility and accessibility of cabling pathways, suspended ceilings are not allowed in Technology Rooms.

5.7.2.2 Doors

Technology Rooms shall have doors with electronically controlled access that are at least 3.0 ft. wide and 7 ft. tall. Doors should be equipped with sweeps, however, door sills are not recommended because they impede the movement of equipment. NOTE: Doors that open outward unless prohibited by Code, provide additional usable space and reduce constraints on the Service Entrance layout.

5.7.2.3 Dust and Static Electricity

Bare concrete floors are a considerable source of dust, and conventional vinyl floor tile promotes the generation of static electricity. Anti-static floor tiles should be provided in each Equipment Room. Imbed 2 in. copper tape between the anti-static tile and the conductive adhesive 1.5 feet from the wall. Leave 12 in. of copper tape exposed above the anti-static tile for grounding to copper signal ground busbar in each Technology Room.

5.7.2.4 Flood Prevention

If possible, locate Technology Rooms above any threat of flooding. Avoid locations that are below or adjacent to areas of potential water hazard (e. g., restrooms and kitchens).

5.7.2.5 Floor Loading

In general, provide a minimum floor loading of 2.4 kPa – 4.8 kPa (50 – 100 lb/sq.ft.).²³ Ultimately, the Architect shall determine structural requirements.

5.7.2.6 Other Uses

Technology Rooms must be dedicated to the telecommunications function and related support facilities, including storage or custodial use. Equipment not related to the support of the Technology Rooms such as piping, duct work, and distribution of building power must not be located in, or pass through, the Technology Room. Technology Rooms must not be used as passageways for unauthorized persons to other facilities within the building. Technology Rooms shall not have roof access for maintenance (such as hatches) that could pose security or environmental (i.e., rain leakage) threats.

5.7.2.7 Wall Requirements

Technology Room walls shall extend from the finished floor to the structural ceiling (e.g., the slab), be covered with two coats of white latex or fire-retardant white paint and be one hour fire-rated as required by the applicable codes and regulations. Technology Room walls should not have windows installed, nor is it desirable to locate Technology Rooms on perimeter/curtain walls where windows comprise the entire surface of the wall.

²³ Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual*, 9th Edition Chapter 7, p. 7-7.

5.7.2.8 Backboard

Provide AC- grade or better plywood, 8 ft. high with a minimum thickness of 0.75 in. around the perimeter of the room. Plywood shall be either fire- rated or treated on all sides with at least two coats of fire-resistant paint. The bottom of the plywood shall be mounted 18 in. AFF (above finished floor).

5.7.2.9 Mechanical System (HVAC) Requirements

Provide HVAC that will maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). Thermostatic controls should be located within the room itself to prevent setting changes by unauthorized personnel. Maintain positive pressure with a minimum of one air change per hour in the Technology Room.

Provide:

- Temperature 65 degrees F +/- 10 degrees
- Relative humidity 30% -- 55%

Estimated Heat Loads: 5,000 to 7,500 BTU per equipment cabinet or rack.

5.7.3 Electrical System Requirements

5.7.3.1 Lighting

Provide a minimum equivalent of 500 lux (50 footcandles) measured at floor level, evenly distributed. Locate light fixtures a minimum of 2.6 m (8.5 ft) above the finished floor. Emergency lighting systems which operate on trickle-charge storage batteries are required as a safety precaution in the event of an inadvertent power outage.

5.7.3.2 Power

Technology Rooms shall be equipped to provide adequate electrical power. At minimum, Provide three dedicated, non-switched 20A, 120 Volt (V) alternating current (AC) with locking electrical outlets (NEMA L5-20R) and straight blade NEMA 5-20R receptacles for equipment power, each on separate branch circuits. Dependent on equipment requirements, 208VAC power may also be required.

Provide separate duplex 120 V AC convenience outlets (NEMA 5-15R or 5-20R) for tools, test sets, etc., located at least 18 in. above the finished floor, placed at approximately 6 ft. intervals around perimeter walls and identified and marked as such. All outlets must be on non-switched circuits.

5.7.3.3 Bonding and Grounding

Provide a copper signal ground busbar in each Technology Room. The ground lead shall be a copper cable sized appropriately to provide not greater than 2 Ohms of resistance, cad-welded to the Ufer Ground or building steel. Provide labeling which states: "DO NOT DISCONNECT".

5.7.4 Fire Suppression System Requirements

Provide wet-pipe system with sprinkler heads in wire cages to prevent accidental operation. Smoke detectors are required.

5.8 Communication Cable Tray

5.8.1 Purpose

Cable Tray is intended for above ceiling installation for the creation of main pathways for the management of high volumes of cable through corridors, and for access and egress to Equipment Rooms and Technology Rooms. Cable Tray is in the Continuous Support category.

5.8.2 General Installation Considerations

5.8.2.1 Coordination With Other Trades

Cable Tray installation must be coordinated continuously with the other trades, (Structural, Electrical, Mechanical, Ceiling installers, etc.,) during construction to ensure that it will be accessible once construction is completed. In general the tray should be placed about 8 inches above the suspended ceiling to ensure access once the ceiling is in place.

5.8.2.2 Routing

Where possible, Cable Tray should be routed over common use areas such as corridors and not be routed over restrooms, electrical rooms. Avoiding routes over classrooms and offices is important where repeated access to the tray would disrupt normal teaching or work activities.

5.8.3 Construction

5.8.3.1 Heavy Duty Cable Tray

Heavy Duty Cable Tray shall be installed in areas where a high density of communication cable is to be installed. IT designers should be consulted during early stages of design to determine the projected density of cable to be supported. Cable Tray is to be manufactured of aluminum alloy 6063-T6 or equal, and comply with NEMA Class 12A. Aluminum is preferable to steel due to weight and corrosion considerations. Ladder type Cable Tray is preferable to solid bottom

Cable Tray as it allows access and egress of cable from above or below the tray. Solid bottom configurations may be required in transition areas, (e.g. across hard ceilings), or areas where the density of air handling equipment or structural members above the ceiling prohibits access to the tray. Flanges should be configured inward to assist in containment of cable within the tray.²⁴

5.8.3.2 Light--Medium Duty Cable Tray

Welded wire or "Basket"-type Cable Tray is acceptable for installation in areas where the density of cable does not warrant the installation of a Heavy Duty Cable Tray. Basket type tray is particularly well suited for installation below raised access floors.

5.8.4 Dimensions

In general, Cable Tray should be a minimum of 18 in. wide, with a depth of 4 in. Narrower cable tray may be acceptable for locations with low volumes of cable, however, more narrow Cable Tray shall not be substituted for the 18 in. standard without prior approval.

5.8.5 Support Requirements

Where possible and practical, wall mounted angle brackets shall be used to support the cable tray. For locations away from a supporting wall, a trapeze-style support is to be used along the span of the Cable Tray. The trapeze is constructed of channel stock (i.e., Unistrut) and 5/8 in. threaded rod. The trapeze support elevation should allow a minimum of 8 in. between the top edge of the cable tray and the slab above. Appropriate threaded rod anchors are to be selected and approved by the Project Structural Engineer. Trapeze supports are recommended to be placed every 10 ft. and at cable tray intersections and terminations.

Seismic bracing for the Cable Tray as required by Code, shall be installed along Cable Tray routes. Coordination of lateral and oblique bracing locations must be effected with the other disciplines whose equipment and systems share the area above the suspended ceiling.

5.8.6 Cable Tray Bonding and Grounding Requirements

²⁴ Vantage Technology Consulting Group, Inc., *TR and ER Standards*, 2002.

Cable Tray shall be bonded to the Telecommunications Grounding Bus Bar in the Technology Room(s) on the same floor. All non-contiguous segments of the Cable Tray shall be bonded together using appropriately-sized copper wire ensuring less than 2 Ohms of resistance, with crimp-on lugs. The lugs shall be bolted to each segment of the Cable Tray to ensure electrical continuity throughout the length of the Cable Tray system.

5.8.7 Cable Tray Firestopping Requirements

Cable Trays that penetrate fire-rated walls shall be equipped with wall penetration sleeves at each location, and have appropriate firestopping materials installed after the placement of cable has been completed.

5.9 Communication Cable Runway (Ladder Rack)

5.9.1 Purpose

Cable Runway, also commonly known as Ladder Rack, is commonly used within Technology and Equipment Rooms to route cable to or from sleeves, risers, ducts, cable trays to termination fields within equipment racks or mounted on walls. It does not have the trough characteristics of cable tray, and therefore, it provides continuous support with an ease of access. This is a highly desirable in Technology Rooms where moves, adds and changes to cable routing are relatively frequent.

5.9.2 Materials and Applications

Cable Runway is available in various widths, and therefore may be used for a range of cable types and volumes. Cable Runway may be mounted vertically on walls and be used to support riser cable from floor to ceiling as it passes between floors. Cable Runway systems are typically contained within the confines of a single room or closet, and it is not normally installed through walls, floors or ceilings in the same manner as conduit and cable tray. The well-designed Cable Runway system uses a combination of the walls, the top of equipment racks and threaded rods for bracing and support. Attachment of Cable Runway to these components provides the integrity of a mutually supporting system. Despite this level of structural integrity, Local Building Codes may require additional seismic bracing for code compliance.

5.9.3 Communication Cable Runway Bonding and Grounding

In Technology and Equipment Rooms, the Communication Cable Runway system should be bonded to the Telecommunications Ground Bus with an appropriately sized copper wire to ensure not more than 2 Ohms of resistance. In areas where Cable Runway is installed outside of Technology and Equipment Rooms, including riser closets and other locations, bonding and grounding of Communication Cable Runway is desired if practical.

5.10 Communication Cable System Conduit

5.10.1 Purpose

Conduit is intended as a permanent and continuous Intrabuilding pathway for communication cable. Conduits are used in locations where access to cable tray is unavailable where portions of the pathway span are inaccessible (i.e. embedded in walls), and used as a pathway for small quantities of cable where cable tray is impractical. Conduit is relatively easy to bend, and it is used extensively to provide structured pathways where significant changes in cable direction are necessary. Conduit is used to protect cable from damage, and to minimize EMI interference. In addition, certain Conduit materials may be used to house non-rated cables between end points to ensure NEC Code compliance.

5.10.2 Conduit Quantity and Diameter

The quantity and diameter of Conduits vary with their application. In general, large diameter Conduits, such as 4-inch Conduit, is typically used for major trunk routes, and they are installed in multiples to provide spare capacity.

5.10.3 Conduit Bend Limitations

In general, conduits shall not have more than 180 degrees of bends or turns in a segment without the installation of a pullbox. Placement of pullboxes must be considered as another contender for above-ceiling space when planning conduit routes. (See the discussion of Intrabuilding Communication Cable System Pull Boxes, in Section 7.5)

5.10.4 Conduit Fill Ratios

Communication Conduits have fill limitations based on the number and size of cables installed within them. Planning the number and diameter of conduits required for specific routes should be based on the anticipated cable load, and guidance for fill ratio calculations provided in ANSI/TIA/EIA-569A and the NEC.

5.10.5 Conduits to Individual Communication Outlets

Conduits serving individual workstation outlets are smaller in diameter such as $\frac{3}{4}$ in. or 1 in., and they are intended to hold only a few, small-diameter cables. They are to be connected to double-gang, deep device boxes (2-1/2 in. deep), equipped with a single-gang drywall ring at the outlet location. Individual workstation conduits are to be dedicated to only one outlet box each, and shall not be “daisy-chained” together.

5.10.6 Conduits to Building Roof

A minimum of one 2-inch rigid galvanized steel conduit should be installed which penetrates the roof membrane and routed to the Technology Room on the uppermost floor of the building. This conduit will provide a pathway to the roof for the connection of antennas to the building backbone. The penetration of the roof must be weather-sealed as specified by UNM Facilities. The exposed end of the conduit shall be equipped with a weather head to prevent the entrance of moisture, insects, birds, etc. Should the penetration point not be collocated with the antenna placement location, and it is not practical to route conduit within the building, horizontal conduit shall be placed along the roof from the penetration in the roof of the Technology Room to where the antenna is to be set. Horizontal conduit shall be affixed to free-standing redwood blocks (2”X 4”X 12”) with galvanized conduit straps. The redwood blocks are to be placed along the route from penetration to the antenna site no more than 8 feet apart. Should the antenna require power for steering motors, separate power conduits must also be provided.

5.10.7 Conduit Materials

5.10.7.1 Rigid Galvanized Steel (RGS, RMC)

Rigid Galvanized Steel, (RGS, or Rigid Metallic Conduit [RMC] per NEC) is used in areas exposed to the outside elements both above and below ground. It is an optional material specified by the NEC for the containment of non-rated cables that pose a smoke inhalation hazard in the case of fire.²⁵ RGS Conduit is heavier than either Intermediate Metallic Conduit (IMC) or Thinwall Electrical Metallic Tubing (EMT) and thus requires more robust support structures to hold it in place. RGS also requires the use of threaded couplers and fittings which add to installation costs due to the increased labor necessary to assemble several sections together. The thickness of the walls of RGS Conduit make the use of Conduit bending machines an absolute necessity for field installation.

5.10.7.2 Intermediate Metallic Conduit (IMC)

IMC Conduit is used in areas exposed to the outside elements, and although it is Galvanized like RGS Conduit, its walls are of thinner gauge steel, and IMC is not often used in direct-buried applications. IMC Conduit is acceptable for non-rated cable installations.²⁶ IMC Conduit may be used, however, to carry riser-rated cable and innerduct in vertical and horizontal cable applications. The thickness of the walls of IMC Conduit make the use of Conduit bending machines strongly recommended.

²⁵ NEC Article 800.50, Exception No.3, FPN No. 2

²⁶ *Ibid*, Article 800.50

5.10.7.3 Thinwall Electrical Metallic Tubing (EMT)

EMT is used primarily for both high- and low- voltage electrical installations within the confines of an environmentally-controlled building. EMT is relatively light, and in smaller diameters, easy to form using only hand tools. EMT Conduit connectors and fittings are available in two configurations, either the more commonly seen “Set-Screw” Type, or the virtually air-tight “Compression” Type fittings. In general, set-screw connectors and fittings comply with NEC Code for low-voltage applications and are suitable for most installations. EMT Conduit is not acceptable for non-rated cable installations. EMT Conduit may be used, however, to carry riser-rated cable and innerduct in vertical and horizontal cable applications. Short sections of EMT Conduit are commonly used as sleeves for wall penetrations, and floor cores for riser applications.

5.10.7.4 Flexible Conduit – (“Flex”)

The use of Flexible Conduit is not the preferred alternative for communication cable installation and shall not be used when EMT Conduit is practical for use. Installation of Flex Conduit is an acceptable option in congested ceilings, walls, for connections into modular furniture, or similar applications. When using Flex Conduit, increase the diameter of the Flex by one trade size over what the requirement would be using smooth-wall conduit.

5.10.7.5 Plastic Conduit/Polyvinyl Chloride (PVC)/Liquitight Conduit

Plastic and PVC Conduit is to be used for underground duct construction between buildings and vaults. Liquitight Conduit is commonly used as a flexible pathway for higher voltage electrical conductors in wet environments. The use of Plastic, PVC or Liquitight Conduit within buildings is not recommended due to NEC Code compliance issues for fire rating.²⁷

5.10.7.6 Innerduct

Innerduct is sometimes referred to as sub-duct and is used primarily as a means to subdivide large diameter metallic or plastic Conduits into distinct pathways for fiber optic cable, however, copper cable is sometimes placed within Innerduct to prevent tangling with other cables already present. Innerduct is available in plenum, riser-rated, and non-rated materials, for interior and exterior applications, in a range of diameters, as well as a variety of colors for ease of identification. The most common configuration is corrugated Innerduct which is very flexible and provides a low friction pulling environment. Innerduct is produced in solid and ribbed styles as well. Beside installation within Conduit, Innerduct can be placed by itself within cable trays, suspended from ceilings using cable hangers, and run vertically through sleeves as pathways for riser cables.

²⁷ NEC Article 300.21 (B)

5.10.8 Conduit Support Requirements

Conduits require substantial support mechanisms such as channel stock/threaded rod trapeze supports. Individual Conduits may be supported using threaded rods with clamps. Conduits can also be attached to the underside of cable trays and affixed to walls where practical. Supports are particularly critical at points on the pathway route where significant changes in direction (i.e. 90-degree bends) occur. This support is necessary due to the lateral forces incurred by the conduit when cable is pulled through the bend itself. In some areas, seismic bracing of Conduit is required by local building codes. Accommodations for lateral and oblique bracing struts must be coordinated with the other disciplines that vie for critical ceiling space.

5.10.9 Bonding and Grounding of Conduits

Bonding of Conduits to the Telecommunications Grounding System is required. At the termination of Conduit runs within Technology Rooms, attachment of a ground wire between the Telecommunications Ground Bus to grounding rings installed on Conduit box connectors should be accomplished to ensure electrical continuity of the Conduit system. Bonding and grounding must be performed where metallic conduit is installed or embedded in concrete.

5.10.10 Firestopping of Conduits

Partially filled and empty conduits Conduits that pass through fire-rated walls or through floors shall be firestopped in accordance with NEC²⁸ and Local Fire Codes. Flexible non- hardening, firestopping putty or pillows are preferred, as these materials can be readily removed (and replaced) for additional cable installation when necessary.

²⁸ NEC Article 300.21

5.10.11 Miscellaneous Conduit Requirements

In order to protect cable from damage during installation or static conditions following installation, Conduits should be cut square, with the cut ends reamed and deburred . Plastic bushings are to be installed over the each end of every Conduit. To facilitate cable installation, nylon or polyethylene pull strings shall be placed in each Conduit from end to end. Conduit plugs are not necessary for empty or spare Conduits in indoor environments, however, any empty conduit or duct which traverses the outdoors should have a conduit plug installed to prevent the introduction of noxious gases or water into the building.

5.11 Intrabuilding Communication Cable System Pull Boxes

5.11.1 Purpose

Pull Boxes are used in conjunction with Conduit installations to provide access to cables at appropriate locations for distribution to tributary locations, and to facilitate cable installation along the route after the length and the number of bends in a conduit run make cable pulling difficult. In general, a Pull Box is required each 100 feet, and/or after 180 degrees of directional change has been effected. For example, a Pull Box should be placed along the route after two 90 degree bends, 25 feet apart are encountered.²⁹

5.11.2 Materials

For indoor use, NEMA Type 1 Pull Boxes are adequate for most applications. For areas exposed to heavy moisture, chemicals or weather elements, NEMA Type 3 or 4 Pull Boxes are usually required. The configuration of Pull Boxes varies, as some are equipped with hinged covers, others with removable covers which are screwed or bolted on. The configuration selected should account for the accessibility of the Pull Box once all construction is completed, and other fixtures or finishes may interfere with removal of the cover for access.

5.11.3 Placement

In general, a Pull Box is required each 100 feet of a conduit run, and/or after 180 degrees of directional change in the conduit pathway has been effected. For example, a Pull Box should be placed along the conduit route after two 90 degree bends, 25 feet apart are encountered.

Consideration should be made for the direction of cable pulls, or, if this is ambiguous, Pull Boxes should be placed on both end of such bends.

²⁹ Building Industry Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual*, 9th Edition Chapter 4, p. 4-48.

The use of Pull Boxes for directional change itself should be avoided, since the pulling and frictional forces absorbed by the inside radius of conduit sweeps cannot be mitigated. Pull Boxes should be placed after bends in conduit such that the resulting pull is straight through the Pull Box and the directional change is accommodated by the sweep of the conduit.

The size of Pull Boxes make placement above suspended ceilings a challenge, since in most commercial buildings, the area above the T-bar grid is typically congested with mechanical and electrical equipment. This equipment occupies the area above ceilings in addition to structural components which comprise the basic building itself.

5.11.4 Pull Box Support Requirements

Pull Boxes are structures permanently affixed to the building structure. They can be attached directly to the ceiling slab, or suspended by 4-point threaded rod supports anchored to the ceiling.

5.11.5 Pull Box Bonding and Grounding Requirements

As Pull Boxes become an integral part of the conduit system, the conduit connectors that attach the conduits to the box create electrical continuity with the conduits themselves. Individual bonding of Pull Boxes is not normally required.

5.11.6 Firestopping of Pull Boxes

As Pull Boxes are designed to be resealed with the appropriate cover after they have been accessed, firestopping of conduits within Pull Boxes is not required.

5.12 Horizontal Cable Support Hardware (Non-Continuous)

5.12.1 Purpose

Non-Continuous Horizontal Cable Support Hardware is used in locations where the communication cable is not supported by continuous systems such as cable trays or conduit. Since support is not continuous, cable weight is concentrated at the intervals of the support hardware. Therefore, Non-Continuous Cable Supports shall be placed not more than 6 feet apart in linear runs.

5.12.2 J-Saddle Hooks

These components are metal stampings configured in a “J” form, which provide a broad cradle or saddle support for bundles of cable. The larger surface area of the saddle prevents kinking, or crimping of high-performance UTP cable. J-Saddle Hooks are available in a variety of sizes and they can accommodate a range of cable bundle sizes and weights. These hangers may be supported by threaded rod, beam clamps, etc., and can be “ganged” together to provide a number of support way points along a cable route. As this type of hanger preserves critical UTP cable geometry, they are the preferred method for non-continuous cable support.

5.12.3 Bridle Rings

Bridle Rings attach to ceiling hangers and are used for supporting a small number of cables, typically over the last few feet of a tributary run to a communication outlet drop location. Bridle Rings are not practical for heavy bundles or large numbers of cable as the thin surface area presented by the ring can deform the critical geometry of high performance UTP cable.

5.13 Intrabuilding Cable Media

5.13.1 Requirements

The cabling system shall meet or exceed the following performance requirements:

- Intrabuilding Backbone (Riser): The Intrabuilding Backbone shall support standards-based network protocols up to and including 10 Gigabit Ethernet.
- Intrabuilding Backbone (Link): The Link connections (between Technology Rooms on a floor) shall support standards-based network protocols up to and including 10 Gigabit Ethernet.
- Horizontal Cable: The horizontal cabling shall support standards-based network protocols of up to Gigabit Ethernet (for the copper component). It shall be supplemented in specific locations with optical fiber cabling that shall support 10 Gigabit Ethernet connections.
- All cables shall be certified to comply with advertised performance and warranted against defects by the manufacturer for industry-standard time periods.

- Specifically, the cabling system shall support the following network and communication protocols:

Technology / Protocol

10 Gigabit Ethernet
Gigabit Ethernet (including trunked connections)
100/10 Mbps Ethernet
ATM (up to OC-48)
Legacy Protocols, including Token Ring and FDDI.
OC-3, OC-12 and OC-48 connections
T1 and T3 connections
Telemetry and Patient Monitoring (IP and RS-232)
Analog and Digital Telephone Service
Broadband and Baseband Video Signals

Comment

(Optical fiber only)

(RS-232 over copper cabling only)

(Copper cabling only)

(Optical fiber and optional coaxial cabling only)

5.14 Intrabuilding Backbone Cable Media

5.14.1 Intrabuilding Backbone (Riser) Cable

The hub of the cabling system will be located in the Equipment Room. Optical fiber and copper backbone cables will emanate from this room to the Technology Rooms located throughout the facility. Multimode cable shall be capable of supporting 1000Base-SX 1Gbps Ethernet for a minimum of 1Km, 10G BaseS 10Gbps Ethernet for a minimum of 300 meters. The following cables will be provided running from the Data Center to each Technology Room on each floor:³⁰

Cable Type	Quantity
Singlemode optical fiber- Tight buffered, plenum rated (OFNP)	12 elements (6 pairs)
Multimode optical fiber (50 micron, 2000/500 MHz.km) Tight buffered, plenum grade (ONFP)	12 elements (6 pairs)
Voice-grade 24 AWG twisted pair copper cable plenum grade (CMP) preferable, however, ARMM-type riser rated (CMR) may be used in certain applications	2 pairs per outlet, or 2 pairs per 100 square feet, which ever value is greater
RG-11 Quad-Shield Coaxial Cable, plenum grade (CMP)	As Required
Category 6 UTP copper cabling plenum grade (CMP)	12 cables, if distance is less than 100 Meters

^{30, 26} Vantage Technology Consulting Group, Inc., *TR and ER Standards, 2002*

5.14.2 Intrabuilding Backbone (Link) Cable

Optical fiber and copper link cables will run between the Technology Rooms in the building. These link cables serve two purposes; in the event of a cable break or failure they can be used to patch around the problem area, and they can also be used to support specific cabling configurations in a localized environment. The following cables will be provided running from each Technology Room to its adjacent Room on each floor and to the Rooms located directly above and below this Room, as applicable:³¹

Cable Type	Quantity
Singlemode optical fiber- Tight buffered, plenum rated (OFNP)	12 elements (6 pairs)
Multimode optical fiber (50 micron, 2000/500 MHz.km) Tight buffered, plenum grade (ONFP)	12 elements (6 pairs)
Cat 6 UTP copper cabling plenum grade (CMP)	12 cables, if distance is less than 100 Meters
RG-11 Quad-Shield Coaxial Cable, plenum grade (CMP)	As Required

5.14.3 Intrabuilding Termination Equipment Racks

In general, Intrabuilding Cable patch panels used for both Intrabuilding Cable and Horizontal Cable termination, wire managers, and electronic equipment, will be mounted in standard 19-inch x 7-foot aluminum equipment racks. Manufacturers shall be approved by UNM.

Essential to the proper installation of cable and equipment is vertical and horizontal cable management hardware which must be considered in the space planning layout of every Equipment and Technology Room. Typical vertical cable managers add approximately 6 inches of width to each of the outboard sides of a single equipment rack.

In situations where rows of multiple racks are “ganged” together, one vertical cable manager is placed between two adjoining racks. (i.e., An array of two racks would require three vertical cable managers).

The equipment racks are to be mounted in Equipment Rooms and Technology Rooms in the quantity necessary to support all necessary cable and hardware equipment. A minimum allowance of 25-30 percent vacant rack unit space is required for future growth in the Equipment Room and Technology Rooms of each facility. One rack unit (RU) is 1-3/4 inches in height, and a standard 7 –foot equipment rack has a mounting capacity of approximately 44 RU’s. Termination and cable management equipment are manufactured in standard multiples of RU’s in height.

Equipment racks are typically supported and braced by overhead Cable Runway (Ladder Rack) which serves the dual purpose of providing support and a means for routing cable to the termination hardware installed within the racks themselves.

5.14.4 Intrabuilding Termination Equipment Cabinets

Equipment cabinets are used primarily in Equipment Rooms where large and heavy electronic equipment is mounted. Equipment Cabinets have the same mounting configuration as equipment racks, the mounting rails are typically 19-inches wide, 7-feet tall, and have a 44-RU capacity. Since they have a depth dimension as well, Equipment Cabinets allow four-point support and suspension of hardware. For example, large zone hubs can be 10-12 RU’s in height, and be 20 inches in depth. They may weigh over 100 lbs. Manufacturers of such hardware usually specify mounting rails that require attachment to the front and rear of a cabinet for adequate support.

Cabinets can be customized with fans, locking doors, and other appliances which make them a versatile element of the communications infrastructure.

5.14.5 Intrabuilding Cable Termination Hardware

5.14.5.1 Intrabuilding Copper Backbone Cable Termination Hardware

Multipair Copper Backbone cable is to be terminated on 110-style termination blocks, with 5-pair connectors. 110 blocks will either be attached to the plywood backboard or mounted on brackets within the equipment racks as determined by UNM.

5.14.5.2 Intrabuilding Optical Fiber Backbone Cable Termination Hardware

Optical fiber cable will be terminated within a Fiber Distribution Unit (FDU) with appropriate connectors according to UNM specifications. The FDU is to be mounted within the Equipment Racks according to UNM guidelines, with a minimum of 25% spare capacity for growth.

5.14.5.3 Intrabuilding Coaxial Cable Termination Hardware

Where coaxial cable is used for signal distribution, the design of the broadband system will dictate the location of cable termination hardware. Typically, broadband signals require the placement of splitters, amplifiers and directional taps, which are more practical to mount on plywood backboards. In some cases, however, rack-mounted patch panels equipped with BNC or F-type connectors may be sufficient for system requirements.

5.15 Horizontal Cable Media

There remains a large installed base of Category 5 and 5e cable on the UNM campus, however, as new buildings are constructed, and renovations of older buildings occur, UNM intends to transition to the deployment of Category 6 UTP cable. Category 6 cable is more capable than Category 5 or 5e for the support of converged technologies.

Horizontal (station) Category 6 UTP cables, supplied by manufacturers approved by UNM, will run from the Technology Rooms to outlets located throughout the facility. Maximum cable length is 90 Meters (295 feet). Each outlet will be provided with multiple, standards-based cables, faceplates, and connectors. Workstation termination hardware shall be manufactured by providers approved by UNM. This will allow each outlet to support multiple information systems without requiring re-cabling. The following cables will be provided installed as “home runs” from the Technology Room to each outlet it serves.

Cable Type	Quantity
Cat 6 UTP copper cables	To Be Determined by Project Requirements
<i>Option:</i> Multimode optical fiber (50 micron, 2000/500 MHz.km)	
<i>Option:</i> RG-6 Quad-Shield coaxial cable for legacy media distribution	Media Outlets only.

5.15.1 Horizontal Cable Media Termination Hardware

Horizontal UTP Cable for either voice or data applications will be terminated on 48-port, RJ-45 style patch panels. These patch panels are typically 2 RU's in height. Planners must provide enough spare ports to support 25-30 percent growth of the standard outlet configurations in the facility being served. (e.g., for a facility with 100, 4-cable outlet terminations in a particular Technology Room, the planner must provide space for 25 to 30 additional outlets, or 100-120 additional ports for growth).

5.16 Interbuilding Pathways

Interbuilding Communication Ductbanks are communication infrastructure pathways that carry communication cables between buildings in a campus environment. The Duct itself is typically constructed of contiguous segments of PVC conduit. In the absence of a multi-building campus, Ductbanks complete the underground connection between the building and communications carrier-owned vaults where a combination of copper, fiber optic and in some cases, coaxial cable is distributed from the carrier to the user building. Ductbanks can be constructed in several configurations, each with a differing level of permanence and durability. These construction methods are generally either concrete-encased Ductbanks or direct-buried Ductbanks.

Transition Structures are spaces classified as vaults, manholes, handholes, and pedestals where cable is distributed and routed to other locations such as buildings. These structures allow technicians access to cable and splices to perform maintenance or to modify distribution configurations. The size of the Transition Structure selected for installation is determined by the number of ducts and potential cable count the structure must contain. Transition Structures present accessible locations for critical Interbuilding Backbone Cables and splices, and therefore shall be secured by tamper resistant locking mechanisms. This measure will minimize the potential for serious disruption to campus communications in the event of malicious damage or destruction of these cables.

The following provides general requirements for all Interbuilding Communication Duct Banks and Transition Spaces as components of the overall communication cable system infrastructure. Ductbanks used for low voltage communication facilities are not permitted by Code to be collocated with electrical transmission cables.

5.17 Interbuilding Communication Ductbanks

5.17.1 Purpose

Interbuilding Communication Ductbanks are designed to provide a permanent and durable pathway system which is available for the delivery of entrance cable from carrier service providers, or as part of a campus Interbuilding backbone system connecting several buildings together.

5.17.2 Routing of Ductbanks

Interbuilding Communication Ductbanks carry vital Interbuilding Backbone cable media which serve a host of facilities on Campus. Severing of the Interbuilding Backbone can potentially cause a loss of communications to the buildings downstream of the cut. For this reason it is critical that Ductbanks be routed around buildings, and that in no case does the pathway for the Interbuilding Backbone pass through a building on its route through Campus.

5.17.3 Ductbank Configuration and Quantity of Ducts

Once it is in place, modification to the Communication Ductbank is often impractical. It is critical, therefore, to plan for adequate expansion and growth of the communication system at the time the Ductbank is constructed, rather than after the fact. This is especially pertinent to concrete-encased Ductbanks. No less than four ducts should ever be installed at the time of construction. This rule applies, even if only a small number of cable pairs or strands of fiber that partially fill just a single duct are projected to be required over time. Ductbanks are configured in arrays, typically with several rows stacked together. 1 x 4, 3 x 3, 3 x 4 are examples of duct arrays, which also correspond to the arrangement of duct openings in pre-cast concrete vaults and manholes where transitions occur.

5.17.4 Ductbank Construction Materials and Methods

As the majority of Interbuilding Communication Ductbanks are installed in populated areas, the Ducts must share underground pathways with existing underground infrastructure components such as water lines, gas lines, sanitary systems and so on. As these utilities frequently need to be dug up for maintenance and repairs, it is critical that the communications infrastructure be provided the highest level of durability to prevent inadvertent damage by backhoes and other heavy equipment. Only 3000 p.s.i. compaction concrete-encased Ductbanks are considered acceptable for installation in these environments.³² The duct material itself should be Trade Size 4 (4-inch diameter), PVC Schedule 40 EB or equal, and suitable for contact with concrete.

5.17.5 Duct Placement

Duct routing should be planned with consideration for distance between Transition Structures and difficulty of cable pulls, particularly when high-count multipair copper cables are necessary. The minimum radius for curves is 15 feet. Trenches should be dug with the following depth and width considerations for concrete pours:

Concrete-Encased Ductbank Dimension Guidelines³³

Ground Cover	Minimum of 36 inches
Top Level of Concrete	Minimum 2 Inches above top duct
Concrete on Outer Sides of Ductbank	Minimum 4 inches
Concrete Between Ducts	1 inch (above, below and to each side)
Bottom Level of Concrete	Minimum 1.5 inches

³² University of New Mexico Facilities Engineering Standard

³³ BICSI *Customer Owned Outside Plant Manual*, Figure 3.10, p.3-43. Note: Figure 3.10 specifies an outer side dimension of 1.5 inches, however, this is superseded by UNM's Facilities Engineering Standard of 4 inches.

5.17.6 Ductbank Marking

The top layer of concrete in the ductbank should be dyed red to alert workmen who encounter the concrete while hand digging during utility location. A metallic warning tape, detectable with magnetic location equipment, should be buried directly over the path of the Ductbank approximately 18 inches above the ducts.

5.17.7 Ductbank Termination At The Building

Communication Ducts should be terminated with bell-end connectors, flush with the inner surface of the wall.

5.18 Interbuilding Spaces (Transition Structures)

5.18.1 Purpose

Interbuilding Spaces are essentially Transition Structures that allow access to cable installed within underground Ductbanks. These structures are required by Codes to be exclusively for low voltage communication cable and equipment. They may not be collocated with electrical transmission lines or facilities. Transition Structures provide a protected location for the storage of splice cases and slack loops of cable. The Transition Structures also facilitate the distribution of cable to multiple locations by providing a junction point for ducts radiating in several directions. Pedestals are above-ground enclosures which are used for the termination or cross-connection of Interbuilding cable. As pedestals are vulnerable to vandalism and other damage such as from vehicle impact, their use on the UNM Campus is not recommended.

5.18.2 Selection of Transition Structure Type

The type of Structure chosen for installation is dependent on the number of ducts in the span. These can range from vaults measuring 20 feet long, and 12 feet deep, to small, shallow, handholes only a few feet square. In most cases, preformed concrete structures are available in several sizes and capacities from large vaults down to handholes. Rarely is it necessary to form and pour a custom structure on-site.

Structures also have weight-bearing cover/lid capacities that range from light pedestrian traffic to deliberate heavy vehicular traffic.

The appropriate rating should be selected based on the anticipated exposure of the structure to these differing traffic types.

5.18.3 Placement of Transition Structures

Structures should be placed after 180 degrees of directional change has been effected in the ductbank route. In straight or relatively straight runs, there should be no more than 400 feet between structures.

Structures should not be used as the apex of 90 degree changes in duct direction. Sweeps and structures should be planned such that the sweep occurs outside of the structure, allowing straight cable pulls through the structure itself.

5.18.4 Transition Structure Accessories and Equipment

Transition Structures require the following equipment:

- A sump, or gravel drainage in the case of small hand holes
- Corrosion-resistant pulling eyes
- Cable racking
- Grounding cables installed per applicable codes or practices
- Ladders and steps
- Watertight duct plugs

5.19 Interbuilding Backbone Cable Media

This section describes the cable materials and configuration of Interbuilding Backbone Cable Media. This type of cable is specifically designed for use in areas exposed to the elements and that will be subjected to harsh installation conditions. Every type of cable listed shall be warranted by the manufacturer against defects in material or performance.

Splices for all Interbuilding Backbone Media types are to be effected within buildings wherever possible. While it is true that running duplicated cable counts in and out of the same facility consume ductbank capacity, this technique provides three valuable benefits for continuing operation and maintenance of the cable system. 1) The splice itself is protected from the elements by being in a protected, environmentally controlled space; 2) Maintenance or changes to the Backbone Cable distribution configuration can be accomplished indoors, which minimizes the deleterious effects of weather on the technicians. 2) The splice is not as vulnerable to vandalism, sabotage or gradual degradation and damage from continuous exposure to the outside environment.

5.19.1 Optical Fiber Backbone Cable Requirements Based on Building Type

UNM has determined that dependent upon the purpose and/or the tenant assets within a specific building, cables of standard sizes shall be installed between their end points. It will be the responsibility of UNM to specify the strand count and routing of cables in each instance. For general applications the standard strand counts are shown below.

Strand Count	Application
Composite 96-strand Singlemode, 48 -strand 50µM Multimode loose-tube outside plant (OSP) cable	Zone Hub to Zone Hub Connectivity (Point to Point)
Composite 48-strand Singlemode, 48- strand 50µM Multimode loose-tube outside plant (OSP) cable	To be determined by project requirements
Composite 24-strand Singlemode, 24- strand 50µM Multimode	To be determined by project requirements

loose-tube outside plant (OSP) cable	
Composite 6-strand Singlemode, 12-strand 50µM Multimode loose-tube outside plant (OSP) cable	To be determined by project requirements

5.19.2 Interbuilding Backbone Cable Media

5.19.2.1 Optical Fiber Interbuilding Backbone Cable

Optical Fiber is becoming the predominant media for the transmission of high-bandwidth data signals. Multimode Optical Fiber is limited by distance and bandwidth constraints, and it should only be used in the Interbuilding Backbone in limited applications. Singlemode Optical Fiber is recommended for installation in the Interbuilding Backbone where required throughout the Campus. Loose-tube Optical Fiber cable with a non-conducting central strength member is recommended for use. Strand count will vary based upon the Backbone Distribution scheme. Loose-tube Optical Fiber is not rated for installation beyond 50 feet of a building's Service Entrance, therefore it must either be terminated or spliced to indoor-rated cable within the 50 foot distance limitation.

5.19.2.2 Optical Fiber Backbone Cable Requirements Based on Building Type

UNM has determined that dependent upon the purpose and/or the tenant assets within a specific building, cables of standard sizes shall be installed between their end points. 50µM Multimode cable shall be capable of supporting 1000Base-SX 1Gbps Ethernet for a minimum of 1Km, 10G BaseS 10Gbps Ethernet for a minimum of 300 meters. It will be the responsibility of UNM to specify the strand count and routing of cables in each instance. For general applications the standard strand counts are shown below.

Strand Count	Application
Composite 96-strand Singlemode, 48 -strand 50µM Multimode (50 micron, 2000/500 MHz/km) loose-tube outside plant (OSP) cable	Zone Hub to Zone Hub Connectivity (Point to Point)
Composite 48-strand Singlemode, 48- strand 50µM Multimode (50 micron, 2000/500 MHz/km) loose-tube outside plant (OSP) cable	To be determined by project requirements
Composite 24-strand Singlemode, 24- strand 50µM Multimode (50 micron, 2000/500 MHz/km) loose-tube outside plant (OSP) cable	To be determined by project requirements
Composite 6-strand Singlemode, 12-strand 50µM Multimode (50 micron, 2000/500 MHz/km) loose-tube outside plant (OSP) cable	To be determined by project requirements

5.19.2.3 Multipair Copper Interbuilding Backbone Cable

Multipair Copper Interbuilding Backbone Cable is diminishing in its utility in Campus backbone scenarios, since Optical Fiber has overshadowed copper cable's bandwidth carrying capacity and physical size. Nonetheless, Multipair Copper Interbuilding Backbone Cable will remain an important element in the Campus backbone for years to come.

Typical Multipair Outside Plant (OSP) Copper Backbone Cable is constructed with a heavy polyethylene jacket over a metallic shield. The cable pairs inside the jacket are coated with a water displacement gel in the event the water integrity of the jacket is lost.

Multipair Copper Backbone Cable is unrated and according to NEC, must be terminated, spliced within 50 feet of building entry, or if these distances are exceeded, the cable must be installed in conduit for its entire length³⁴. Multipair Copper cable is conductive and capable of delivering damaging and potentially lethal electrical surges to equipment and personnel caused by lightning strikes or by exposure to high voltage electrical current. For this reason, Multipair Copper Interbuilding Cable must be terminated on, or spliced to, electrical protector units at the Service Entrance. This equipment protects personnel and equipment within the building from electrical shocks caused by factors outside the building. The type and manufacture of electrical protector units will be determined by UNM Standards, however, splices or protector unit panels should be mounted on backboards within the Service Entrance. The square footage necessary for this equipment varies with the pair count of the Multipair Copper Cable entering the building.

³⁴ ANSI/NFPA 70, *The National Electrical Code*, Article 800.50, Exceptions No. 1, 2, and 3

5.19.2.4 Interbuilding Coaxial Backbone Cable

Where necessary and not avoidable, Coaxial Backbone Cable shall be installed for the distribution of baseband and broadband signals. Coaxial cable is subject to high levels of attenuation (signal loss over distance) and large diameter coaxial cable is often used to mitigate this loss. Coaxial cables of ½ inch diameters and larger, are expressed as decimal equivalents for the diameter in inches, (e.g. .500, .625, .750 and 1.000) This type of Coaxial cable is very rigid, and must be installed using specialized equipment. The engineering of coaxial distribution systems will dictate the cable diameter, location of splices, amplifiers and other distribution equipment throughout the system.

5.20 Information Technology Infrastructure Reinforcement Guidelines

The threat of terrorism to our critical infrastructure assets dictate that facility and technology management take precautions toward the hardening and preservation of key facilities and equipment. Awareness of the unconventional means that terrorist elements use to effect their ends, Information technology infrastructure is particularly vulnerable to these threats due to the ubiquitous nature of communications facilities. The following Table provides suggested steps that planners and designers implement in order to mitigate the threat of vandalism, or sabotage.

5.20.1 Facility Class Definitions

Facility Class Definitions	
Class	Explanation
General Campus Areas	This applies to the Campus as a whole, or because of the location of a facility, it may not belong to a specific building, but be placed in a common area.
Class 1 Facility	This would be classified as a critical building or facility, where the damage or loss of the communication infrastructure would cause a major safety or health and welfare crisis on the Campus. Examples include: The UNM Building, The Hospital, The Telecommunications Building, and Public Safety.
Class 2 Facility	This type of Facility is key to the operation of the University, yet not as critical as a Class 1 Facility. Examples could include, Scholes Hall, Residence Halls, and major classroom buildings.
Class 3 Facility	A Class 3 Facility is one which has importance to the University, however, it is not a building heavily reliant on communications. Examples could include Lecture Halls and warehouse facilities.

5.20.2 Infrastructure Reinforcement Elements

The following table provides a list of Infrastructure Elements that may be implemented as buildings are retrofitted, or in new construction projects. Their overall benefit will be to enhance the physical security of critical information technology assets.

Infrastructure Reinforcement Elements					
Infrastructure Reinforcement Elements	General Campus Areas	Class 1 Facility	Class 2 Facility	Class 3 Facility	Explanation/Purpose
Enhance Tunnel Security	X				Prevent unauthorized access.
Install locks and liquid-tight seals on manholes/handholes	X				Prevent unauthorized access and the introduction of flammable liquids into manholes.
Enclose generators, fuel tanks, and oil, coolant reservoirs for emergency power generation systems	X				Prevent sabotage of equipment.
Construct Secondary and Tertiary access pathways		X			Provide alternate pathways of ingress/egress into buildings in the event of destruction of primary route or cable.
Construct Secondary access pathways			X		Provide an alternate pathway of ingress/egress into buildings in the event of destruction of primary route or cable.
Install security access controls to Service Entrances, Equipment Rooms and Technology Rooms		X	X	X	Implement card readers, surveillance cameras and the "Two-Man Rule" for access of 3 rd party vendors and maintenance technicians.

Infrastructure Reinforcement Elements					
Infrastructure Reinforcement Elements	General Campus Areas	Class 1 Facility	Class 2 Facility	Class 3 Facility	Explanation/Purpose
Implement an Emergency Operations Center (EOC)		X			Preparation for the conduct of voice, data and other communication operations from an alternate location or locations in the event of catastrophic damage to a primary communications facility.
Secure air handling equipment serving communications facilities to prevent tampering		X	X		Prevent the shutdown, or intentional contamination of air supplies (chemical or bacteriological) and HVAC systems serving critical communication facilities
Remove labels and signs from Service Entrances, Equipment Room, and Technology Room doors.		X	X	X	Make rooms look non- descript, make identification by non-communications/technology personnel difficult.
Transition all aerial cable to underground facilities	X	X	X	X	Aerial cable is vulnerable to damage from fire, extreme weather, vehicle impact and outright destruction from chainsaws or axes.
Plug and seal duct opening in duct banks including vacant ducts and ducts with existing Cable installed.	X	X	X	X	Prevent the introduction of flammable liquids or water into ducts.

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF FACILITY PLANNING
INFORMATION TECHNOLOGY INFRASTRUCTURE PLAN

Final Report

APPENDICES

April 30, 2003

6. APPENDICES

6.1 University of New Mexico Information Technology Infrastructure Plan Steering Committee

- List of ITIP Steering Committee Members

6.2 Peer Benchmarking

- Questionnaires

6.3 Focus Groups

- Presentation
- Graphics
- Day in the Life

6.4 Project Information

- Cost Estimate Information
- Project Plan (abbreviated)

Appendix 1

University of New Mexico Information Technology Infrastructure Plan Steering Committee

Information Technology Infrastructure Advisory Group

1. Mary Kenney, Associate Director of Facility Planning for the Health Sciences
2. Roger Lujan, Director, UNM Facility Planning
3. Holly Buchanan, Director, Hsc Library
4. Linda Byrd, Tech Planner, HSC Library
5. Ron Margolis, CIO, UNMH

Information Technology Master Plan Steering Committee

1. Advisory Group
2. Gary Bauerschmidt, Associate Director, Info Technology, UNM CIRT
3. Lou Sullo, Director, Information Technology, UNM CIRT
4. Matt Braun, Network Engineer, IS, UNM Hospitals
5. Robert Meyer, Architect, UNM Facility Planning
6. Janice Davis, Program Manager/Facility Planner, UNM Hospitals
7. Rick Olcott, Manager, Systems & Programming, UNM Physical Plant Info Systems
8. Donna Humbard, Manager, Communications, UNM Hospitals

Information Technology Master Plan Steering Committee (Continued)

9. Paula Loendorf, Director, UNM Telecommunications
10. Mark Reynolds, Operations Director, UNM Telecommunications
11. Jeff Easton, CEO Lobo Energy
12. Bill Adkins, Interim Associate Vice President, UNM CIRT
13. Max Kerlin, Director, Resource Management, Academic Affairs
14. Kathy Guimond, Chief, UNM PD
15. Fred Youberg, Director, EMIS Project
16. Walt Miller, Assoc VP, Student Development
17. Debby Knotts, Mgr, New Media and Extended Learning
18. Nancy Middlebrook, Program Planning Officer, Academic Affairs
19. Dick Howell, Special Assistant to Vice Provost

Appendix 2

Peer Benchmarking

- Peer Questionnaires

Appendix 3

Focus Groups

- Presentation
- Audience Response Graphics (Faculty Focus Group Session)
- Day in the Life Handout

KMIT Leadership Council Roster

HSC Appointed Members			
Title	Representative	Phone	Email
Associate Vice President for Knowledge Management and IT	Holly Buchanan	272-2548	hbuchanan@salud.unm.edu
Associate Vice President for Finance and Administration	Linda Easley	272-2885	mleasley@salud.unm.edu
Chief Information Officer UNMH	Ron Margolis	272-2168	rmargolis@salud.unm.edu

KMIT Advisory Council Roster

HSC Elected and Appointed Members		
Unit	Representative	Term
College of Nursing	Geoff Shuster, DNSc	7/03 - 6/06
College of Pharmacy	Jess Benson, PharmD	7/03 - 6/06
HSLIC	Christee King, MLS	7/03 - 6/05
School of Medicine	Steve Mitchell, MD	7/02 - 6/05
University Hospitals	Jerry McGraw, PA-C, MPAS, MBA	7/01 - 6/04
Academic Taskforce	Bill Troutman, PharmD (Chair)	7/02 - 6/05
Administration	Pug Burge	7/03 - 6/04
Clinical Taskforce/UH IS Steering Committee	Fred Hashimoto, MD	7/03 - 6/06
Education & Training Task Force	David Wilks, MD	7/02 - 6/05
Research Task Force	Ken Miller, PhD, RN (Chair Elect)	7/01 - 6/06
IAIMS Technical Task Force/IS Directors	Daniel Sandoval	7/01 - 6/04
HSC Member-at-Large	Matthew Luke, MD	7/03 - 6/06
HSC Member-at-Large	Philip Heintz, PhD	7/03 - 6/05
HSC Member-at-Large	Cynthia Lewis-Bliehall, MD	7/03 - 6/06
HSC Member-at-Large	Bob Bailey, MD	7/03 - 6/06

KMIT Advisory Council Ex Officio and External Representatives	
Unit	Representative
External Representative	Bill Adkins (UNM CIO)
External Representative	Lou Sullo (CIRT)
External Representative	Susan Carkeek (HR)
External Representative	Dick Howell, PhD (Extended University)
Ex officio - IAIMS IS Planner	Sally Bowler-Hill
Ex officio - HSLIC Informatics	Philip Kroth, MD, MS
Ex officio - CON Curriculum Committee	Nancy Morton, MS, and Robin Meiz- Grochowski, PhD
Ex officio - SOM Education Council	Eve Espey, MD
Ex officio - Biocomputing	Tudor Oprea, MD, PhD
Ex officio - Telemedicine Program	Dale Alverson, MD
Ex officio – VAMC	Michael Jones

KMIT Operations Council Roster

HSC Elected and Appointed Members			
Unit	Representative	Phone	Email
Leadership Council	Holly Buchanan (Chair)	272-2548	hbuchanan@salud.unm.edu
Planning Office	Sally Bowler-Hill	272-0691	sbowler-hill@salud.unm.edu
Technical Architecture sub-committee	Rick Adcock	272-9821	radcock@salud.unm.edu
UH Information Systems Steering Committee	Matt Braun	272-3270	mbraun@salud.unm.edu
Technical Architecture sub-committee	Mike Campbell	272-2168	mcampbell@salud.unm.edu
Administration sub-committee	Ryan Deller	272-2558	rdeller@salud.unm.edu
Leadership Council	Linda Easley	272-3192	leasley@salud.unm.edu
Technical Architecture sub-committee	Greg Gaillard	272-3684	ggallaird@salud.unm.edu
IAIMS Clinical Task Force, UH IS Steering Committee	Fred Hashimoto	272-2147	fhashimoto@salud.unm.edu
UH Information Systems Steering Committee	Glen Jornigan	272-2168	gjornigan@salud.unm.edu
UH Information Systems Steering Committee	Denise Jurca	272-3361	djurca@salud.unm.edu
Leadership Council	Ron Margolis	272-2168	rmargolis@salud.unm.edu
Technical Architecture sub-committee	Barney Metzner	272-1696	bmetzner@salud.unm.edu
UH Information Systems Steering Committee	Ella Sitkin	272-2168	esitkin@salud.unm.edu
Administration sub-committee	Dorothy Starr	272-3117	dstarr@salud.unm.edu
Advisory Council	Bill Troutman	272-4261	wtroutman@salud.unm.edu
Academic sub-committee	Janis Teal	272-4688	jteal@salud.unm.edu
Technical Architecture sub-committee	Kevin Wiley	272-3683	kwiley@salud.unm.edu

IS Directors Committee Roster

HSC Elected and Appointed Members	
Unit	Representative
Health Sciences Library and Informatics Center	John Abrams
Health Sciences Library and Informatics Center	Rick Adcock
UH Carrie Tingley Hospital	John Austin
Health Sciences Library and Informatics Center	Sally Bowler-Hill
Cancer Research and Treatment Center	John Brandt
University Hospitals	Matt Braun
Cancer Research and Treatment Center	Sarah Brooks
Health Sciences Library and Informatics Center	Holly Buchanan
University Hospitals	Mike Campbell

Cancer Research and Treatment Center	Ron Darling
Office of the Medical Investigator	Jean Durka
HSC Administration	Linda Easley
School of Medicine	Barbara Gabaldon
Health Sciences Library and Informatics Center	Greg Gaillard
UNM CIRT	Moir Gerety
University Physicians Associates	Gale Grabowski
University Hospitals	David Grisham
School of Medicine	Tom Gutierrez
Internal Medicine	Fred Hashimoto, MD
Health Sciences Library and Informatics Center	Peter Hicks
University Physicians Associates	Tom Hoehn
Dept of Anesthesiology	Rosa Jacquez
University Hospitals	Glen Jornigan
University Hospitals	Denise Jurca
University Hospitals	Ron Margolis
Dept of Cell Biology and Physiology	Mick McGee
Center of Development and Disability	Laurie McPherson
Health Sciences Library and Informatics Center	Barney Metzner
HSC Budget Office	Kirsten Moeller
Dept of Pathology	Althea Moss
Dept of Radiology	Daniel Sandoval
College of Nursing	Jon Sibray
University Hospitals	Ella Sitkin
General Clinical Research Center	Lori Sloane
UNM CIRT	Lou Sullo
Irmin Wehmeier	College of Pharmacy
Bioinformatics Core Office of Research and Graduate Studies	Michael Wester
Health Sciences Library and Informatics Center	Kevin Wiley

IS Steering Committee Roster

HSC Appointed Members	
Unit	Representative
Department of Internal Medicine	Sanjeev Aurora, MD
Department of Psychiatry	Bob Bailey, MD
University Hospitals - Administration	Nancy Brandt, MA
University Hospitals - Information Technology	Matthew Braun
Health Sciences Library and Informatics Center	Holly Buchanan, EdD
HSC Executive Vice President	Philip Eaton, MD
Health Sciences Library and Informatics Center	Gregory Gaillard
University Hospitals - Information Technology	David Grisham, PhD
Department of Internal Medicine	Fred Hashimoto, MD
Department of Radiology	Philip Heintz, PhD

University Physicians Associates	Tom Hoehn
University Hospitals - Information Systems	Glen Jornigan, BUS, BSMT
University Hospitals - Information Technology	Denise Jurca, MBA
University Hospitals - Health Information Management	Ginny Keenan
University Hospitals - Outcomes Research	Jim Little
University Hospitals - Administration	Ron Margolis, MBA
University Hospitals - Behavioral Health	Rodney McNease, MA
Health Sciences Library and Informatics Center	Barney Metzner
University Hospitals - Carrie Tingley Hospital	Barbara Ohm, MBA
University Hospitals - Ambulatory Services	Jamie Silva-Steele, RN, BSN, MBA
University Hospitals - Information Systems	Ella Sitkin, MS
University Hospitals - Quality / Outcomes Management	Paula Tietjen
Department of Radiology	Michael Williamson, MD
University Hospitals - Administration	PJ Woods, RN, PhD

HSC Advisory Council for Knowledge Management & Information Technology (KMIT)

A faculty liaison council has been commissioned by the Vice President for Health Sciences to support two-way dialogue among faculty and HSC leadership concerning information/telecommunication technologies needed to support education, research, patient care, and administration. The KMIT Leadership Council enhances communication among faculty in the School of Medicine, College of Nursing, and College of Pharmacy, and advises Holly Buchanan, Linda Easley, and Ron Margolis. This Council, comprised of faculty and staff, is an integral part of the IAIMS (Integrated Advanced Information Management Systems) planning process.

- **Charge:** Council members assist in predicting the future and in identifying faculty needs in the information/telecommunication technologies and knowledge management resources supporting HSC Strategic Planning goals in education, research, clinical care, and administration. Technologies and resources include those needed to support the curriculum, distance learning, continuing education, patient care and telehealth, research processes, outreach, training and professional development (including simulation), administrative services, workstation and network support, application support, web-based technologies for internet/intranet development, public access computing, classrooms, and audio-visual production. Specifically the Council shall:
 - Facilitate dialogue and networking between faculty and IT staff
 - Advise on policy development;
 - Examine contemporary problems and issues;
 - Raise awareness through forums, presentations, or demonstrations;
 - Serve as an advocate for the HSC with the IT Executive Cabinet
- **Structure:** Membership in the HSC KMIT Advisory Council is comprised of:
 - A faculty representative from each of the four academic units [College of Nursing, College of Pharmacy, School of Medicine, and Health Sciences Library and Informatics Center] and a representative from University Hospital (5);
 - Representatives from each of the IAIMS project planning committees (6);
 - HSC representatives-at-large, appointed by the VPHS (4) from recommendations of the Leadership Council;
 - External advisors appointed by the VPHS (2-3), e.g., a representative from CIRT, or local industry;
 - IAIMS system planner, ex officio (1);
 - Ex officio representatives from: SOM (Education Council), CON (Curriculum Committee and Research Committee), and COP (Curriculum Committee), Telemedicine Program, VAMC.
- **Membership Terms:** Terms for elected representatives are 3-years, and staggered, beginning annually in July.
- **Chair/Chair-Elect:** Council members elect, annually, a chair-elect, who will rise to become chair.
- **Meeting Frequency:** The Council meets at least six times a year, prepares a written record from the meeting to be distributed to HSC faculty, and submits an annual report.

Executive Vice President's Leadership Forum

March 3, 2005	<u>Third Annual Symposium on Scholarly Communication: Cultural Transformation of the University's Knowledge Base</u>	<u>Daniel Greenstein, PhD</u> , Associate Vice Provost for Scholarly Information and University Librarian for Systemwide Library Planning at the University of California and Executive Director of the California Digital Library
October 19, 2004	<u>CPOE (Computerized Provider Order Entry) – the Good, the Bad, and the Ugly</u>	J. Marc Overhage, MD, PhD Associate Professor of Medicine, Indiana University School of Medicine Investigator, Regenstrief Institute, Inc.
October 18, 2004	<u>Islands of Information: Linking Clinical Data</u>	J. Marc Overhage, MD, PhD Associate Professor of Medicine, Indiana University School of Medicine Investigator, Regenstrief Institute, Inc.
April 7, 2004	Testing the assertions, presentations of problems and case discussions	Stuart J. Nelson, MD Head, Medical Subject Headings Section National Library of Medicine National Institutes of Health
April 6, 2004	<u>Vocabulary Development and Maintenance</u> <u>The Example of MeSH</u> <u>Practical Considerations in Interoperability</u> <u>The Unified Medical Language System</u>	Stuart J. Nelson, MD Head, Medical Subject Headings Section National Library of Medicine National Institutes of Health
March 12, 2004	<u>Second Annual Symposium on Scholarly Communication: Stewardship of the University Community's Knowledge Base</u>	<u>Lawrence Lessig, J.D.</u> , Professor of Law at <u>Stanford Law School</u> , founder of the School's <u>Center for Internet and Society</u> <u>Johann van Reenen</u> , M.Sc., M.Dip. Lib. Sci., UNM Associate Professor, Assistant Dean for Public and Research Services of the UNM General Library and Director of Centennial Science and Engineering Library
February 18, 2004	<u>On the Proper Use of Man and Machines</u>	Stuart J. Nelson, MD Head, Medical Subject Headings Section National Library of Medicine National Institutes of Health
February 17, 2004	<u>Problems in Formalization (AKA The Limits of Logic)</u>	Stuart J. Nelson, MD Head, Medical Subject Headings Section National Library of Medicine National Institutes of Health
March 7, 2003	Through the Lens of Complex Adaptive Systems: The Emergence of Learning	Stewart P. Mennin, PhD Assistant Dean, Educational Development and Research

	Individually and Collectively	Professor, Department of Cell Biology and Research, School of Medicine, UNM
February 27, 2003	First Annual Symposium on Scholarly Communications: Scholarly Communication and the Common Good	David Shulenburg, Provost and Executive Vice Chancellor, University of Kansas, "The Scholarly Communication Crisis: a Call for a Public Goods Solution." Alan Covich, Professor, College of Natural Resources, Colorado State University, "Evaluating the Success of BioOne: an Innovative Partnership of Professional Societies, Libraries, Publishers, and Universities." Rick Luce, Director, LANL Research Library, "Out of the Quagmire: a Focus on Institutional Repositories."
May 23, 2002	Creating Community-Wide Health Information Systems Architectures: Partnering with Regional Health Planning Groups Empowering, Embracing, Energizing Consumers: A Mandate for Change	Patricia Brennan , Ph.D, M.S.N Professor of Nursing & Industrial Engineering University of Wisconsin-Madison Patricia Brennan , Ph.D, M.S.N Professor of Nursing & Industrial Engineering University of Wisconsin-Madison
January 30, 2002	Building an Medical Informatics Community	Charles P. Friedman, Ph.D. Professor of Medicine & Information Sciences Associate Vice Chancellor for Biomedical Informatics University of Pittsburgh
July 26, 2001	Experiential Training for Emergency Responders using Virtual Reality	Sharon Stansfield, Ph.D. Ithaca College
June 7, 2001	Unified Medical Language System (UMLS)	Zoe Stavri, PhD.
March 29, 2001	The Impact of Information Technology on Research, Education and Delivery of Health Care in the next decade.	Valerie Florance, PhD. AAMC
March 15, 2001	Technology-Driven Planning	
March 7, 2001	Beyond Wired: Wireless Technology and Health Information	5th Annual Houston Conference on Health Informatics

VICE PRESIDENT'S LEADERSHIP FORUM - EVALUATION FORM SUMMARIES


Speaker	Date	Attendees (N)	Relevancy of Topics	Timeliness of Topic	Program Format	Speaker Knowledge	Q&A Segment	Program Evaluation
3rd Annual Scholarly Communications Symposium	3/3/2005	95 *	*	*	*	*	*	*
Overhage	10/19/2004	19	4.94	4.94	4.75	4.94	4.75	4.94
Overhage	10/18/2004	21	4.90	4.80	4.40	4.90	4.60	4.70
Nelson	4/7/2004	9	5.00	5.00	5.00	5.00	5.00	5.00
Nelson	4/6/2004	22	4.54	4.38	3.92	4.85	3.75	4.46
2nd Annual Scholarly Communications Symposium	3/12/2004	80	*	*	*	*	*	*
Nelson	02/18/04	19	4.37	4.74	4.26	4.95	4.29	4.63
Nelson	02/17/04	18	4.22	4.39	4.22	4.94	3.58	4.33
Mennin	03/07/03	25	4.52	4.44	4.70	4.85	4.73	4.50
1st Annual Scholarly Communications Symposium	02/27/03	96	*	*	*	*	*	*
Brennan	05/23/02	26	4.96	4.80	4.32	4.84	4.64	4.52
Brennan	05/23/02	16	4.67	4.42	3.58	4.67	4.42	3.83
Freidman	01/30/02	61	4.38	4.58	4.00	4.50	4.19	4.00
Stansfield	02/26/01	16	3.45	3.64	3.27	3.91	3.64	3.73
Florence	03/29/01	45	4.77	4.57	4.05	4.73	4.48	4.50

NOTES:


The scale used in the evaluation ranges from 5 (Excellent) to 1 (Poor).

* The Scholarly Communications Symposium utilized a different evaluation form


IAIMS Planning Aid: Features and Functions


IAIMS Planning Aid: Features and Functions																		
	Leadership Council			Advisory Council			Advisory Council			Advisory Council			Advisory Council			Advisory Council		
	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented	1- Very Little Progress 2- Partially Present 3- Mostly Present 4- Fully Implemented			
	N=7	N=10	Gap	N=11	N=11	N=11	N=4	N=4	N=4	N=6	N=27	N=25	Gap					
2002 - Average	2000 - Average	Gap	2002 - Average	2000 - Average	Gap	2002 - Average	2000 - Average	Gap	2002 - Average	2000 - Average	Gap	2002 - Average	2000 - Average	Gap				
Information Culture of the Institution																		
Education, research & clinical resources are accessible from a single desktop display.	2.67	2.00	0.67	2.30	2.09	0.21	2.75	2.50	0.25	2.57	2.20	0.38						
There is an organizational structure for information that is recognized and accepted.	3.14	2.20	0.94	2.50	2.45	0.05	2.40	1.67	0.73	2.14	2.55	0.44						
IAIMS issues are a regular feature of senior management and board discussions.	2.43	2.57	-0.14	2.56	2.00	0.56	3.00	2.50	0.50	2.71	2.67	0.32						
The information infrastructure is recognized as a fundamental tool for meeting business (mission) goals.	2.86	2.88	-0.02	2.63	2.55	0.08	2.60	2.00	0.60	3.00	2.77	0.30						
There is an institutional strategy for Internet-based commerce.	2.17	2.00	0.17	1.67	2.00	-0.33	1.80	2.00	-0.20	1.57	1.80	-0.20						
There are institutional strategic initiatives that depend on information infrastructure.	2.86	2.22	0.63	2.90	2.40	0.50	2.75	3.00	-0.25	2.86	2.84	0.30						
Access to library, research and clinical information systems is time, place, and platform independent.	2.86	2.63	0.23	2.80	2.45	0.35	2.75	2.75	0.00	2.14	2.64	0.03						
Information policies reflect input from all effected parties.	3.00	2.38	0.63	2.20	2.11	0.09	2.20	2.25	-0.05	2.43	2.46	0.21						
The IAIMS effort is supported by stable institutional funds.	2.25	2.00	0.25	2.33	1.89	0.44	2.00	2.67	-0.67	2.33	2.23	0.04						
Faculty, students and staff can view information about themselves stored in the institution's information systems.	2.17	2.00	0.17	1.80	1.50	0.30	1.60	1.50	0.10	1.83	1.85	0.18						
There is a zero-tolerance policy regarding violations of security/confidentiality of personal information.	3.14	2.57	0.57	2.18	2.09	0.09	1.67	2.00	-0.33	2.50	2.37	0.15						
There is a designation of IAIMS leadership with proper background and status.	3.50	2.50	1.00	2.64	2.50	0.14	1.83	2.25	-0.42	2.80	2.69	0.28						
There is evidence of institutional unity/commitment to the IAIMS program.	3.20	2.50	0.70	2.40	2.55	-0.15	1.60	2.20	-0.60	3.00	2.55	0.42						
There is leadership appreciation of the importance of information technology to the goals of the	3.60	2.50	1.10	2.90	2.80	0.10	2.91	2.50	0.41	3.00	3.10	0.50						
There are training and policy awareness programs for all users of information systems.	2.43	1.75	0.68	2.30	2.67	-0.37	2.00	2.25	-0.25	2.50	2.31	0.22						
All major organizational components are involved in IAIMS planning and operations management.	2.71	2.25	0.46	2.40	1.90	0.50	2.00	2.00	0.00	2.67	2.45	0.40						
Average Score across section within group	2.81	2.31	0.50	2.41	2.25	0.16	2.24	2.25	-0.01	2.50	2.49	0.22						
The Information Management Plan																		
There is an IAIMS Plan and a process for keeping it updated.	2.71	2.88	-0.16	3.10	2.40	0.70	3.00	2.75	0.25	3.43	3.06	0.39						
There are IAIMS activities that support national information goals(outreach, NGL, training, underserved).	2.67	2.71	-0.05	2.70	2.18	0.52	2.50	1.00	1.50	2.33	2.55	1.97						
Administrative computing for health care, education and research is represented in the IAIMS plan.	2.83	2.71	0.12	2.90	2.55	0.35	2.67	2.00	0.67	3.00	2.85	0.43						
There is a component of the IAIMS plan that promotes and rewards innovation.	2.60	2.50	0.10	2.08	2.09	-0.01	2.00	1.67	0.33	1.75	2.11	0.02						
There is a strategic architecture document - (see Hripcsak article in JAMIA).	2.67	1.67	1.00	2.33	1.70	0.63	0.00	2.50	-2.50	2.40	1.85	-0.11						
There are evaluation methods in place to assess progress toward/achievement of IAIMS goals.	3.00	1.83	1.17	2.40	2.18	0.22	3.00	2.00	1.00	2.50	2.73	0.01						
There are milestones for reaching key elements of the IAIMS plan.	3.00	2.00	1.00	2.50	2.30	0.20	3.00	2.75	0.25	2.71	2.80	0.45						
Average Score across section within group	2.78	2.33	0.45	2.57	2.20	0.37	2.31	2.10	0.21	2.59	2.56	0.36						
Information Management and Administration																		
There is a program for assessing security vulnerabilities (e.g., run 'hacker scripts').	2.50	1.67	0.83	2.40	1.91	0.49	2.00	1.33	0.67	2.00	2.23	1.64						
There is designated leadership with appropriate background and status.	3.33	2.43	0.90	2.73	2.45	0.27	2.60	3.00	-0.40	3.33	3.00	0.37						
There are sanctions for violation of confidentiality/security that are enforced.	2.33	2.50	-0.17	1.90	1.90	0.00	3.00	2.00	1.00	2.50	2.43	0.30						
Every individual has a unique identifier or logon-ID.	3.43	3.33	0.10	3.00	3.09	-0.09	3.33	3.25	0.08	2.88	3.16	-0.07						
There are confidentiality and security protections for computer based information about individuals.	2.71	2.86	-0.14	2.33	2.70	-0.37	3.25	2.00	1.25	2.71	2.75	0.23						
There are limits to unauthorized physical access to computer systems.	2.40	2.67	-0.27	2.50	2.55	-0.05	3.00	2.33	0.67	2.50	2.60	0.08						
The use and efficiency of systems and services is measured.	2.67	2.00	0.67	2.10	2.09	0.01	2.33	1.50	0.83	1.75	2.21	1.86						
Input is gathered from system users, including patients and students, about the cost and benefits of IT applications.	2.80	1.75	1.05	1.80	1.64	0.16	2.00	1.00	1.00	2.00	2.15	1.46						
The institution has adopted standards for hardware, network design.	3.33	2.90	0.43	2.70	2.64	0.06	2.67	3.25	-0.58	3.17	2.97	0.04						
The institution has adopted standards for software and integration.	3.33	3.33	0.00	2.40	3.50	-1.10	2.67	3.25	-0.58	2.13	2.63	-0.73						
Virus checking programs are installed on all servers.	3.33	3.17	0.17	2.80	3.27	-0.47	3.20	3.00	0.20	2.83	3.04	-0.10						
There is a current inventory of technological status and capabilities.	3.33	2.20	1.13	2.44	2.45	-0.01	2.33	2.25	0.08	2.40	2.63	0.33						
There is secure authentication for remote and mobile users.	2.80	3.17	-0.37	2.75	2.67	0.08	2.00	2.33	-0.33	1.86	2.35	-0.37						
There is substantial involvement of the library in overall management of information.	3.40	3.14	0.26	3.00	3.18	-0.18	2.67	3.25	-0.58	2.17	2.81	-0.38						
There is a firewall that bars access by outsiders to all but systems critical to them.	2.83	3.00	-0.17	2.13	2.20	-0.08	2.67	1.33	1.33	1.83	2.36	0.19						
There is a process for evaluating success/failure/lessons learned.	3.00	2.00	1.00	2.00	1.80	0.20	3.20	2.00	1.20	2.00	2.55	1.93						
The inventory of users, devices and usage is used for ongoing management of the information environment.	3.00	2.00	1.00	2.30	2.45	-0.15	2.00	2.00	0.00	1.83	2.28	0.13						
There are data marts or data warehouses for administrative and research needs.	2.33	2.33	0.00	1.90	2.00	-0.10	1.67	1.00	0.67	2.17	2.02	0.24						
There is desktop access to full text materials and digital images stored on institutional servers.	2.40	2.17	0.23	2.30	2.33	-0.03	2.33	1.33	1.00	2.33	2.34	0.40						
There are role-based access controls to confidential information.	2.50	2.33	0.17	2.22	2.36	-0.14	2.75	2.00	0.75	2.33	2.45	0.22						
There is an emergency access plan for the EMR.	2.25	2.67	-0.42	2.43	2.30	0.13	4.00	2.33	1.67	3.00	2.92	0.49						
Average Score across section within group	2.86	2.55	0.31	2.39	2.45	-0.06	2.65	2.18	0.47	2.37	2.57	0.17						
Education Mission																		

Computers and the Internet are fundamental to the success of education programs.	3.50	2.88	0.63	2.90	2.64	0.26	3.25	3.00	0.25	2.50		3.04	2.84	0.20
Health professions instruction includes information/informatics specialists.	3.29	2.50	0.79	2.30	2.10	0.20	2.17	1.67	0.50	2.50		2.56	2.09	0.47
Health professions education programs have informatics competency requirements.	2.71	1.60	1.11	1.90	1.60	0.30	2.00	1.00	1.00	1.00		1.90	1.40	0.50
There is a curriculum management system for use by educational administrators and instructors.	2.86	2.17	0.69	1.80	2.09	-0.29	2.60	1.33	1.27	2.00		2.31	1.86	0.45
All required curriculum materials are available in electronic form.	2.67	2.67	0.00	2.17	1.90	0.27	2.60	1.33	1.27	2.00		2.36	1.97	0.39
There are academic faculty involved in IT development for education.	3.40	1.67	1.73	2.30	2.10	0.20	2.20	1.33	0.87	1.50		2.35	1.70	0.65
The medical education research portfolio includes informatics-related topics.	3.17	1.50	1.67	1.90	2.00	-0.10	2.00	1.67	0.33	1.00		2.02	1.72	0.29
The effects of IT applications on teaching and learning are measured.	2.80	2.00	0.80	1.60	1.70	-0.10	2.00	1.00	1.00	1.00		1.85	1.57	0.28
There are academic rewards for IT-related innovation.	2.20	2.50	-0.30	1.40	1.30	0.10	2.00	1.00	1.00	1.00		1.65	1.60	0.05
There is an integrated electronic student record.	2.20	1.20	1.00	1.67	1.60	0.07	2.00	1.00	1.00	1.00		1.72	1.27	0.45
IAIMS costs related to education are budgeted and monitored.	2.75	1.25	1.50	1.56	1.89	-0.33	3.50	1.33	2.17	1.00		2.20	1.49	0.71
Average Score across section within group	2.87	1.99	0.87	1.95	1.90	0.05	2.39	1.42	0.97	1.50		2.18	1.77	0.41
Clinical Mission														
An audit log is maintained of accesses to patient-related information.	3.00	2.60	0.40	2.50	2.10	0.40	3.50	2.00	1.50	3.00		3.00	2.23	0.77
Affiliates in remote clinics have comparable access to the institution's clinical information systems.	2.40	2.50	-0.10	2.50	1.80	0.70	4.00	2.00	2.00	3.20		3.03	2.10	0.93
All data applicable to one patient can be obtained through the same interface.	2.25	2.00	0.25	1.90	1.44	0.46	2.50	1.75	0.75	3.20		2.46	1.73	0.73
New information about patients is stored in electronic form.	2.50	2.00	0.50	2.30	2.22	0.08	3.00	2.00	1.00	3.20		2.75	2.07	0.68
The clinical information system has decision support (e.g. alerts, literature links, etc.).	2.75	2.00	0.75	1.88	2.38	-0.50	3.00	1.50	1.50	2.33		2.49	1.96	0.53
There are 'time-out' programs that log out registered users after idle periods.	3.00	2.00	1.00	2.67	1.33	1.33	3.50	2.67	0.83	2.75		2.98	2.00	0.98
Patients have the right to request and view audits of access to their medical records.	2.40	2.00	0.40	2.67	1.67	1.00	1.50	-0.50	2.20	2.00		2.07	1.72	0.34
The authorization form for patients improves their understanding of options and has a limited life span.	2.20	1.50	0.70	2.00	2.00	0.00	2.50	2.00	0.50	2.00		2.18	1.83	0.34
Patient-identifiable information is encrypted before it is sent over public networks.	2.50	1.67	0.83	2.00	1.89	0.11	2.00	2.33	-0.33	1.60		2.03	1.96	0.06
There are procedures for moving patient information from print to electronic form.	2.50	1.33	1.17	1.88	1.63	0.25	2.00	1.50	0.50	2.40		2.19	1.49	0.71
There are linkages between clinical and academic informatics groups.	2.25	1.75	0.50	1.90	2.22	-0.32	2.00	2.00	0.00	2.50		2.16	1.99	0.17
The effects of IT applications on the clinical process of care are measured.	2.25	1.67	0.58	1.44	1.88	-0.43	3.00	1.50	1.50	2.00		2.17	1.68	0.49
The effects of IT applications on health outcomes are measured.	2.25	1.25	1.00	1.38	1.88	-0.50	3.00	1.50	1.50	2.00		2.16	1.54	0.61
The effects of IT applications on the timeliness of care are measured.	2.25	1.25	1.00	1.56	1.88	-0.32	3.00	1.25	1.75	2.00		2.20	1.46	0.74
There are established telemedicine activities.	3.00	2.00	1.00	2.44	2.89	-0.44	3.00	2.25	0.75	2.00		2.61	2.38	0.23
IAIMS costs relating to clinical care are budgeted and monitored.	2.50	2.00	0.50	1.67	2.00	-0.33	3.00	2.00	1.00	1.00		2.04	2.00	0.04
Average Score across section within group	2.50	1.84	0.66	2.04	1.95	0.09	2.75	1.86	0.89	2.34		2.41	1.88	0.52
Research Mission														
There are academic faculty with primary roles in informatics research.	2.80	1.60	1.20	1.75	1.78	-0.03	1.25	2.33	-1.08	1.33		1.78	1.90	-0.12
The basic research portfolio includes informatics topics.	2.60	1.60	1.00	1.38	1.56	-0.18	1.33	1.75	-0.42	1.50		1.70	1.64	0.07
Basic researchers have access to clinical information stored institutional systems resources.	2.60	1.57	1.03	1.43	1.56	-0.13	1.50	1.75	-0.25	2.00		1.88	1.63	0.26
There is a system for electronic grants management, including approvals and submissions.	1.33	1.57	-0.24	1.89	1.78	0.11	2.00	2.50	-0.50	1.92		1.78	1.95	-0.17
Informatics support (e.g., database design, terminology, decision support, etc) is available to researchers.	2.50	1.57	0.93	1.86	1.78	0.08	2.50	2.00	0.50	1.67		2.13	1.78	0.35
There is a process for providing basic researchers with access to clinical information in institutional systems.	2.50	1.25	1.25	1.50	1.89	-0.39	2.50	2.25	0.25	1.67		2.04	1.80	0.25
There are mechanisms for protecting security and integrity of research data in electronic form.	2.00	2.00	0.00	2.00	2.22	-0.22	2.50	2.25	0.25	1.67		2.04	2.16	-0.12
IAIMS costs relating to research are budgeted and monitored.	2.50	1.75	0.75	1.50	2.00	-0.50	2.50	2.50	0.00	1.50		2.00	2.08	-0.08
The number of externally funded informatics projects has increased.	3.00	2.25	0.75	2.00	2.29	-0.29	2.50	2.33	0.17	2.00		2.38	2.29	0.09
Average Score across section within group	2.43	1.68	0.74	1.70	1.87	-0.17	2.06	2.19	-0.12	1.69		1.97	1.91	0.06
Average Score across all questions within group	2.72	2.17	0.55	2.20	2.15	0.05	2.46	2.02	0.44	2.21		2.40	2.11	0.29

Present State				IAIMS Planning Aid: Features and Functions				Future State			
1 - Very Little Progress	2 - Partially Present	3 - Mostly Present	4 - Fully Implemented					1 - All Institutions Should Have	2 - Most Institutions Should Have	3 - Leading Edge Should Have	4 - Only Those Who Want it Should Have it
				Information Culture of the Institution							
				Education, research & clinical resources are accessible from a single desktop display.							
				There is an organizational structure for information that is recognized and accepted.							
				IAIMS issues are a regular feature of senior management and board discussions.							
				The information infrastructure is recognized as a fundamental tool for meeting business (mission) goals.							
				There is an institutional strategy for Internet-based commerce.							
				There are institutional strategic initiatives that depend on information infrastructure.							
				Access to library, research and clinical information systems is time, place, and platform independent.							
				Information policies reflect input from all effected parties.							
				The IAIMS effort is supported by stable institutional funds.							
				Faculty, students and staff can view information about themselves stored in the institution's information systems.							
				There is a zero-tolerance policy regarding violations of security/confidentiality of personal information.							
				There is a designation of IAIMS leadership with proper background and status.							
				There is evidence of institutional unity/commitment to the IAIMS program.							
				There is leadership appreciation of the importance of information technology to the goals of the enterprise.							
				There are training and policy awareness programs for all users of information systems.							
				All major organizational components are involved in IAIMS planning and operations management.							
				The Information Management Plan							
				There is an IAIMS Plan and a process for keeping it updated.							
				There are IAIMS activities that support national information goals(outreach, NGI, training, underserved).							
				Administrative computing for health care, education and research is represented in the IAIMS plan.							
				There is a component of the IAIMS plan that promotes and rewards innovation.							
				There is a strategic architecture document - (see Hripcsak article in JAMIA).							
				There are evaluation methods in place to assess progress toward/achievement of IAIMS goals.							
				There are milestones for reaching key elements of the IAIMS plan.							

Present State				IAIMS Planning Aid: Features and Functions				Future State			
1 - Very Little Progress	2 - Partially Present	3 - Mostly Present	4 - Fully Implemented					1 - All Institutions Should Have	2 - Most Institutions Should Have	3 - Leading Edge Should Have	4 - Only Those Who Want it Should Have it
				Information Management and Administration							
				There is a program for assessing security vulnerabilities (e.g., run 'hacker scripts').							
				There is designated leadership with appropriate background and status.							
				There are sanctions for violation of confidentiality/security that are enforced.							
				Every individual has a unique identifier or logon-ID.							
				There are confidentiality and security protections for computer based information about individuals.							
				There are limits to unauthorized physical access to computer systems.							
				The use and efficiency of systems and services is measured.							
				Input is gathered from system users, including patients and students, about the cost and benefits of IT applications.							
				The institution has adopted standards for hardware, network design.							
				The institution has adopted standards for software and integration.							
				Virus checking programs are installed on all servers.							
				There is a current inventory of technological status and capabilities.							
				There is secure authentication for remote and mobile users.							
				There is substantial involvement of the library in overall management of information.							
				There is a firewall that bars access by outsiders to all but systems critical to them.							
				There is a process for evaluating success/failure/lessons learned.							
				The inventory of users, devices and usage is used for ongoing management of the information environment.							
				There are data marts or data warehouses for administrative and research needs.							
				There is desktop access to full text materials and digital images stored on institutional servers.							
				There are role-based access controls to confidential information.							
				There is an emergency access plan for the EMR.							
				Education Mission							
				Computers and the Internet are fundamental to the success of education programs.							
				Health professions instruction includes information/informatics specialists.							
				Health professions education programs have informatics competency requirements.							
				There is a curriculum management system for use by educational administrators and instructors.							

Present State				IAIMS Planning Aid: Features and Functions				Future State			
1 - Very Little Progress	2 - Partially Present	3 - Mostly Present	4 - Fully Implemented					1 - All Institutions Should Have	2 - Most Institutions Should Have	3 - Leading Edge Should Have	4 - Only Those Who Want it Should Have it
				All required curriculum materials are available in electronic form.							
				There are academic faculty involved in IT development for education.							
				The medical education research portfolio includes informatics-related topics.							
				The effects of IT applications on teaching and learning are measured.							
				There are academic rewards for IT-related innovation.							
				There is an integrated electronic student record.							
				IAIMS costs related to education are budgeted and monitored.							
				Clinical Mission							
				An audit log is maintained of accesses to patient-related information.							
				Affiliates in remote clinics have comparable access to the institution's clinical information systems.							
				All data applicable to one patient can be obtained through the same interface.							
				New information about patients is stored in electronic form.							
				The clinical information system has decision support (e.g. alerts, literature links, etc.).							
				There are 'time-out' programs that log out registered users after idle periods.							
				Patients have the right to request and view audits of access to their medical records.							
				The authorization form for patients improves their understanding of options and has a limited life span.							
				Patient-identifiable information is encrypted before it is sent over public networks.							
				There are procedures for moving patient information from print to electronic form.							
				There are linkages between clinical and academic informatics groups.							
				The effects of IT applications on the clinical process of care are measured.							
				The effects of IT applications on health outcomes are measured.							
				The effects of IT applications on the timeliness of care are measured.							
				There are established telemedicine activities.							
				IAIMS costs relating to clinical care are budgeted and monitored.							
				Research Mission							
				There are academic faculty with primary roles in informatics research.							
				The basic research portfolio includes informatics topics.							

Present State				IAIMS Planning Aid: Features and Functions				Future State			
1 - Very Little Progress	2 - Partially Present	3 - Mostly Present	4 - Fully Implemented					1 - All Institutions Should Have	2 - Most Institutions Should Have	3 - Leading Edge Should Have	4 - Only Those Who Want it Should Have it
				Basic researchers have access to clinical information stored institutional systems resources.							
				There is a system for electronic grants management, including approvals and submissions.							
				Informatics support (e.g., database design, terminology, decision support, etc) is available to researchers.							
				There is a process for providing basic researchers with access to clinical information in institutional systems.							
				There are mechanisms for protecting security and integrity of research data in electronic form.							
				IAIMS costs relating to research are budgeted and monitored.							
				The number of externally funded informatics projects has increased.							

Knowledge Management and Information Technology (KMIT) Health Sciences Center Information Technology Standards for Users

Revised April 25, 2005 and approved by the KMIT Operations Council and KMIT Advisory Council

1.0 Introduction

Information Technology (IT) standards for the Health Sciences Center (HSC) have been developed to ensure the highest level of technical support and provide a more reliable, integrated Knowledge Management and Information Technology (KMIT) environment. The standards have been written in view of published State of New Mexico and UNM IT standards; industry best practices; local, state and federal regulations and peer institution benchmarks for IT services and support.

This document, initially authorized and approved in 1998, will be reviewed and revised annually so that the standards remain relevant and useful. Some sections may be updated more frequently to accommodate technology and regulatory changes.

These standards are developed, reviewed, and approved by the HSC KMIT advisory groups (i.e. KMIT Operations Council, KMIT Advisory Council, KMIT Leadership Council) and the Information Systems (IS) Directors Committee. Standards are created and updated based on feedback to the HSC Help Desks; industry best practices and trends identified by HSC IT staff; and technology surveys, including the biennial IT survey given by the Health Sciences Library and Informatics Center (HSLIC).

2.0 Support Standards

2.1 Help Desk Support

Detailed contact information and descriptions of technical support services for the HSLIC and UNM Hospitals (UNMH) Help Desks can be found on the following pages:

<http://hsc.unm.edu/library/usersupport/>
http://hyper.unm.edu/unmhs_intranet/IT/Index.cfm?nbcid=2.

In general, user support services available through the UNM Computer and Information Resources and Technology (CIRT) unit are also available to HSC campus users. For example, software that is licensed for distribution to UNM faculty, staff and students can be accessed at: <http://www.unm.edu/cirt/swdist/index.html>. For a list of CIRT consulting services, review their web page: <http://www.unm.edu/cirt/cirt4.html>. However, in most cases, HSC users should first contact the HSLIC or UNMH Help Desks in order to be directed to or report problems with CIRT systems.

2.2 Notification of Changes in Levels of System Support

HSC Departments can expect at least 3 months notice of any major changes in system standards or support, i.e. changes in support for operating systems or productivity applications that will require hardware/software upgrades. Prior to publication, all proposed changes will be discussed within KMIT, IS Directors and HSC Departmental Contacts groups to assure appropriate opportunity for feedback from faculty and technical staff.

3.0 Authority

3.1 State of New Mexico IT and UNM CIRT Standards

In general, the HSC will meet or exceed minimum Information Technology Standards defined by the New Mexico Office on Information and Communications Management (OICM) and UNM CIRT.

3.2 HSC Definition of Knowledge Management and Information Technology and Guiding Principles

Knowledge management creates a user-centered environment that ensures easy access to and ethical use of appropriate information resources. Effective policy and training, as well as a ubiquitous, unobtrusive information technology infrastructure are essential to a knowledge management program providing stewardship for the collection, storage, organization, retrieval, archiving, and access to data and information.

Information technology supports knowledge management and includes a variety of devices and the connectivity that links them, in order to enable all forms of communication.

The **Guiding Principles** for fostering the creation of a knowledge management environment to maximize the power of information technologies include the following:

- Data gathering takes place once, accurately, and at the original source. It will be integrated and anticipate future needs.
- Information is available in a timely, useful and intuitive way to those with the need to know.
- The knowledge management environment enriches knowledge-based interactions and decisions, and eliminates all process steps that do not add value.

4.0 Network Management Standards

4.1 Infrastructure and Centralized Services

Core Network Services

CIRT provides UNM with commodity and specialized Internet access. Additionally, CIRT maintains the core network infrastructure that links the HSC network to other UNM and Internet resources.

The HSC Network Management Team supports all HSC campus network equipment in accordance with CIRT standards. The HSC Network Management Team maintains all network equipment, including the core network as well as distribution and access layers. They also oversee the distribution of IP addresses within the .health.unm.edu domain.

Wireless

The HSC currently provides 802.11b wireless access to the UNM network and the Internet in most of its buildings. This access was designed to provide coverage for large conference rooms and open public areas. Future plans include greater penetration into individual office spaces areas throughout all buildings.

At this time the wireless network is for convenience only. Authentication and encryption are not required. At some point in the near future the HSC will standardize to a specific 802.11 version when security is deployed to the wireless networks to ensure enterprise wide compliance with HIPAA security standards for electronic patient information. Once this security is implemented, HSLIC will have the only public wireless access at the HSC.

Building Cabling and Telecommunications (pager, voice mail, telephone)

UNM Telecommunications supports telephone/PBX communication services at the HSC. UNMH IT (the Network Management Team) serves as the initial point of contact for all HSC telecommunications work requests.

The current UNM copper cabling standard is category 5e for data and voice. The 'standard' faceplate includes two data ports and one voice port. Per the UNM IT Master plan, category 6 cabling will be considered for all major new construction.

Centralized Services

CIRT supports the centralized financial, human resource and student systems for all of UNM including the HSC. UNMH has its own centralized financial (Ross Financials) and human resource (Empath) systems, for which its IT division provides technical support.

4.2 Network ID

At UNM the term NetID is used to describe a username/password combination required for authentication to UNM managed secured systems and services. All UNM employees are provided with a UNM NetID. UNM NetID's are used to access: UNM email, UNM ERP applications, UNM's eLibrary, WebCT, UNM Parking Services and UNM portal/web applications. The CIRT Support Center provides support for services accessed using the UNM NetID.

In addition to the UNM NetID, all HSC employees receive a separate HSC NetID. HSC NetIDs are used to access: HSC network file sharing services, GroupWise email, desktop PCs, HSC specific web applications and remote access to HSC restricted library services.

Efforts to synchronize provisioning and maintenance of UNM and HSC NetIDs are under way. The HSC will not support the implementation of new systems that do not use one of these IDs for authentication. More information about NetIDs at UNM can be found at:

<http://hsc.unm.edu/library/usersupport/FAQ/whatisanetid.shtml> .

Directory Services are the core technology behind UNM's NetIDs. In an effort to coordinate the integration of new servers and applications, users should coordinate the introduction of new systems and shared applications with HSLIC or UNMH IT staff to insure support and compatibility with one of the Directory Services technologies supported by UNM (Microsoft's Active Directory, Novell's eDirectory, LDAP).

4.3 Server and Systems Management

In the interest of planned growth, business continuity and efficient use of UNM resources within the HSC campus environment, HSC departments should consult with HSLIC staff prior to all application/file server purchases. The HSC Network Management Team will not provide network connectivity to systems that have not received prior authorization to provide server based services. Systems currently in place are subject to periodic assessment to ensure they are in compliance with industry best practices along with state and federal regulations (e.g. HIPAA). Systems shown to represent a security risk to the institution by not complying with current support standards are subject to remediation by their assigned data owner.

All UNMH server purchases must be made through the Director of PC Systems and Support. This includes any servers needed to support vendor applications at UNMH.

5.0 Security Standards

5.1 Security/Passwords

Each employee is individually responsible for maintaining their passwords in accordance with the UNM and HIPAA mandated HSC password protection policy and procedures. Doing so will help assure the security and integrity of individually identifiable and business critical information. Users of UNMH IT managed systems are required to attend training and sign a confidentiality statement before receiving system access.

5.2 Virus Scanning and Data Backup

All UNM or UNMH desktops and servers connected to campus networks must have current virus scanning installed and actively scanning the appropriate file systems. McAfee VirusScan is the current, centrally managed and site-licensed virus protection software available at no cost for all HSC computers running Windows 2000 or XP Professional. It is therefore strongly recommended that HSC and UNMH users use McAfee's VirusScan unless there is a significant business need to install a different product.

All connections on the network are continuously monitored for malicious activity that is the result of a virus infection or system compromise. Given the criticality of the HSC network, the network connection/port of an infected/compromised machine will be disabled until the issue is addressed and approved for reactivation by one of the HSC Help Desks.

All centralized systems supported by UNMH IT and HSLIC are backed up in accordance with best practices and HIPAA legislation. Individual users in cooperation with systems administrators should develop a regular system and data backup procedure for workstations and departmental servers. Everyone should recognize that they are responsible for data stored on local system drives. Those who maintain mission critical servers and services should use current enterprise class business continuity procedures including: off-site storage, automated media rotation and redundancy. All backup and business continuity procedures should be reviewed annually in reference to the HSC IT Disaster and Contingency Plan Policy which can be found at:

http://hsc.unm.edu/library/kmit/docs/IT%20Disaster%20and%20Contingency%20Plan_V5.pdf

6.0 Electronic Communication Standards

6.1 Email and Calendaring

All HSC Information Technology staff support GroupWise (GW) for faculty, staff and student email and electronic calendaring (along with other GW features). There is no charge to units for installation of the GW client on the desktop. UNM CIRT does not promote a particular e-mail client but provides limited support for Mulberry and UNM Web Mail. They currently support Corporate Time as their calendaring service.

In response to increased concern about the impact of unsolicited mail on employee productivity and HSC email systems, spam filtering software has been installed on the salud.unm.edu gateway. The filter is designed to limit the amount of junk email (spam) distributed to individual GW accounts. Messages from the .edu, .gov and .org domains are not screened. Messages from other domains (.com, .net, etc.) are evaluated and scored according to the message type, route, origin and several other parameters that are known to identify spam. Only messages which accumulate a high score are blocked from the GW system. When a message is blocked, an automated reply to that effect is returned to the sender. The server-based spam filter works automatically, and does not require a specific version of GW.

6.2 Terminal Emulation

The HSLIC and UNMH Help Desks provide full support for SSH ("Secure Shell"), which can be downloaded from the CIRT web site, to provide secure terminal emulation access to mainframe systems. UNMH Help Desk also provides support for LanWorkPlace Pro and SmarTerm. Support for these insecure terminal emulation products is limited and will be diminished over time.

6.3 Video and Internet Conferencing

The HSC offers faculty, students and staff a variety of video conferencing services including: IP multicast/multipoint sessions (e.g. Access Grid and Conference XP), IP point-to-point/H.323 sessions (e.g. Windows Messenger) and secure H.320 sessions through the HSC Center for Telehealth.

Multicast desktop video conferencing/collaboration is encouraged for sessions held on-campus. However, because video conferencing and the associated desktop collaboration features can be bandwidth intensive and present significant client configuration challenges, caution is advised when extending a session to an off-campus, non-HSC managed system.

Given the complexity associated with building dedicated video conferencing/collaboration facilities, all proposals for new video conferencing rooms must be coordinated with UNMH, HSLIC or Telehealth program staff. Existing facilities are available to support multipoint or leased line conferences to external sites, but a fee-for-service charge will be incurred to cover technician time needed to setup and facilitate the session.

6.3 Instant Messaging

Currently, the HSLIC and UNMH Help Desks provide limited support for Windows Messenger and GroupWise Instant Messaging. Any department wishing to use this technology should work with their respective IT support group to facilitate this.

6.4 Web Support

HSLIC IT staff support the following World Wide Web browsers and application development environments:

- Browsers: Internet Explorer 5.5+ is the HSC standard browser and receives full support from both HelpDesks. (KMIT recognizes the value of having a second browser such as Firefox installed on the same PC, but non- IE browsers will not receive the same level of centralized support).
- Web authoring: Microsoft FrontPage and Macromedia DreamWeaver
- Application Development: Macromedia Cold Fusion
- Database development: Microsoft's SQL Server or Oracle (in conjunction with applications written in Macromedia Cold Fusion). Microsoft Access databases are not supported for online applications.
- Online Education: WebCT

6.5 Audio/Video Streaming Media Support

Windows Media server based audio and video streaming services are provided by HSLIC IT staff. The Windows Media streaming formats WMV and WMA have been selected as HSC standards for delivery of on-demand and live streaming media. The HSC will support unicast and multicast (as it becomes more widely available) media streaming. Because of server performance and maintenance considerations, direct web based audio and video located on HSC servers other than the HSC media server either for direct or progressive download in any format is not allowed. All audio and video streaming requests will be structured according to HSC web-presentation guidelines.

The restriction to Windows Media applies only to the serving of audio and video content from HSC servers to users over the web. The restriction does not apply to audio and video content created for distribution by other media like CD and DVD. It also does not apply to the ability of HSC client computers to access content in any of the major streaming media formats. HSC client systems are preconfigured with the software to play Windows Media, QuickTime, and Real Media formatted material.

7.0 Hardware Standards

7.1 Workstations, Printers and Peripherals

HSC Administration believes that standardizing the vendor and configuration of desktop and laptop computers is in the best interest of the institution and that every faculty member should have a workstation which meets minimum standards. These minimum standards can be found at:

<http://hsc.unm.edu/library/usersupport/40NewWorkstations/10MinimumHardware.cfm>.

Currently, the HSLIC and UNMH Help Desks support Windows XP Professional.

Purchasing – UNMH

All UNMH departments must secure IT equipment (including PC's, laptops, tablets, PDA's, printers and scanners) through the UNMH IT department. The normal process is to make an IT Equipment request through the on-line budget tool during the budget cycle. Special requests, not made during the budget

cycle, can be made through the equipment contingency fund during the fiscal year. All contingency requests are made to the Director of PC Systems and Support.

Purchasing – HSC (non-UNMH)

HSC departments using UNM funds to purchase computer equipment should either consult the HSLIC Help Desk or select equipment from supported vendors' websites. The current vendors are: Dell for laptop and desktop computers and Dell or Hewlett Packard for networked printers.

Prior to making new purchasing decisions, the HSLIC Help Desk can obtain quotes from these vendors. They also will attempt to assist departments to plan for upgrading workstations that are below the minimum specifications. If you need consultation regarding upgrade options or sources of external support for non-standard equipment, please contact the HSLIC Help Desk.

In addition, each HSC unit is encouraged to maintain currency of workstations through a planned replacement/upgrade every 3-4 years, with some portion of workstations replaced annually. Some workstations may need to be upgraded more frequently based on special needs.

As an ongoing practice, various strategies will be investigated to provide more flexibility and stability in budgeting, and improve our ability to provide workstation support (e.g., group purchasing, single vendor, leasing, on-site vendor maintenance). One example is the Faculty Workstation Project. This program offers new-model personal computers for faculty and staff at a reduced cost to each HSC department, with the remaining cost subsidized by the HSC Administration. Offered every fall, HSLIC purchases the computers, receive requests from HSC departments, and configures and distributes the workstations.

Tablet PC

The HSLIC Help Desk currently supports the ACER C110 and the Motion M1300 models of tablet PC. Tablet PC support services include imaging, software installation, setup printing, email and network connectivity for approved tablet PC's. No other tablet PC models are supported at this time. Since this technology is still new and rapidly changing, please consult with the HSLIC Help Desk before purchasing.

PDA

The HSLIC and UNMH Help Desks provide limited support for handheld devices which use the Palm operating system (PalmOS) and Microsoft's PocketPC 2003. Specifically, they provide setup assistance for synchronizing basic PDA applications (calendar, contacts etc.) with their desktop counterparts. The Help Desks can also provide recommendations on which model will best suit your needs.

7.2 Emerging Technologies

The HSC provides limited support for a variety of emerging technologies. Contact the HSLIC Help Desk for more information.

8.0 End User Software Standards

8.1 Desktop Productivity Software

Microsoft Office has been selected by CIRT as the UNM standard. With the exception of Outlook, all HSC information technology staff will provide basic troubleshooting support for Microsoft Office. CIRT also provides basic support for Microsoft Office and other desktop software. A detailed list of supported CIRT supported software can be found at: <http://www.unm.edu/cirt/sw/>.

The HSLIC and UNMH Help Desks also encourage the use of utilities (e.g. CD burning software, disk defragmenters, etc.) that are integrated into the Windows XP operating system where ever possible. Both Help Desks provide limited support for these applications.

8.2 Knowledge Management Applications

The following applications are supported throughout the HSC:

- Bibliographic Citation Management: RefWorks, EndNote (HSLIC Help Desk)
- Institutional Virtual Repository: DSpace (HSLIC Help Desk)
- Document Management and Collaboration: Work2gether (HSLIC and UNMH Help Desks)
- Learning Management Systems: WebCT [curricular] (HSLIC Help Desk), _____ [training] (HSLIC and UNMH Help Desks)

HSLIC Library Services provides instruction on these applications to all HSC faculty, staff and students.

9.0 Remote Access

The UNM electronic resources can be accessed remotely by any Internet service provider. The HSC services that can be accessed remotely include:

Proxy Server for Online Resources

University Libraries and HSLIC provide remote access to online resources through the use of a proxy server as licensing permits. This system allows off-campus users with access to servers and services at HSLIC that otherwise could not be accessed outside of the UNM computing environment. Departments who purchase new online resources should contact HSLIC about site-wide licensing and inclusion of these products on the proxy server.

Virtual Office

The HSC offers Novell's Virtual Office as a way to access files remotely. With secure authentication, Virtual Office offers access to shared directories, e-guide, printers, and email just as if users were at the workplace. Virtual Office can be found at: <https://myhsc.health.unm.edu>.

GroupWise Access

GroupWise Web Access is considered to be a supplement to the standard client and not a replacement for it. Links to GroupWise web access can be found in various locations throughout the HSC web site. It does not have the same flexibility as the standard client (e.g. right-click, drag-and-drop, etc.), but it can fulfill many of the same functions by using checkboxes and buttons.

The GroupWise client is also available for users with high speed connections. It may be downloaded via ftp from a link on the Technology Support web site (<http://hsc.unm.edu/library/usersupport/>). By downloading the full version of GroupWise, users may take advantage of the software's full functionality remotely.

Virtual Private Network Access

UNMH operates secure Virtual Private Network (VPN) services for resources that require secure off-site access when necessary for critical work of the Health Sciences Center. Contact the HSLIC or UNMH Help Desk for access.

Medical Record Remote Access

UNMH through its Help Desk offers the ability to remotely access the Cerner Millennium products through a secure Citrix ICA client connection. This access is available for HSC providers.

CIRT offers direct dial-up access for modem users. Information regarding direct-dial up access can be found at http://www.unm.edu/cirt/quickrefs/qr_dialups.html.



THE UNIVERSITY OF NEW MEXICO
HEALTH SCIENCES LIBRARY
AND INFORMATICS CENTER

Faculty Workstation Project: A Case Report

Holly Shipp Buchanan, EdD
Frederick Hashimoto, MD
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IAIMS Consortium Annual Meeting
May 2003

Abstract

Faculty in academic health centers need robust campus networks and high level workstations. At the University of New Mexico (UNM), a project began in 2000 in which institutional funding mechanisms changed to encourage faculty acquisition of standard institutional workstations rather than equipment purchased by individual or departmental preferences. These standards promoted the most cost-effective operation and development of information systems, and offered faculty a higher level of IT support on the UNM HSC campus.

Problems

- Many UNM HSC faculty members had substandard workstations or no workstations
- Workstation standards did not exist
- Limited centralized technical support due to variability of workstations
- Negative perception of Help Desk
- No regular replacement and upgrade strategies for workstations

Background - 2000

- A campus-wide faculty survey found that budgets for capital IT equipment did not exist, and that 2/3 of respondents believed that improved computing capabilities would enhance their teaching and research effectiveness*
- Cerner, GroupWise, & SCT Banner applications require larger, more powerful workstations
- Of 480 School of Medicine faculty workstations, 160 (33.3%) were below standards and 212 (44.2%) were below 266 MHz

Setting/Participants

- Academic and research environment in a Health Sciences Center
- Faculty in Medicine, Nursing, and Pharmacy ($\geq .5$ FTE)



Questions

- Will standardized faculty workstations:
 - Be accepted by faculty and leadership?
 - Increase faculty satisfaction?
 - Improve workstation support?
- Can financial subsidies be a successful strategy for rapid acceptance?
- Can routine workstation upgrades be financially sustained?

Methodology

- Departmental inventory of existing workstations
- Focus groups
 - Identify needs
 - Develop standards for hardware and software
- Obtain funding commitments from leadership
- Surveys of AAMC/GIR and AAHSL members
 - Prevalence of institutional policies for faculty workstations
 - Institutionally funded
- Demonstrations for faculty

Results

- Since FY01, approximately 1/3 of faculty received new workstations annually
- In FY02, 400 standardized workstations were selected by administrators and staff
- In FY03, all users have adopted faculty workstation hardware and software standards

2003 Workstation Hardware Standards

- Dell Optiplex
- Small Form Factor Case
- Pentium 2.4 GHz
- 256 MB RAM
- 40 GB High Speed Hard Drive
- Rewriteable CD Recorder
- Digital 17-inch Flat Panel Monitor
- Digital Dual Display Video Card

2003 Workstation Software Suite

- Windows XP Professional
- MS Office XP Professional (Word, Excel, Access, PowerPoint)
- GroupWise
- Internet Explorer
- Netscape Navigator
- Adobe Acrobat Reader
- McAfee VirusScan
- Internet Application Suite
- QuickTime
- Citrix Client (Cerner applications)

Outcomes

- Centralized standards can be implemented in a decentralized environment.
- A greater percentage of faculty have high-level workstations.
- Faculty time spent on researching and ordering workstations is decreased.
- HSC Leadership endorses the project.
- The Budget Office believes the project is cost-effective; volume purchasing offers higher price breaks.
- Help Desk staffing is maximized and efficiency improves; turnaround time is reduced, and more calls are handled.

Next Steps



- Determine if standardized workstations increase faculty satisfaction and productivity.
- Determine if the efficiency of the Help Desk improves.

For More Information...

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 <p>THE UNIVERSITY OF NEW MEXICO HEALTH SCIENCES CENTER</p>	Administrative Policies Procedures
Health Sciences Center	DRAFT: 8/20/2003 STATUS: Pending comment from HSC Legal

Web Development Policy	Primary Age Group: All Ages <u> N/A </u> <u> </u> Newborns <u> </u> Pediatrics <u> </u> Adults
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POLICY

To promote the development of quality University of New Mexico Health Sciences Center web sites and applications, it is the policy of the Health Sciences Center (HSC) that employees acknowledge the procedures, guidelines and standards referenced in this document. Information within an HSC web site must be current, accurate and relevant in view of the site's intended audience and conform to UNM copyright guidelines. The presentation of information should consistently reflect the use of approved standards. Systems supporting HSC web sites will conform to security and contingency best practices defined in HSC information systems security and business continuity policies.

POLICY CROSS REFERENCE

- UNM Computer User Guidelines (2510)
- UNM Hospitals Information Security Policy
- UNM Hospitals Internet Security Policy
- UNM Hospitals Information Ethics Agreement
- HSC Web Site Standards
- HSC Electronic Communications Policy

DEFINITIONS

1. *HSC web site* – The HSC web site is the set of web accessible documents and applications that are managed by staff dedicated to the development of the HSC's centralized web services. It includes any web site that supports a bi-directional link to <http://hsc.unm.edu> and contains official information about an HSC organizational unit.
2. *Project site* – A project-oriented site with information and applications that cross departmental boundaries, or is independent of any departmental affiliation, or is aimed organizationally sponsored project or program.

3. *Departmental site* – A site with content that is affiliated with an officially recognized department.
4. *HSC splash page* – The entry point for the HSC web site – currently <http://hsc.unm.edu>.
5. *Intranet* – A site with restricted resources intended for a specific subset of the HSC web site audience. Intranets can have their own navigation, access controls and development procedures, but must continue to comply with other policy statements within this document.
6. *Navigation* – A recurring set of links that allows visitors to easily move to specific areas of a site.
7. *Secure site* – A site requiring the use of the Secure Socket Layer (SSL) protocol.
8. *Web application* – Client or server-side data processing programming that is run/executed from a web site.
9. *Design standards* – Definitions of how to use design elements that are common to webs within the HSC web site.
10. *Virtual host* – A web site registered in the Domain Name System (DNS) as a host that is logically distinct from the primary web site on a given system, e.g. myweb.unm.edu on the system that supports hsc.unm.edu.

GENERAL INFORMATION AND DESIRED OUTCOME:

OUTCOMES

1. Consistent branding
2. Consistent navigation
3. Consistent high quality presentation
4. Improved currency and relevance of information
5. Clear procedure of how to post and link information
6. Clear accountability
7. Consistent implementation of security standards

ROLES and RESPONSIBILITIES

1. **Web Administrator:** The individual that coordinates the development, application and enforcement of HSC web site policies, procedures and standards. He/she ensures an active, vibrant community of Site Managers, Web Authors and Content Owners.

2. Site Manager: An individual who manages the overall operation of one of the officially recognized consolidated web sites (e.g. hsc.unm.edu, hyper.unm.edu, hscapp.unm.edu). Responsibilities include posting content and maintaining applications, running reports, monitoring statistics, reporting security incidents, working with content owners to develop/maintain content currency and relevance, and coordinating site development with the Web Administrator. A Site Manager's responsibilities must be recognized in a job description.
3. Web Author: An individual who is primarily focused on working with Content Owners to maintain the currency and relevance of and updates a web site accordingly. While a Web Author may be more involved in site development, it is an adjunct responsibility and not necessarily in their job description.
4. Content Owner: The individual responsible for the accuracy, relevance and timeliness of the information presented on a page.
5. Senior Web Designer: The individual who defines the visual/graphical standards for the HSC web site and provides design guidance for junior Web Designers, Site Managers, Web Authors and Content Owners. The designer also works with public relations/marketing personnel to ensure that standards reflect current branding and communications initiatives.
6. HSC Web Development Team: The Health Sciences Library and Informatics Center team of programmers, designers and managers who provide centralized web development and management services for Health Sciences Center schools and departments.
7. HSC Relaunch Committee: The committee is comprised of the Web Administrator, Web Designer, Site Managers and high-level institutional representatives as appropriate. The committee's primary focus is to regularly review and make recommendations on HSC website design and navigation changes.

PROCEDURES

1. Establishing Department or Project Sites
 - 1.1 The Content Owner and Web Author work together to conceptualize the site in view of the potential internal and external audiences and then develop content and a logical framework. The Web Author contacts the Site Manager or Web Administrator for conceptual approval and content development recommendations.

1.2 Once site content has been fully developed, the Web Author and the Site Manager/Web Administrator plan for site implementation. At this time, URL, security, secure services and other technical features of the site are discussed in view of HSC web site standards documents, major project priorities and when appropriate, the KMIT 3-year plan.

1.3 The site is prepared in a test environment and after final review by the Site Manager/Web Administrator, is published and linked to production systems.

1.4 Systems supporting departmental and project sites will be maintained by Health Sciences Library and Informatics Center or UNM Hospitals IT staff in accordance with HSC standards for security and service continuity.

1.5 Virtual hosts (e.g. HSClibrary.unm.edu on the hsc.unm.edu system) are difficult/expensive to maintain and have the potential to undermine constructive organizational affiliations. Systems supporting centralized HSC web services will not be configured to host virtual web sites.

1.6 Content Owners, Web Authors and Site Managers will provide the Web Administrator with a signed copy of the UNM Acceptable Computer Use Policy (2500) as a commitment to adhere to UNM copyright policy before publishing content on an HSC web site.

2. Posting a Web Application on an HSC web server

2.1 An officially recognized department or project manager must sponsor the application.

2.2 The requester should contact the Web Administrator or Site Manager to discuss the project requirements and time frame.

2.3 Web Administrator or Site Manager will recommend development tools/training and provide a suitable development environment. Current tools and environments are described in the accompanying HSC Web site Standards document.

2.4 Applications developed with Health Sciences Library and Informatics Center (HSLIC) Web Development Team resources are prioritized by the Web Administrator in view of the current projects and available resources. Applications developed with UNM Hospitals Information Technology Web Application Team resources are prioritized by the UNM Hospitals Site Manager in view of the current projects and available resources.

2.5 The systems supporting sponsored web applications will be maintained by HSLIC or UNM Hospitals Information Technology staff in accordance with HSC standards for security and service continuity.

3. Maintaining web sites within the HSC Web site

3.1 Only Site Managers, Web Authors or Content Owners can change the content on a given departmental/project web site.

3.2 Site Managers and Web Authors are responsible for the design and navigation accuracy of the site. They will regularly check for broken links. They will compare site content to similar HSC sites to ensure that information is accurate and not duplicated.

3.3 A representative for each site (e.g. Content Owner, Web Author or Site Manager) should attend Web Authors Group meetings. If unable to attend, they should make sure the Web Administrator has their contact information so they can receive information discussed in the meetings. The Web Administrator will provide site representatives with meeting schedules, agendas and notes from each meeting.

3.4 The Web Administrator will provide department/project contacts with site reports and statistics.

3.5 The Web Administrator will work with non-clinical department Content Owners to ensure that sites are reviewed periodically in accordance with the HSC web site content standard. The UNM Hospitals Site Manager will work with UNM Hospitals content owners to ensure that sites are reviewed periodically in accordance with the HSC web site content standard

3.6 Site Managers, Web Authors and Content Owners should report security irregularities to the HSC IT Security Manager and the Web Administrator as soon as they are noticed.

4. Required Design Elements

4.1 All HSC websites will use the following design elements on each page:

- 1) The top-level navigation system as recommended by the HSC Relaunch Committee (see Roles and Responsibilities of this document).
- 2) The page footer as approved by the HSC Relaunch Committee. The footer will contain links to the HSC Legal Office approved disclaimer and privacy statement. More detailed information about the navigation system and footer requirements can be found in the accompanying HSC Web Site Standards document.

5. Updating Design Elements

5.1 The Web Administrator receives ongoing individual feedback on the shared components of the site design and usability through a variety of mechanisms including regular Web Author meetings, focus groups, online surveys and email. The Web Administrator will conduct site usability studies and surveys. All suggestions and comments regarding site design and usability should be submitted to the Web Administrator. The Web Authors Group meeting is the primary design and template discussion forum.

5.2 Comments and recommendations from Web Authors Group are forwarded to the Relaunch Committee for consideration.

5.3 The Relaunch Committee will recommend changes to be implemented. If the changes are minor (determined by the Web Administrator to not have a significant impact on departmental web site marketing and functionality), then changes can be approved directly by the Vice President's office. If the changes are major, then they need to be approved by the KMIT Advisory Committee and the HSC Leadership Council.

6. Updating HSC Splash Page

6.1 The Web Administrator and Sr. Web Designer will review the HSC Splash Page at the beginning of each fiscal year or when organizational changes warrant.

6.2 If a redesign or update is deemed necessary, a project plan will be generated with an associated timeline.

6.3 The Web Administrator and Sr. Web Designer will present a proof of concept for the redesign to the KMIT Advisory Committee for approval, and finally to the Leadership Council and the Vice President for Health Sciences for authorization.

6.4 Minor redesigns can be commissioned/directly approved by the Vice President's Office.

7. Updating Templates and Top-Level Navigation

7.1 The Web Administrator, Sr. Web Designer and Site Managers will review the templates and top-level navigation annually, or whenever organizational changes warrant.

7.2 If the template(s) or navigational systems require major changes, a project plan will be generated with an associated timeline.

7.3 The Relaunch Committee project plan. The charge of the committee is to provide input to the Web Designer regarding the nature of the changes required for the templates and top-level navigation.

7.4 The Sr. Web Designer develops new templates for review by Web Authors Group and approval by KMIT Advisory Committee.

7.5 The Web Development Team develops new navigational scheme for review by Web Authors Group and approval by KMIT Advisory Committee.

7.6 Minor redesigns (determined by the Web Administrator to not have a significant impact on departmental web site marketing and functionality), can be commissioned/directly approved by the Vice President's office.

8. Updating HSC Web site Standards Document

8.1 The Web Administrator, the Sr. Web Designer and their respective management will review the Web site Standards document annually or whenever organizational changes warrant.

8.2 If an update is deemed necessary, the Web Administrator will draft an updated set of standards for review by management noted above.

8.3 A Draft of new standards is presented to the Web Authors Group for feedback.

8.4 A final draft will be presented to the KMIT Advisory Council for approval.

9. Updating Web Development Policy

9.1 The Web Administrator and KMIT Operations Group will review this Web Policy at least annually and whenever organizational changes warrant.

9.2 If an update is deemed necessary, the Web Administrator will draft an updated policy for review by KMIT Operations.

9.3 The final draft will be presented to the KMIT Advisory Council for approval and then forwarded to the Leadership Council for final approval.

9.4 The UNM Health Sciences Center recognizes the need for the web policy to accommodate the changing needs of the different HSC components. If an HSC department must publish a site that does not follow the guidelines/standards described in these documents, the department will be encouraged to present their case for exception to the HSC Web Authors and

KMIT Operations Groups. The KMIT Operations Group will decide if an exception is warranted and/or if an adjustment to the policy is necessary.

KEY DOCUMENTATION

1. HSC Web site Standards which include:

- Visual graphical standard
- Navigation standard
- Logo or branding standard
- Security standard
- Copyright standard (use of copyright logo)
- Search engine standard
- Templates standard
- Content standard (currency, accuracy, appropriateness, relevance)

2. UNM Hospitals and Health Sciences Library and Informatics Center business continuity and information systems security plansA contingency plan is developed to provide the best possible recovery capability in the event that some loss of capability or data has occurred. One of the values of a contingency plan is that planning has taken place before the contingency event; therefore, valuable recovery time is not lost in planning *"after the fact"*.

The desired outcome is an established policy for disaster recovery and contingency planning.

The format and required elements for the HSC Business Continuity and Disaster Recovery Plan are outlined in Attachment 2. Each individual system covered under this policy must have an individual contingency plan included in the plan. Attachment 1 shows the template for individual system contingency plans.

All information must be entered into the UNMHSC Business Continuity and Disaster Recovery Plan database. The plan must be integrated in the overall business recovery and contingency plan.

Prior to any new mission-critical system or system containing EPHI being placed into production, a contingency plan must be documented and submitted to the appropriate IT Executive Director (UNMH) or Associate Director (HSLIC) or designee [replace designee with position title] for approval and inclusion into the HSC Business Continuity and Disaster Recovery Plan. The types of systems covered by this policy include databases, software, and hardware and network systems.

The Knowledge Management Information Technology (KMIT) Leadership Council or designee has overall responsibility for creating and maintaining both this policy and the Disaster Recovery and Contingency Plan.

This policy applies to all individuals who are responsible for purchase, development, installation, implementation or maintenance of key data, software, communications, hardware and the facility that houses the equipment.

PROCESS:


None.

LEGAL AUTHORITY AND ENFORCEMENT – This policy is according to and enforced by federal [45 CFR Parts 160, 162 and 164: Health Insurance Reform – Security Standards], state and local laws, UNM and UNMH Personnel Policies and Procedures and other UNMHSC policies and procedures as applicable.

Failure to adhere to this policy may result in immediate removal of all privileges granting access to the UNMHSC electronic communications systems, and may subject the user to further disciplinary action, dismissal, and/or legal prosecution as per Section 3215, Sub-Sections 4 and 5 of the University of New Mexico Business Policies and Procedures Manual.

Developed: 8/20/2003
Developed By: Ella Sitkin, Greg Gaillard
Revised: 8/20/2003
Reviewed By: KMIT Operations Group, KMIT Advisory Council
Approved By: HSC Leadership Council
Approved: 10/--/2003

Signatures: _____

 <p>THE UNIVERSITY OF NEW MEXICO HEALTH SCIENCES CENTER</p>	Administrative Policies and Procedures
	<p>DRAFT:1/27/2003</p> <p>STATUS: Pending comment from HSC Legal</p>
UNMHSC	

Electronic Communications	Primary Age Group: All Ages <u>N/A</u> <u> </u> Newborns <u> </u> Pediatrics <u> </u> Adults
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POLICY

It is the policy of the University of New Mexico Health Sciences Center (UNMHSC) to protect the confidentiality of identifiable patient information, and the personal information of employees, faculty, students, and volunteers. Electronic communications (data, audio, video, voice and written electronic communications such as e-mail, instant messaging, voice messaging, and all other forms of electronic communications) will be in accordance with law and this Policy and Procedure.

POLICY CROSS REFERENCE

- UNM Board of Regents' Policy 4.4 – Student Records
- UNM Business Policy 2500 - Acceptable Computer Use
- UNM Business Policy 2510 - Computer Use Guidelines
- UNM Business Policy 2520 – Computer Security Controls and Guidelines
- UNM Business Policy 3710 - Personnel Information Disclosure
- UNMH E-mail Use Procedures
- UNMH Information Ethics Agreement
- UNMH Information Technology Security Policy
- UNMH Internet Use Policy
- UNMH Release of Information
- UNMHSC Code of Conduct/Organizational Ethics Policy

GENERAL INFORMATION AND DESIRED OUTCOME

1. The purpose of this policy is to ensure that personal information collected from patients, employees, faculty, students, and volunteers is used appropriately, and that the privacy of personal information is protected. This includes compliance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

2. This policy applies to all individuals and groups who use or access UNMHSC Electronic Communications.

3. Definitions:

- 3.1. Electronic Communications - Includes all data, audio, video, web browsers, voice and written transmissions such as e-mail, instant messaging, voice messaging, and facsimile.
- 3.2. Confidential Information – Information requiring special safeguards due to its private nature. Examples include:
 - 3.2.1. Patient Care Information (e.g., patient identity, diagnosis, and treatment)
 - 3.2.2. Personal Employee Information. See UNM Policy 3710 for exceptions that are considered public information.
 - 3.2.3. Faculty Information
 - 3.2.4. Volunteer Information
 - 3.2.5. Student and Trainee Information

4. Procedures governing the use of UNMHSC Clinical Operations Electronic Communications are as follows:

- 4.1. Electronic communications will only be used within the scope of a user's authorized function as assigned by the UNMHSC or another authorized branch of the University of New Mexico (UNM). Personal use of UNMHSC Electronic Communications is permitted provided that it does not generate a direct cost to the UNMHSC or interfere with other users' access to resources. E-mail System Administrators will make no attempt to recover or restore lost personal messages.
- 4.2. Electronic Communications Systems are not a secure medium. Information sent using electronic communication systems could be monitored, intercepted, and manipulated. Only non-confidential information may be sent using unencrypted methods.

5. Confidentiality of employee and patient identifiable information maintained or transmitted electronically (e.g., via e-mail, SMTP, fax, handheld devices, or printed from computers) shall be protected using all reasonable attempts.

- 5.1. Mask or remove patient identifiers if they are not necessary. Encrypt the message if possible. UNMHSC will provide systems for encryption.
- 5.2. Send only the minimum amount of information necessary.
- 5.3. Identifiable patient or employee confidential information that is stored on portable media such as diskettes, CD ROMs, laptop computers and Personal Digital Assistants (PDAs), must be password protected to limit access to authorized users.

6. Expectations about electronic communications (e-mail and fax) with patients:
 - 6.1 Inform the patient that the security of confidential information cannot be guaranteed when communicated via electronic means.
 - 6.2 Request for the patient to use "Private and Confidential" as well as the category of transaction (medical advice, billing question, prescription, etc.) in the subject line of e-mail correspondence and fax cover sheets.
 - 6.3 Request that the patient includes his/her full name and patient identification number within the body of the message.
 - 6.4 When possible, obtain the patient's written authorization to communicate electronically, including the preferred method of electronic communications, electronic addresses, telephone or fax numbers, etc and place the authorization in the patient's medical record.
 - 6.5 Electronic communications with patients should not be made from multi-user accounts. UNMHSC personnel should clearly identify themselves and their role in the organization within each correspondence.
 - 6.6 Substantive electronic communications containing diagnoses, prognoses, informed consent and orders for treatment must be maintained according to the Medical Records requirements. All such messages should be included as part of the medical record.
7. Examining Electronic Information - There is no guarantee of privacy in using electronic communications. Accessing an employee's computer files for work-related purposes is allowed per Section 3 of UNM Policy 2500. When an employee separates from UNMHSC, work-related files remain the property of UNMHSC.
8. Computing resources require the backup and storage of data and communications, the logging of activity, the monitoring of general usage patterns, and other such activities that are necessary for the rendering of services. To ensure compliance with this policy, UNMHSC reserves the right to monitor Internet use and examine information on, from, or to UNMHSC systems. Investigations will also be performed on electronic files when the integrity or effective operation of the system(s) is in jeopardy.
 - 8.1 Access to an individual's electronic files may be provided without their consent when requested by the UNMHSC Administration for cause.
 - 8.2 This request must contain written justification for providing access to an individual's data, electronic files and communications.
 - 8.3 The UNMHSC Vice President or an Associate Vice President must approve the request.
 - 8.4 The applicable Human Resources and UNMHSC Legal Counsel must be notified before any action is taken.



THE UNIVERSITY OF NEW MEXICO
HEALTH SCIENCES CENTER

Applies To: All
Component(s):
Responsible Department: KMIT Operations Group

Title: Clinical Information Systems Integration (Silo) Policy_V1.doc		Policy			
Patient Age Group:	(X) N/A	() All Ages	() Newborns	() Pediatric	() Adult

POLICY STATEMENT

This policy is designed to help protect the needs of information consumers across the Health Sciences Center and to protect the integrity and confidentiality of the information that is being collected and stored in information systems owned by components of the Health Sciences Center. Historically, the Health Sciences Center has taken a decentralized approach to the use of information systems to gather, store and report data that are needed for daily activities and programmatic and clinical decision-making, including clinical research. This policy revises that methodology in favor of a more standardized approach. The UNM Health Sciences Center is committed to a Knowledge Management and Information Technology program, excellent quality of care, reduced organizational liability, the centralized UNM Hospitals Clinical Data Repository, enriched data available institution-wide, and an integrated information environment. This commitment requires the standardization and interchange of data across information systems at the Health Sciences Center.

DETAILED POLICY STATEMENT

1. Priority is focused upon enriching the data available institution-wide and stored in the UNM Hospitals Clinical Data Repository. All clinical information systems must be equipped to update or exchange information with the UNM Hospitals Clinical Data Repository, with the exception of those meeting the criteria in Section 6. This will require that non-integrated information systems be purchased with an interface to the data repository. All requested clinical information systems purchases must be evaluated for availability of an integrated option, which is preferred over an interfaced system option. Any information system required for patient care must be evaluated by clinician representation from both the system sponsor and UNMH Clinical IS Steering Committee. Where appropriate these systems should be integrated or interfaced into the UNM Hospitals Clinical Data Repository.
2. All departmental clinical information systems must meet or exceed HSC security standards. These standards and procedures include, but are not limited to:
 - PHI
 - utilization tracking
 - physical security of the hardware
 - security of the data stored in the system
 - use of passwords
 - use of an uninterruptible power supply
 - proper environmental conditions.
3. Authorized non-integrated departmental information systems are not guaranteed interface

access to information stored and maintained in the UNM Hospitals Clinical Data Repository. (Complete policy statement. If the effective date is different from the issuing date in the headline banner, then an appropriate discussion of when the policy applies should be included with the policy statement.)

DEPARTMENTAL EXPECTATION:

Departments utilizing approved non-integrated systems shall be responsible for:

- A. Requiring vendor/manufacture to supply designated interface capabilities to the UNM Hospitals Clinical Data Repository from the applications.
- B. Providing appropriate funding for both vendors' "sides" of the interface.
- C. Ensuring procedures are in place to verify the integrity of the data in the departmental information system. This includes, but is not limited to utilization of standard, HSC-defined, unique patient identifiers in the departmental information system.
- D. Providing for the standard operational responsibilities such as backup/restoration of data, operating system security, maintenance and responsiveness to HIPAA security requirements such as the maintenance of appropriate licenses.
- E. Billing mechanisms that avoid double billing for services or other impediments to an efficient audit.
- F. Meeting contract or regulatory requirements for billing, payment, or notice, systems should be able to note and respond to these requirements.

APPLICABILITY

All HSC workforce members.

POLICY AUTHORITY

HSC Leadership Council

REFERENCES

- UNM Business Policy 2500 - Acceptable Computer Use
- UNM Business Policy 2510 - Computer Use Guidelines
- UNM Business Policy 2520 – Computer Security Controls and Guidelines
- UNM Business Policy 3710 - Personnel Information Disclosure
- UNMH Code of Conduct/Organizational Ethics Policy
- UNMH Discipline
- UNMH E-mail Use Procedures
- UNMH Information Ethics Agreement

- UNMH Information Technology Security Policy
- UNMH Internet Use Policy
- UNMH Release of Information
- UNMH Secure Disposition and Destruction of Confidential Documents
- UNMH Use and Disclosure of Protected Health Information
- UNMH Work Rules and Employee Conduct

IMPLEMENTATION PROCEDURES

PROCEDURE FOR SYSTEM REQUEST AND APPROVAL:

- All requests for non-integrated clinical systems will be submitted for review and approval by the HSC Clinical IS Steering Committee.
- The requested system must meet standards of the HSC and UNM Hospitals environments.
- The Department Chair or the UNM Hospitals Executive Director submitting the proposed system must identify and define system deliverables. The requestor must complete the HSC Information Systems Software Request Form available via the KMIT web site at http://hsc.unm.edu/library/kmit/docs/it_systems_and_interface_request_form.doc.
- The department will make a formal presentation to the HSC Clinical IS Steering Committee. Within 60 days following the presentation, the UNMH Clinical IS Steering Committee shall issue a recommendation to the UH CIO and the Requestor on the requested system.

GUIDELINES FOR APPROVED NON-INTEGRATED CLINICAL SYSTEMS INTERFACE:

- Systems must include basic demographic information to uniquely identify patients, as defined by the current UH clinical systems data standards, and point or map back to the UNM Hospitals Clinical Data Repository. Non-integrated clinical systems must have a field for UH medical record number.
- Data necessary for Clinical Information or Business Process Information are required to be shareable between the systems as defined by the UNMH Clinical IS Steering Committee or their appointed subcommittee.

GUIDELINES WHERE NON-INTEGRATED SYSTEMS MAY BE ACCEPTABLE:

- When the information captured in the system is self-contained and not of use to UNM Hospitals for patient care.

- B. When there is no alternative way to achieve results, as approved by the UNM IS Steering Committee.

PERIODIC REEVALUATION

- A. All departments with approved non-integrated clinical information systems can be asked to submit their system to UNMH Clinical IS Steering Committee for periodic reevaluation based upon proposed deliverables. Following this review, the system might be withdrawn if it no longer meets the standards, or if an integrated alternative is now available and acceptable.
- B. Reevaluation with occur two (2) years following the initial acceptance if or when an integrated alternative is available.

DEFINITIONS

- 1. Business process information – any information required by billing entities associated with HSC, UNM Hospitals or UPA.
- 2. Clinical information - any information that would affect subsequent or current patient care, e.g., encounters, medications, complications, outcomes, discharge notes, diagnoses, procedures, allergies.
- 3. UNMH IS Steering Committee – A committee comprised of faculty, IT leadership and hospital leadership chaired by the UNMH CIO and a member of the SOM faculty that is responsible for monitoring progress on implementation of large systems as well as the development and/or modifications of system request forms.
- 4. Integrated Software – Software which work together seamlessly using internal methods of data exchange between applications or modules.
- 5. Interfaced Software – Software that supports an electronic exchange of data between software applications.
- 6. Non-integrated (stand-alone) software – Software that does not have any connection either programmatic or through protocol to other software, e.g., the UNM Hospitals Clinical Data Repository. These systems are self-contained and independently operating without data exchange.
- 7. Protected Health Information (PHI) - Designated by the Health Insurance Portability and Accountability Act as that data contained in paper or electronic record that describes patients' identification, medical history/tests and diagnoses. The UNM Hospitals Clinical Data Repository is the central database which maintains PHI.
- 8. UNM Hospitals Clinical Data Repository – The data that are the product of clinical patient visits, and which are used to support patient care and the electronic medical records at

the UNM Hospitals, including hospitals and outpatient clinics associated with the HSC and UPA.

SUMMARY OF CHANGES

New Policy

KEY WORDS

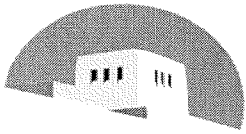
Clinical information, integrated software, interfaced software, non-integrated software, stand-alone software, UNM Hospitals Clinical Data Repository, silo

DOCUMENT APPROVAL & TRACKING

Item	Contact	Date	Approval
Owner	Sally Bowler-Hill, IS Planner, HSLIC		
Consultant(s)			
Committee(s)	KMIT Operations Council		Y
	KMIT Advisory Council		Y
	KMIT Leadership Council		Y
	HSC Leadership Council		Y
Legal (Required)	[Name, Title], [UNMH or HSC]		Y
Official Approver	R. Philip Eaton, MD, HSC Vice President		
Official Signature		[Day/Mo/Year]	
Effective Date		[Day/Mo/Year]	
Origination Date		July 2003	
Issue Date	Clinical Operations Policy Coordinator		

ATTACHMENTS

None



THE UNIVERSITY OF NEW MEXICO HEALTH SCIENCES CENTER

Information Systems – Clinical System/Software Request Cover Sheet
(Use for IS Capital acquisition, replacement, upgrade, software or clinical interfaces)

Cost Center/Department:
Item Name:

Submission Date:

Total Software Acquisition Cost:

Total Hardware Acquisition Cost:

Total Networking Cost:

Total Interface Development Cost:

Yearly Maintenance Cost:

Other Additional Costs:

TOTAL PROJECT COST: \$ 0.00

Signature Section:

Hospital Component		Date
Area/ Executive Director		
Administrator		
Academic Component		Date
Department Chair		

Information Systems Software Request Form

Instructions:

1. Fill in **all** information required below and obtain signatures
2. Submit form to the HSC-IS Clinical Steering Committee (contact Evelyn Martinez, 2-2168).
3. Schedule a presentation to the HSC-IS Clinical Steering Committee (contact Evelyn Martinez, 2-2168).
 - a. All systems must be approved and prioritized by the IS Steering Committee.
4. If you are not able to answer some of the questions or need any help or information, please contact Evelyn Martinez, 2-2168 for triage to appropriate support staff.

Request Information Section

1. Item description – outline general functionality and purpose:

2. Will this software contain:

Patient data?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Employee data?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Financial data?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Other confidential data? (Explain)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Please note: For any system that will contain and/or process patient health data, you must ensure that the system can be used in a way that complies with HIPAA regulations.

3. Please justify this request addressing the following:

- Strategic Business Units (e.g. does this tie into a Strategic Business Unit and which one?)
- Patient needs (Does this have the potential for improving patient outcomes? How?)
- Regulatory needs (Is this system required to meet a new regulation or compliance issue?)
- Cost benefit (What are the potential savings and potential revenues to be gained?)
- Upgrade/replacement (Is there an existing system in place providing similar functionality?)
- Educational need (Does this system meet a medical education need? If so, describe)

4. Which departments and/or staff will use this software?

5. Is FDA approval required for this software? ☐ Yes ☐ No
If so, has the FDA approved this equipment? ☐ Yes ☐ Pending ☐ Not approved

6. Describe any information systems interfaces or computer needs required to implement this project. Remember that all critical patient data needs to reside in the Millennium data repository.

Interface to data repository (patient data, Cerner)?

Interface to financial systems?

Interface to employee database?

Interface to other existing systems? Describe.

7. Is new hardware required? For example, will a server be required to run the software? Are new workstations required? If new workstations are required, did you request them in the IS Operational Budget?
8. Will the system be networked? Does the application require access to the internet to function?
9. What level of support is required to maintain the software? Who will provide the support? (please include hardware, software, interfaces and staffing)
10. Define the downtime system coverage and system recovery plan.
11. Describe how the system and data security requirements will be met.



The University of New Mexico
**Health Sciences Library
 and Informatics Center**

Search the Library

Select a Resource



Web Administration and Development Services - Web Application Standards and Guidelines

UNM Standards

[UNM Graphical Standards](#)

HSC Standards

[HSC Web Photos](#)[UNM Web Logos](#)[HSC Logos](#)[UNM Web Photos](#)

Background

The World Wide Web supports the teaching, research, and outreach missions of the Health Sciences Center as an open, accessible and interactive communications medium. The University of New Mexico encourages faculty, staff, students, campus departments, and administrative units to make broad use of the Web as a tool for learning, communication, and scholarship. Still, computing and data communications are limited resources that serve a large number and variety of users. The following guidelines recognize the importance of the Web for open communication and scholarly activity, while also recognizing that users have the responsibility to make use of these resources in an efficient, ethical, and legal manner.

Web Standards and Content Guidelines

Guidelines for HSC Web Pages: Official Web pages that represent a college, department, unit, or program of the University and the HSC are expected to follow the same professional and graphic standards that apply to official publications in any other medium.

The following standards apply to all official HSC home pages and all pages linked from the HSC Site Map page and the Events & Calendars page: (a home page is the portal or top level page for a college, department, unit, or program)

- The official HSC Navigation Bar will appear on all top level web pages.
- The top level page should incorporate the HSC's disclaimer statement, either as text or as a link. The URL for the disclaimer statement is:
<http://hsc.unm.edu/disclaim.shtml>
- To enhance web page functionality with search engines and to promote University identification, top level web pages should include a meaningful, unique <TITLE> tag that also includes the text "University of New Mexico HSC" or "UNM Health Sciences Center." Example: XYZ at UNM Health Sciences Center or UNM Health Sciences Center - XYZ. Contact the webmaster if you have more questions on this topic.

In addition, the following standards apply to all official HSC web pages:

- Every page must have contact information or a link to contact information. The contact might be a specific individual, a generic contact such as "webmaster" or "XYZ"

Department," or a link to a page of contacts for the unit. The contact(s) should include a physical mailing address, an e-mail address(s), and a telephone number(s).

- To enhance the accessibility of HSC web pages to as wide an audience as possible, all graphic images must include height and width attributes. In addition, all graphic images that are used as navigational links or convey important information must include appropriate text descriptions in the "ALT" attribute.
- Materials will be carefully checked for proper grammar and spelling.
- Materials will be updated and maintained in a timely manner.
- Written permission will be obtained for use of copyrighted materials, with the clear understanding on the part of the copyright holder that these materials will be used on the Web rather than in a printed publication. This applies to the use of text, logos, photographs, drawings, video clips, sound clips or other copyrighted visual images.
- Photos of people, especially minor children, will not be used without express written permission from the subject or a parent or guardian.
- Faculty and staff directory information may be included without permission.
- Any links provided to other sites will be accessible and appropriate. Links to commercial sites are strongly discouraged, with the exception of resources licensed by the University, and links to various search engines that include advertising.
- E-Commerce Policy: The University of New Mexico is currently working on guidelines regarding e-commerce.

[Back](#)

Appendix P

Additional internet/intranet projects include:

- **Searchable provider directory for the University Physician Associates:**

A searchable provider directory with clinics, specialties and short biographies is available for patients. The application allows users to view information about clinics and clinicians online. This application includes information on medical specialties, medical schools, residency training as well as maps and driving directions to individual clinics. The site is <http://hscapp.unm.edu/upa/pd/directory.cfm>

- **Online Community Project Management tool for Family & Community Medicine students:**

Family & Community Medicine students, residents, and faculty use a project management tool for their “Community Project”. The web site is a virtual workspace for students to document their progress on a project and submit it for faculty review. Quantitative evaluations show the web site to increase satisfaction and understanding of the Community Projects requirement. The site is <http://hscapp.unm.edu/communityprojects/>

- **Online HRRC Training Modules:**

A web-based training application is offered for Human Research Review Committee and Biomedical Ethics. All UNMHSC researchers are required to complete the training application if they are involved in human research studies. This program’s design is to give an overview of the history of human subject research, federal regulations, and the UNMHSC requirements for research involving human subjects. It allows users to save their progress as they transition between each of the 16 individual modules in the training course. Users are required to successfully complete each module prior to moving on to the following section. Over 1,400 faculty, staff and students have completed the on-line training course. The site is http://hsc.unm.edu/som/research/hrrc/hrrc_WebTraining.htm

- **Tobacco cessation database and archive for the State of New Mexico:**

The Center for Health Promotion and Disease Prevention (CHPDP) uses an interactive, online data collection and archive application for the State of New Mexico’s ongoing tobacco cessation initiative, sponsored by the CDC and New Mexico’s Department of Health (DOH). The UNM Prevention Research Center evaluates the New Mexico DOH’s tobacco control and youth empowerment efforts, researches complementary medicine use among minority populations, and leads national Prevention Research Center networks working on issues like obesity prevention. The site is <http://hscapp.unm.edu/chpdp/tobaccodirectory/>

- **Online forum to support faculty voting:**

This application allows HSC faculty members to vote online on a variety of issues, such as Chief of Staff, Departmental curriculum changes, SOM Faculty By-Laws, and SOM White Coat Patches Redesign. Online voting has increased faculty participation dramatically.

- **Faculty disclosure database for CME:**

This online, searchable database allows faculty to report financial interest or other relationships (i.e., grants, research support, consultant, honoraria) that he/she has with a manufacturer(s) of any commercial product(s), e.g., drugs, devices, or services. The site is <http://hsc.unm.edu/cme/disclosure/find.htm>

- **CME Courses:**

Various departments develop on-line, multi-media presentations that can be taken for CME credit. Courses usually consist of lecture video and synchronized Power Point slides. Evaluation is required for credit and a record is kept for the CME Office. For example, the site for an online CME course for multiple sclerosis is <http://hscapp.unm.edu/MSeCME/>

- **HSC Online Image Gallery:**

On the HSC intranet, there is an online photograph gallery containing images owned by the HSC. These images are available for departments to use in print and online promotional material. The site is <http://hsc.unm.edu/webdev/Gallery/>

- **Online forum, survey tools and website for RIOS (Research Involving Outpatient Settings) Net project:**

The Research Involving Outpatient Settings Network (RIOS Net) is composed of primary care clinicians in the Southwestern United States practicing in Community Health Centers, Indian Health Service/Tribal facilities, and academic settings. The purpose of the RIOS Network is to advance the science and understanding of providing primary care to the ethnically diverse and often low-income persons of the southwestern United States. Its goal is to bring together primary care clinicians to collaboratively study their clinical work, to share the unique characteristics of their practices, and to investigate ways to improve the care that they provide. The site is <http://hsc.unm.edu/rios/>

**WebCT Usage at the UNM Health Sciences Center
FY2004**

Web-Based Courses Using WebCT				
	2001/2002	2002/2003	2003/2004	% Change from previous year
School of Medicine*	1	5	0	- 100%
College of Nursing	14	23	44	91%
College of Pharmacy	14	16	29	81%
Sub-Total	29	44	73	66%

Web-enhanced (or hybrid) Courses Using WebCT				
	2001/2002	2002/2003	2003/2004	% Change from previous year
School of Medicine*	38	90	74	-22%
College of Nursing	23	26	61	135%
College of Pharmacy	0	0	0	Unchanged
Sub-Total	61	116	135	16%
Total Web-based & Web-enhanced	90	160	208	30%

* includes Diagnostic & Therapeutic Services, Medical Lab Sciences, Masters of Public Health

Health Sciences Library and Informatics Center

HSLIC Spring 2002 (April 9th – April 21st) Online Survey Results

Five hundred and thirty-two (532) usable responses were received during the survey administration period. Analysis excludes those responses made by HSLIC employees (N=15) and those in which the demographic information was not properly coded. Demographic descriptions of respondents appear on pages 1 – 2. Individual survey questions (1-12) do not include non-response or “do not use service”. A Likert-type scale of 1 – 5 was used for Questions 1 – 10, with 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree; see pages 3 – 5.

A comment density analysis was conducted on the responses received to Questions 11 and 12 and responses were categorized into 20 topical categories; see page 6. Question 11 received 338 comments and Question 12 received 352 comments

You are primarily affiliated with:



School of Medicine



College of Nursing



College of Pharmacy



HSLIC



UNM Hospitals



Other HSC dept

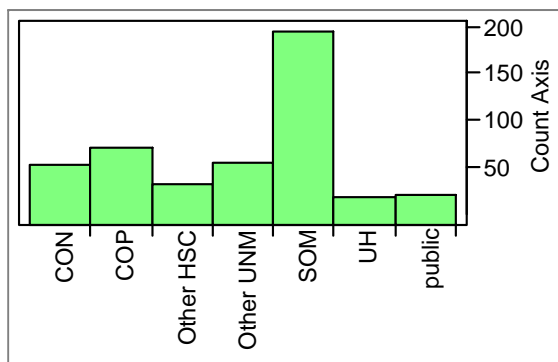


Other UNM dept (not HSC)



No UNM affiliation

All Survey Respondents by Department



All Survey Respondents by Department

Dept	Count	Percentage
CON	65	12.2
COP	83	15.6
Other HSC	45	8.4
Other UNM	68	12.7
SOM	206	38.7
UH	31	5.8
public	34	6.3
Total	532	1.00000

You are:



Staff



Faculty



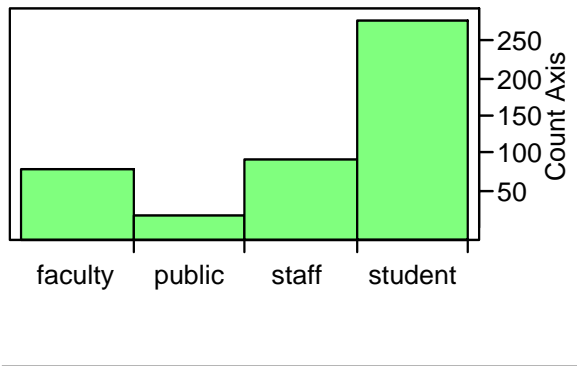
Student



General public

All Survey Respondents by Affiliation

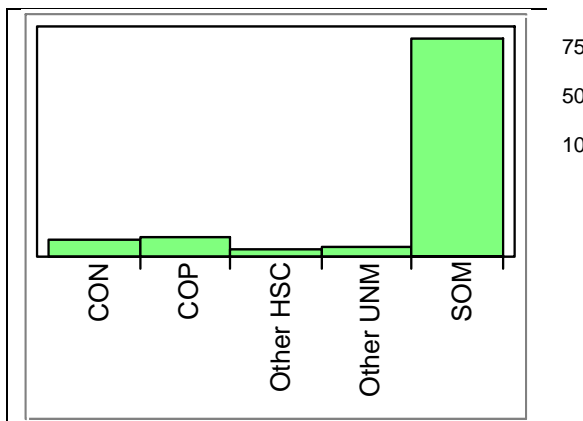
All Survey Respondents by Affiliation



Affiliation Count Percentage

faculty	96	18
public	34	6.3
staff	108	20.3
student	294	55.2
Total	532	1.00000

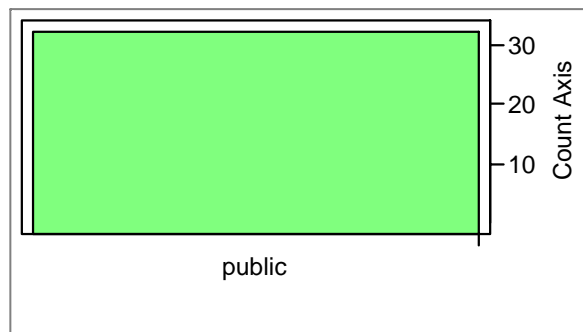
Faculty Distributions by Department



Faculty Distributions by Department

Department	Count	Percentage
CON	6	6.25
COP	7	7.3
Other HSC	3	3.1
Other UNM	4	4.1
SOM	76	79
Total	96	1.00000

Public Distributions



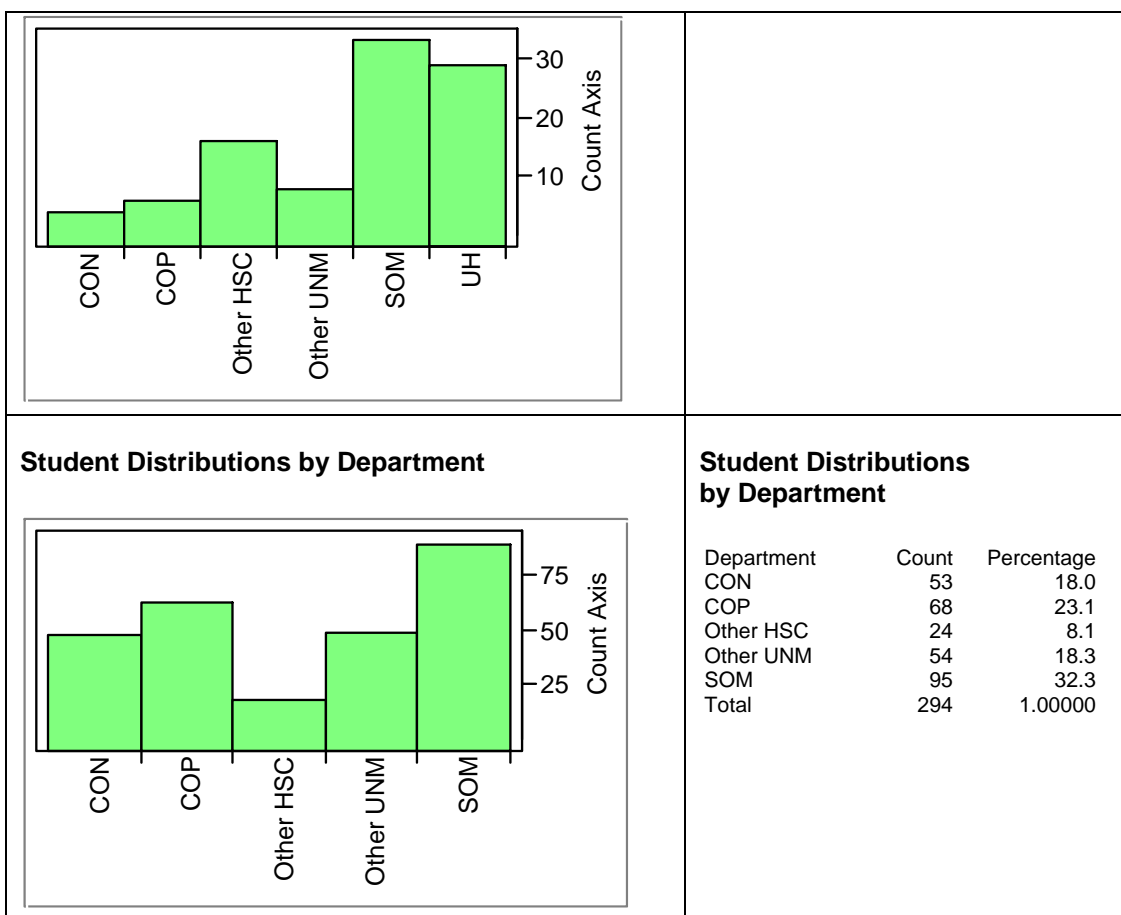
Public Distributions

Department	Count	Percentage
public	34	100
Total	34	100

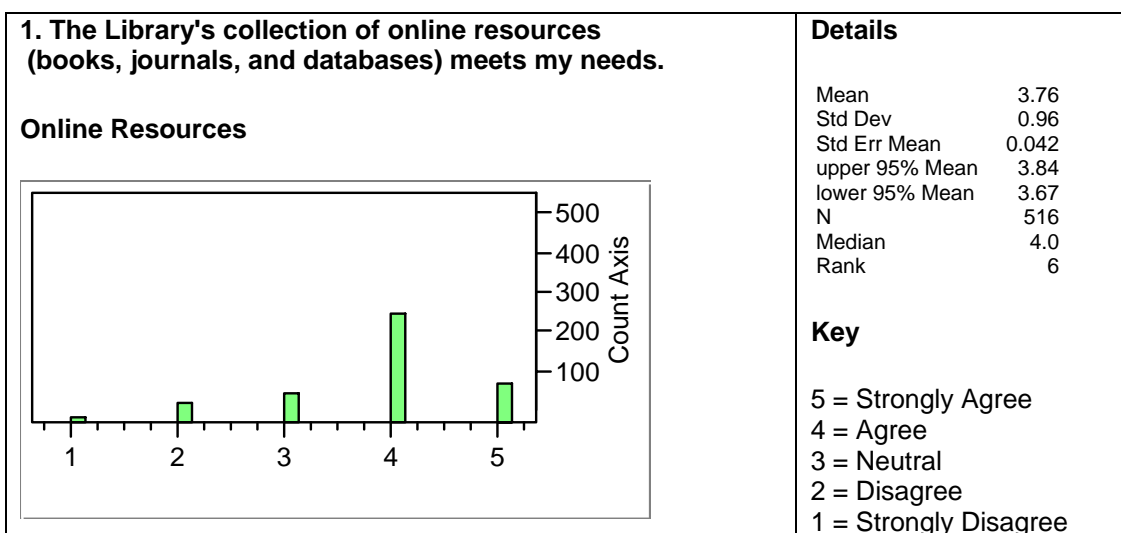
Staff Distributions by Department

Staff Distributions by Department

Department	Count	Percentage
CON	6	5.5
COP	8	7.4
Other HSC	18	16.6
Other UNM	10	9.2
SOM	35	32.4
UH	31	28.7
Total	108	1.00000

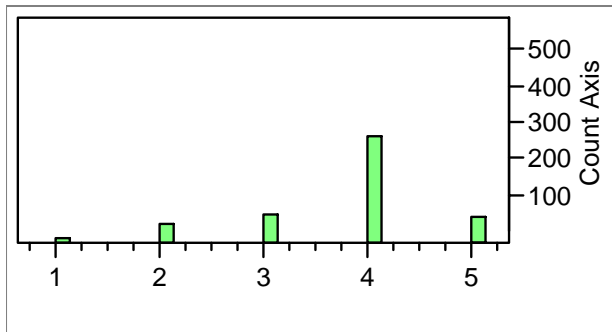


Survey Questions 1-10



2. The Library's collection of print resources (books, journals, and indices) meets my needs.

Print Resources



Details

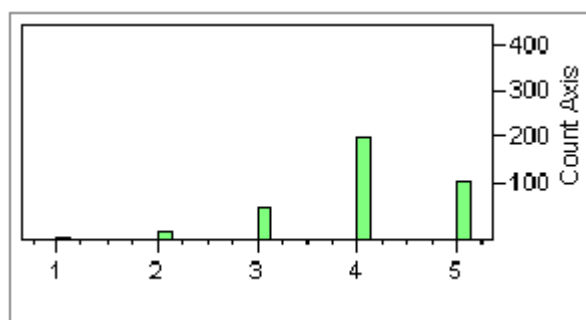
Mean	3.69
Std Dev	0.93
Std Err Mean	0.041
upper 95% Mean	3.77
lower 95% Mean	3.61
N	514
Median	4.0
Rank	8

Key

5 = Strongly Agree
 4 = Agree
 3 = Neutral
 2 = Disagree
 1 = Strongly Disagree

3. A computer workstation is usually available when I need one in the Library.

Workstation



Details

Mean	4.02
Std Dev	0.83
Std Err Mean	0.039
upper 95% Mean	4.09
lower 95% Mean	3.94
N	443
Median	4.0
Rank	4

Key

5 = Strongly Agree
 4 = Agree
 3 = Neutral
 2 = Disagree
 1 = Strongly Disagree

4. The Library faculty and staff have the knowledge to answer my questions.

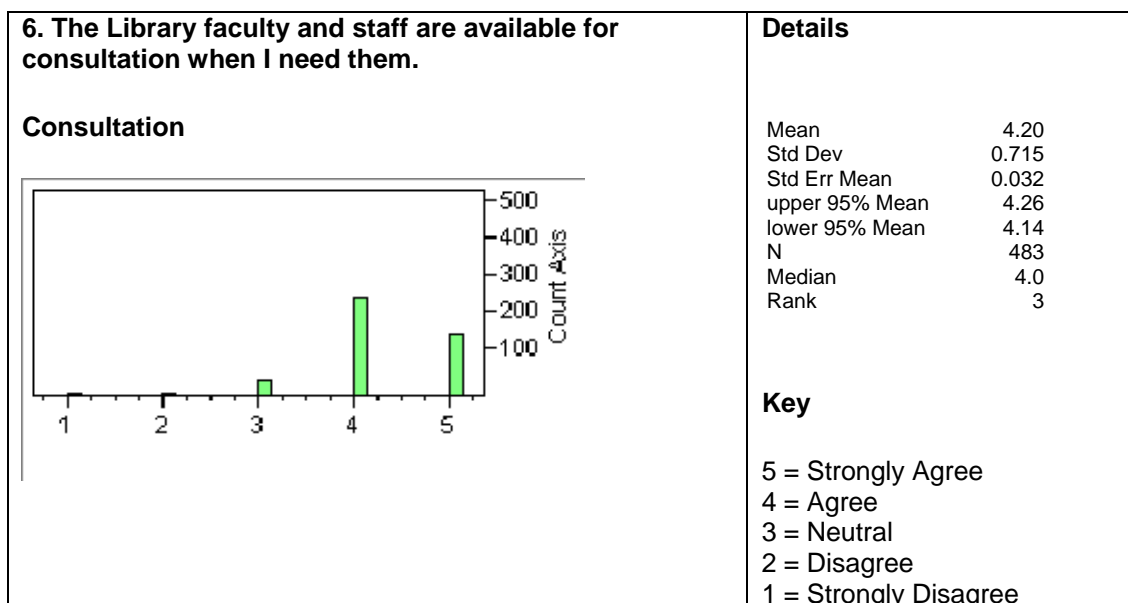
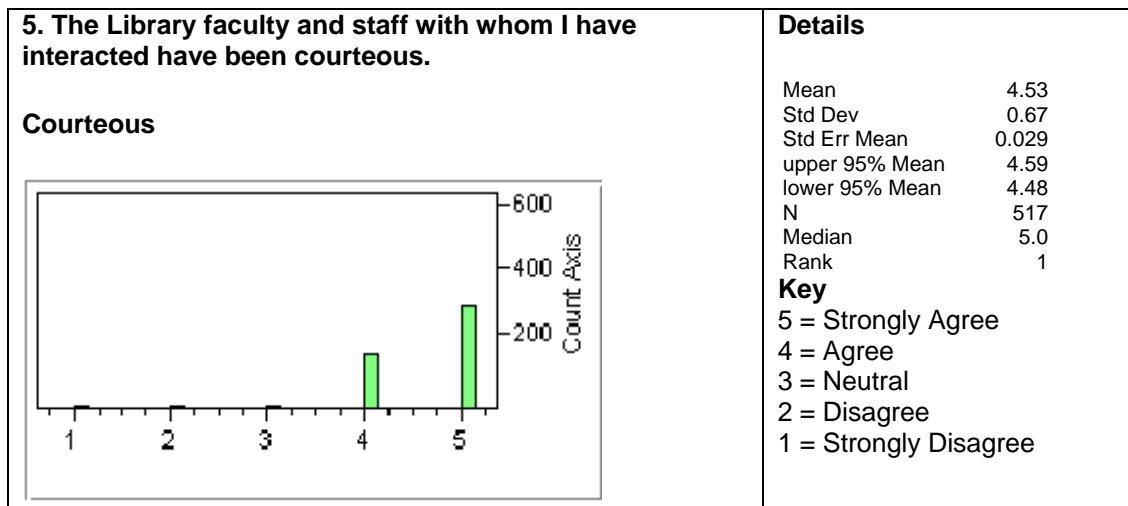
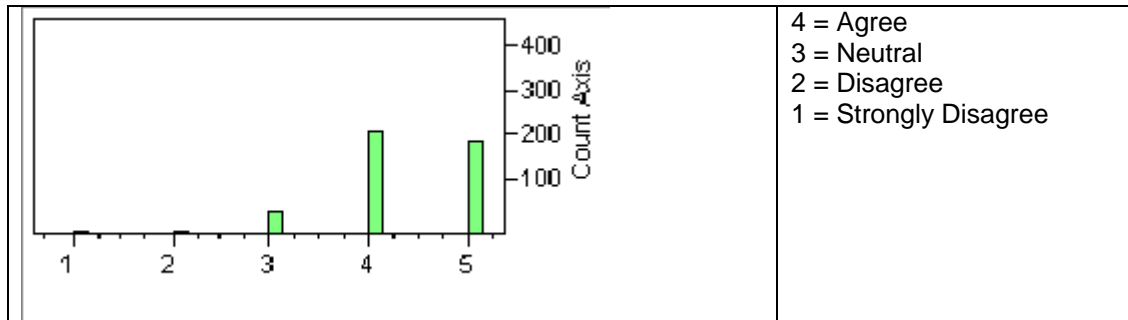
Knowledge

Details

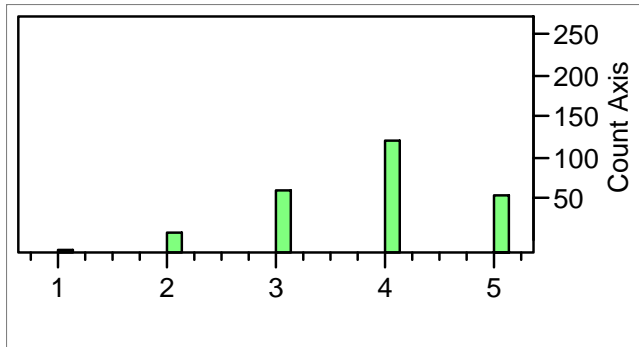
Mean	4.28
Std Dev	0.70
Std Err Mean	0.031
upper 95% Mean	4.34
lower 95% Mean	4.22
N	504
Median	4.0
Rank	2

Key

5 = Strongly Agree



7. I receive requested document delivery and interlibrary loan materials within the time frame I need.
Document Delivery / Interlibrary Loan



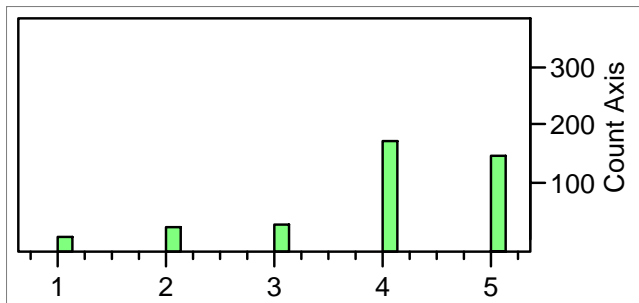
Details

Mean	3.76
Std Dev	0.948
Std Err Mean	0.053
upper 95% Mean	3.86
lower 95% Mean	3.65
N	316
Median	4.0
Rank	7

Key

5 = Strongly Agree
 4 = Agree
 3 = Neutral
 2 = Disagree
 1 = Strongly Disagree

8. I can access the Library's online resources (catalog, journals, databases and indices) from remote locations outside the library building.
Remote Access



Details

Mean	3.89
Std Dev	1.14
Std Err Mean	0.052
upper 95% Mean	4.00
lower 95% Mean	3.79
N	482
Median	4.0
Rank	5

Key

5 = Strongly Agree
 4 = Agree
 3 = Neutral
 2 = Disagree
 1 = Strongly Disagree

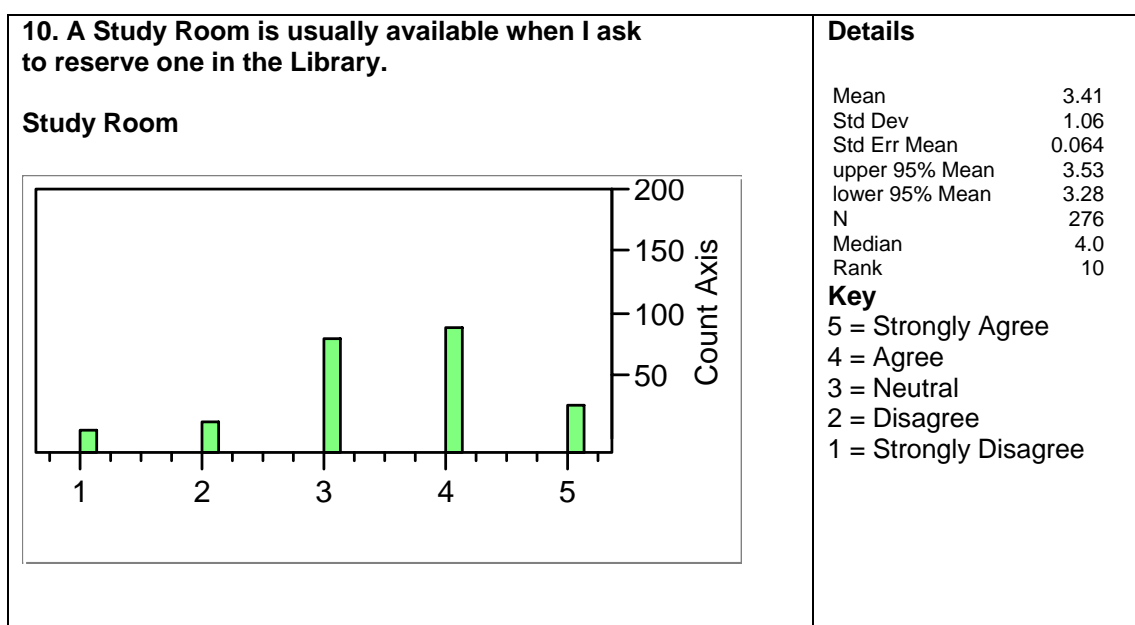
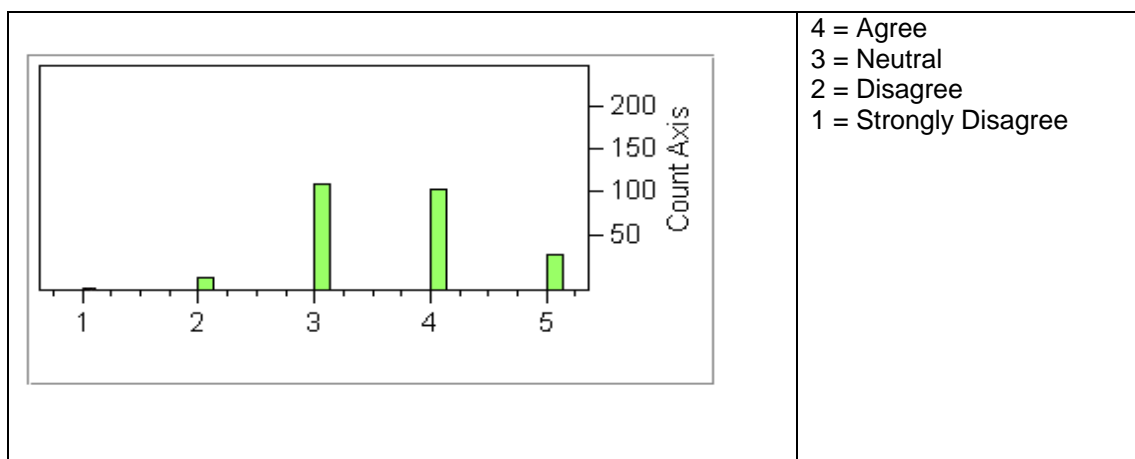
9. The Library's collection of audiovisual materials (models, computer software, and videotapes) meets my needs.
Audiovisual

Details

Mean	3.62
Std Dev	0.801
Std Err Mean	0.046
upper 95% Mean	3.71
lower 95% Mean	3.53
N	301
Median	4.0
Rank	9

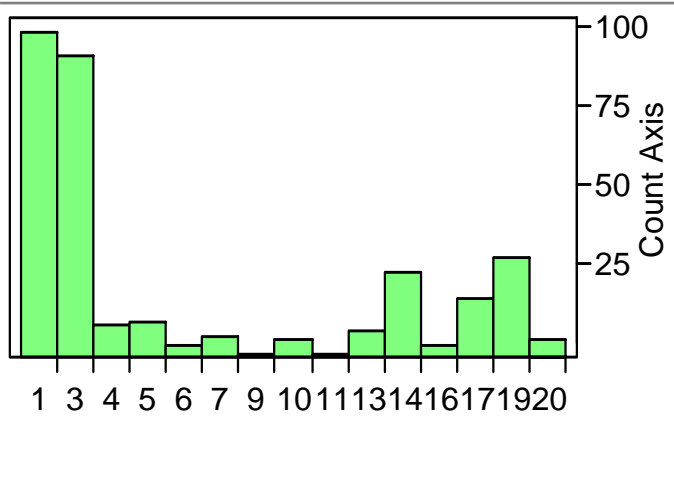
Key

5 = Strongly Agree



Survey Questions 11& 12

11. What is the best thing about the Library?	Distributions		
	Category	Count	%
	1 Staff	103	30.4
	3 Collection (Online)	96	28.4
	4 Collection (Books & Journals)	11	3.2
	5 Quiet / Noise	12	3.5
	6 Proxy / Remote	4	1.1
	7 Study Rooms	7	2.0
	9 Website	1	.2
	10 View	6	1.7
	11 Food (Sell / Eat)	1	.2
	13 Hours	9	2.6



Key for Recode Response Categories

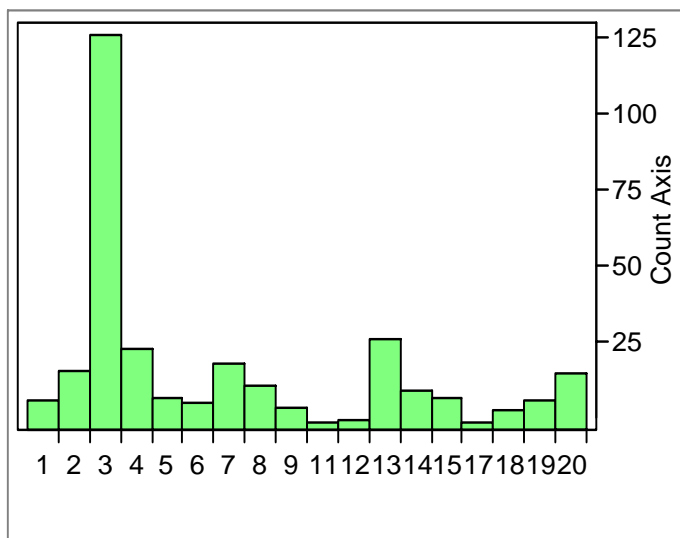
- 1 Staff
- 2 Xerox
- 3 Collection (Online)
- 4 Collection (Books & Journals)
- 5 Quiet / Noise
- 6 Proxy / Remote
- 7 Study Rooms
- 8 HVAC
- 9 Website
- 10 View
- 11 Food (Sell / Eat)
- 12 Circulation Period
- 13 Hours
- 14 Computers
- 15 Free Printing
- 16 Network
- 17 Environment
- 18 DD / ILL
- 19 General (about library)
- 20 Other (non-library)

14 Computers	27	7.9
16 Network	4	1.1
17 Environment	19	5.6
19 General (about library)	32	9.4
20 Other (non-library)	6	1.7
Total	338	100

12.What is the one thing you would change about the Library?

Distributions

Category	Count	%
1 Staff	10	2.8
2 Xerox	20	5.6
3 Collection (Online)	130	36.9
4 Collection (Books & Journals)	27	7.6
5 Quiet / Noise	11	3.1
6 Proxy / Remote	9	2.5
7 Study Rooms	22	6.2
8 HVAC	15	4.2
9 Website	8	2.2



Key for Recode Response Categories

- 1 Staff
- 2 Xerox
- 3 Collection (Online)
- 4 Collection (Books & Journals)
- 5 Quiet / Noise
- 6 Proxy / Remote
- 7 Study Rooms
- 8 HVAC
- 9 Website
- 10 View
- 11 Food (Sell / Eat)
- 12 Circulation Period
- 13 Hours
- 14 Computers
- 15 Free Printing
- 16 Network
- 17 Environment
- 18 DD / ILL
- 19 General (about library)
- 20 Other (non-library)

11 Food (Sell / Eat)	3	.8
12 Circulation Period	4	1.1
13 Hours	30	8.5
14 Computers	13	3.6
15 Free Printing	11	3.1
17 Environment	3	.8
18 DD / ILL	7	1.9
19 General (about library)	10	2.8
20 Other (non-library)	19	5.3
Total	352	100

From the desk of the Vice President

November
2003

The Next Generation Collaboration: Telephone-Telehealth-TeleInternet

As you know, information technology is an important tool in enabling us to fulfill our four mission areas. In order to meet the needs of all New Mexicans, we are continually improving our IT capabilities to help us advance education, patient care, research, and partnerships.

Many of our most successful partnerships are heavily dependent upon our IT platform. I am particularly impressed with the many collaborative opportunities that our faculty and staff have initiated and developed. Such collaborations include—

- HCV NET, led by Dr. Sanjeev Arora, is a partnership with the New Mexico Departments of Health and Corrections, Santa Fe Indian Hospital and community-based physicians.
- Project TOUCH, led by Dr. Dale Alverson, is a partnership with the University of Hawaii.
- The NIEHS Center, led by Dr. Scott Burchiel, is a partnership with Lovelace Respiratory Research Institute.

These partnerships are vital to our success and to fulfilling our mission, and they rely heavily on effective communication and advanced technology.

One of our greatest challenges is ensuring that all of us—including our many partners on and off-campus—have access to the same technological tools and resources. This is critical in creating efficient and effective statewide programs in education, research and health care.

Historically, we have developed our knowledge management systems based on the needs of the individual department or organization. Although our existing systems are very effective within that entity, they may not work well with other UNM systems or non-UNM systems. This can create obstacles to developing strong, statewide programs.

As technology evolves, so does our IT platform. Thirty years ago, our primary knowledge management tool was the telephone. Twenty years ago, we began using telehealth technology. Now, we are entering the era of the Tele-Internet, which supports the earlier technology, but increases our ability to reach all New Mexicans.

We are spearheading the Next Generation Collaboration for Knowledge Networks. Dr. Holly Buchanan, professor and director of the HSC's Library and Informatics Center (HSLIC), will lead this effort. She will work with CIRT, Extended University, Telecommunications, SOM Center for Telehealth, UNM Hospitals and the HSLIC to integrate HSC technologies in support of these statewide initiatives.

The Next Generation Collaboration will help us improve the integration of our knowledge management systems so they continue to achieve exactly what they were designed to—only more effectively. It will also help us continue to build strong partnerships and explore new opportunities for collaboration.

The Next Generation Collaboration will create a link between UNM and our partners across the state. We hope colleges and universities, state and local agencies and others will use the same technology tools and resources, which will facilitate partnerships and benefit all of us.



R. Philip Eaton, MD
Vice President for Health Sciences

HSLIC Online IT Survey Results 2004

The 2004 HSLIC Online IT survey was a web-based survey accessible from the HSLIC home page April 26-May 23, 2004. Originally the survey was scheduled to be removed May 9 but was extended due to a low number of responses.

It was announced to the HSC by two notices on the Public Affairs web page, the first for the weeks of April 26 and May 3 and the second announcing the extended due date. The Public Affairs weekly notice reaches a population of about 9300 HSC students, faculty, and staff. No targeted emails were sent. Although the survey was linked from the library's home page, there was no pop-up to draw it to users' attention. The survey was on the open web, so that other users from the University or from the general community were able to submit their responses also.

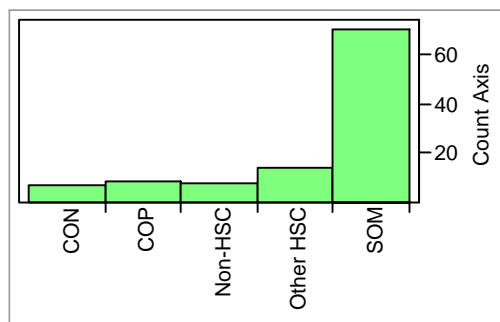
108 useable responses were received. Five responses from internal HSLIC employees were excluded.

The distribution of frequencies

Demographic groups with fewer than 5 respondents were grouped with other, larger demographic groups. The University of New Mexico Hospital affiliated respondents (3) were grouped into Other HSC (11). Other UNM (4) and Public (4) were folded into a category called "Non-HSC (8)." HSLIC employees were not encouraged to complete the survey, but 5 responses indicated a HSLIC affiliation. These responses were subsequently excluded from the results.

You are primarily affiliated with (Department or School):

Distribution of all Survey Respondents by Department



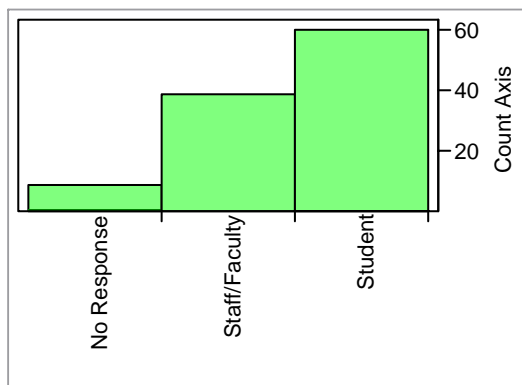
Distribution of all Survey Respondents by Department Frequencies

Frequencies

Level	Count	Percentage
CON	7	0.06
COP	9	0.08
Other HSC	14	0.13
SOM	70	0.65
Non-HSC	8	0.07
Total	108	100

You are:

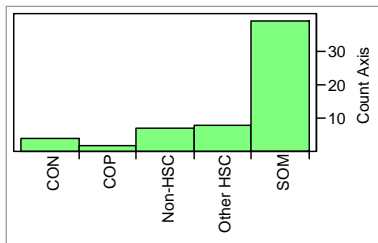
Distribution by Affiliation

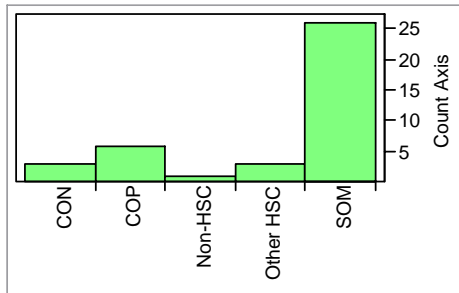


Distribution by Affiliation

Frequencies

Level	Count	Percentage
No Response	9	0.08
Staff/Faculty	39	0.36
Student	60	0.56
Total	108	100

	<div><div>Staff/Faculty Distributions by Affiliation</div><div></div></div>	<div><div>Staff/Faculty Distributions by Affiliation</div><div><div>Frequencies</div><table><tr><td>Level</td><td>Count</td><td>Percentage</td></tr><tr><td>CON</td><td>3</td><td>0.08</td></tr><tr><td>COP</td><td>6</td><td>0.15</td></tr><tr><td>Other HSC</td><td>3</td><td>0.08</td></tr><tr><td>SOM</td><td>26</td><td>0.67</td></tr><tr><td>Non-HSC</td><td>1</td><td>0.03</td></tr><tr><td>Total</td><td>39</td><td>100</td></tr></table></div><div>5 Levels</div></div>	Level	Count	Percentage	CON	3	0.08	COP	6	0.15	Other HSC	3	0.08	SOM	26	0.67	Non-HSC	1	0.03	Total	39	100	
Level	Count	Percentage																						
CON	3	0.08																						
COP	6	0.15																						
Other HSC	3	0.08																						
SOM	26	0.67																						
Non-HSC	1	0.03																						
Total	39	100																						

	<div><div>Student Distributions by Affiliation</div><div></div></div>	<div><div>Student Distributions by Affiliation</div><div><div>Frequencies</div><table><tr><td>Level</td><td>Count</td><td>Percentage</td></tr><tr><td>CON</td><td>4</td><td>0.07</td></tr><tr><td>COP</td><td>2</td><td>0.03</td></tr><tr><td>Other HSC</td><td>8</td><td>0.13</td></tr><tr><td>SOM</td><td>39</td><td>0.65</td></tr><tr><td>Non-HSC</td><td>7</td><td>0.12</td></tr><tr><td>Total</td><td>60</td><td>100</td></tr></table><div>5 Levels</div></div></div>	Level	Count	Percentage	CON	4	0.07	COP	2	0.03	Other HSC	8	0.13	SOM	39	0.65	Non-HSC	7	0.12	Total	60	100	
Level	Count	Percentage																						
CON	4	0.07																						
COP	2	0.03																						
Other HSC	8	0.13																						
SOM	39	0.65																						
Non-HSC	7	0.12																						
Total	60	100																						

Distributions

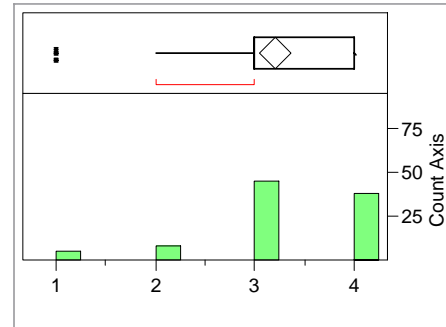
All Responses

1. Health Sciences Library and Informatics Center (HSLIC) employees answer my technology-related questions clearly.

Answer Questions

Mean: 3.21
Total Responses:96
Rank: 13

1. Answer Questions



Moments

Mean	3.21
Std Dev	0.81
Std Err Mean	0.08
Upper 95% Mean	3.37
Lower 95% Mean	3.04
N	96

Frequencies

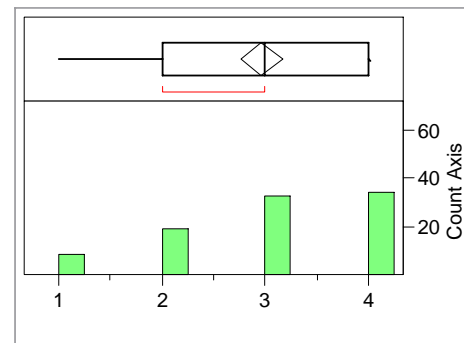
Level	Count	Percentage
1	5	0.05
2	8	0.08
3	45	0.47
4	38	0.4
Total	96	100

2. HSLIC employees respond to a technology question within the time frame I need.

Answer Time

Mean: 2.97
Total Responses:95
Rank: 10

2. Answer Time



Moments

Mean	2.97
Std Dev	0.97
Std Err Mean	0.1
Upper 95% Mean	3.17
Lower 95% Mean	2.77
N	95

Frequencies

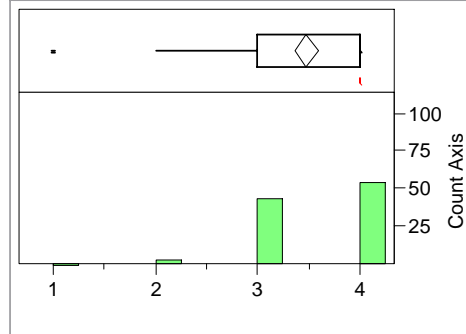
Level	Count	Percentage
1	9	0.09
2	19	0.2
3	33	0.35
4	34	0.36
Total	95	100

3. HSLIC employees with whom I've interacted have been courteous.

Workstation

Mean:3.48
Total Responses:102
Rank: 14

3. Courteous



Moments

Mean 3.48
Std Dev 0.61
Std Err Mean 0.06
Upper 95% Mean 3.6
Lower 95% Mean 3.36
N 102

Frequencies

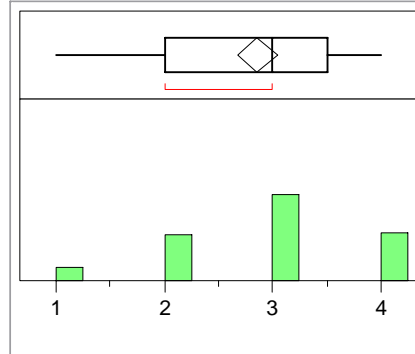
Level	Count	Percentage
1	1	0
2	3	0.03
3	44	0.43
4	54	0.53
Total	102	100

4. My technology Percentagelems usually are resolved on my first interaction with staff.

Percentagelem Resolved

Mean:2.86
Total Responses:93
Rank: 8

4. Percentagelems Resolved



Moments

Mean 2.86
Std Dev 0.88
Std Err Mean 0.09
Upper 95% Mean 3.04
Lower 95% Mean 2.68
N 93

Frequencies

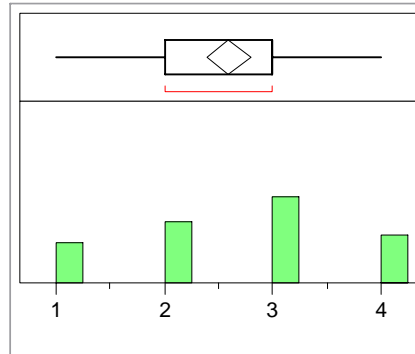
Level	Count	Percentage
1	7	0.08
2	22	0.24
3	41	0.44
4	23	0.25
Total	93	100

5. I am aware of the technology support standards at the HSC.

Courteous

Mean:2.6
Total Responses:99
Rank: 3

5. Support Standards



Moments

Mean 2.6
Std Dev 1
Std Err Mean 0.1
Upper 95% Mean 2.8
Lower 95% Mean 2.4
N 99

Frequencies

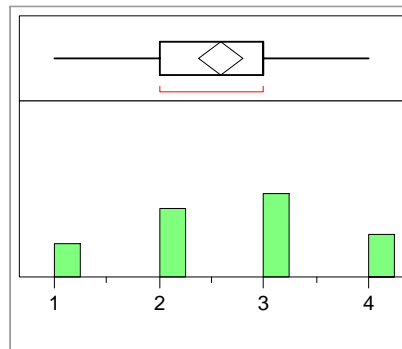
Level	Count	Percentage
1	17	0.17
2	26	0.26
3	36	0.36
4	20	0.2
Total	99	100

6. I use the technology user support website for information and updates.
(<http://hsc.unm.edu/library/usersupport/>)

6. Website

Mean:2.59
Total Responses:80
Rank: 2

6. Website



Moments

Mean 2.59
Std Dev 0.96
Std Err Mean 0.11
Upper 95% Mean 2.8
Lower 95% Mean 2.37
N 80

Frequencies

Level	Count	Percentage
1	12	0.15
2	24	0.3
3	29	0.36
4	15	0.19
Total	80	100

7. Beyond the incidental personal use of computers allowed by University policy (UNM Business Policy 2510) there is too much personal use of the public computers in the public computing area of HSLIC.

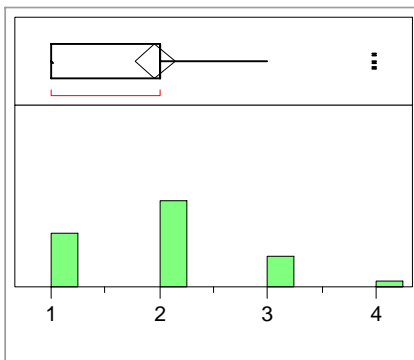
Personal Use

Mean:1.96

Total Responses:73

Rank: 1

7. Personal Use



Moments

Mean	1.96
Std Dev	0.81
Std Err Mean	0.09
Upper 95% Mean	2.15
Lower 95% Mean	1.77
N	73

Frequencies

Level	Count	Percentage
1	22	0.3
2	35	0.48
3	13	0.18
4	3	0.04
Total	73	100

8. A public computer is usually available in the public computing area of HSLIC when I need one.

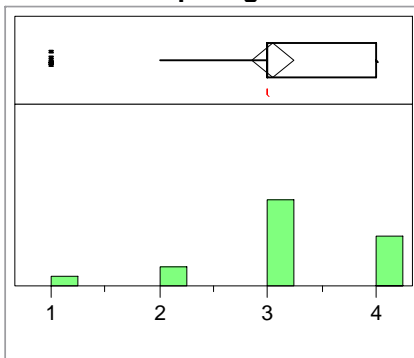
Public Computing

Mean:3.04

Total Responses:74

Rank: 11

8. Public Computing



Moments

Mean	3.04
Std Dev	0.83
Std Err Mean	0.1
Upper 95% Mean	3.23
Lower 95% Mean	2.85
N	74

Frequencies

Level	Count	Percentage
1	5	0.07
2	9	0.12
3	38	0.51
4	22	0.3
Total	74	100

9. There are sufficient public printers in the public computing area to accommodate my needs.

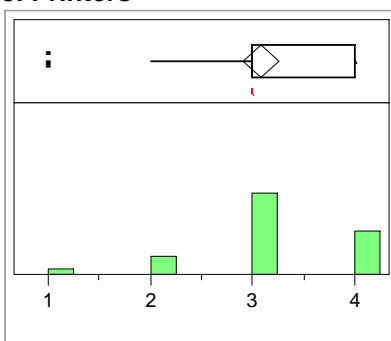
Printers

Mean:3.08

Total Responses:71

Rank: 12

9. Printers



Moments

Mean	3.08
Std Dev	0.77
Std Err Mean	0.09
Upper 95% Mean	3.27
Lower 95% Mean	2.9
N	71

Frequencies

Level	Count	Percentage
1	3	0.04
2	9	0.13
3	38	0.54
4	21	0.3
Total	71	100

10. I am aware of how to get access to the network in the HSLIC building for my own laptop.

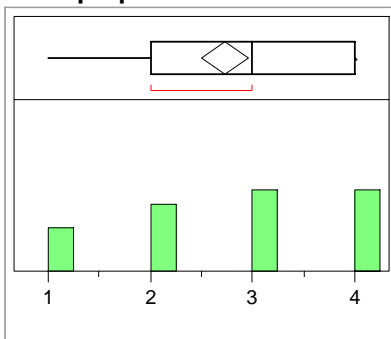
Laptop

Mean:2.73

Total Responses:81

Rank: 6

10. Laptop



Moments

Mean	2.73
Std Dev	1.06
Std Err Mean	0.12
Upper 95% Mean	2.96
Lower 95% Mean	2.49
N	81

Frequencies

Level	Count	Percentage
1	13	0.16
2	20	0.25
3	24	0.3
4	24	0.3
Total	81	100

11. I am satisfied with the speed of the Internet at the Health Sciences Center.

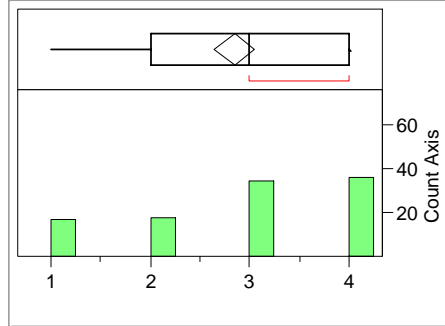
Network Speed

Mean:2.85

Total Responses:106

Rank: 7

11. Network Speed



Moments

Mean	2.85
Std Dev	1.07
Std Err Mean	0.1
Upper 95% Mean	3.05
Lower 95% Mean	2.64
N	106

Frequencies

Level	Count	Percentage
1	17	0.16
2	18	0.17
3	35	0.33
4	36	0.34
Total	106	100

12. The GroupWise email system helps me to be productive.

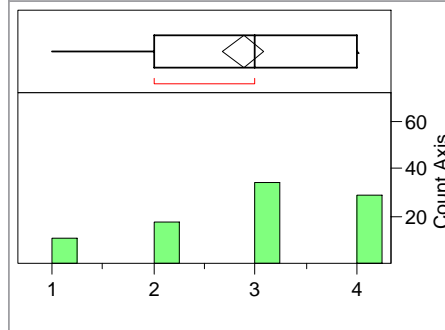
GroupWise

Mean:2.88

Total Responses:92

Rank: 9

12. GroupWise



Moments

Mean	2.88
Std Dev	0.99
Std Err Mean	0.1
Upper 95% Mean	3.09
Lower 95% Mean	2.67
N	92

Frequencies

Level	Count	Percentage
1	11	0.12
2	18	0.2
3	34	0.37
4	29	0.32
Total	92	100

13. When I have a Percentagelem with WebCT, I know where to go for help.

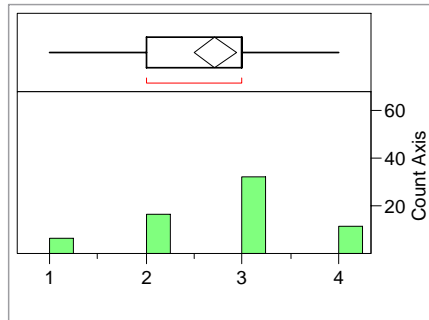
WebCT

Mean:2.72

Total Responses:68

Rank:5

13. WebCT



Moments

Mean	2.72
Std Dev	0.88
Std Err Mean	0.11
Upper 95% Mean	2.93
Lower 95% Mean	2.51
N	68

Frequencies

Level	Count	Percentage
1	7	0.1
2	17	0.25
3	32	0.47
4	12	0.18
Total	68	100

14. The help text on my WebCT course site is useful.

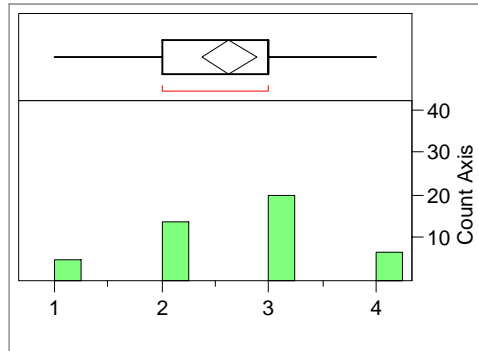
WebCT Help

Mean:2.63

Total Responses:46

Rank:4

14. WebCT Help



Moments

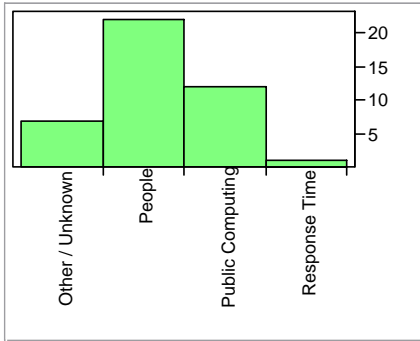
Mean	2.63
Std Dev	0.88
Std Err Mean	0.13
Upper 95% Mean	2.89
Lower 95% Mean	2.37
N	46

Frequencies

Level	Count	Percentage
1	5	0.11
2	14	0.3
3	20	0.43
4	7	0.15
Total	46	1

15. What is the best thing about Technology Support?

Best Thing



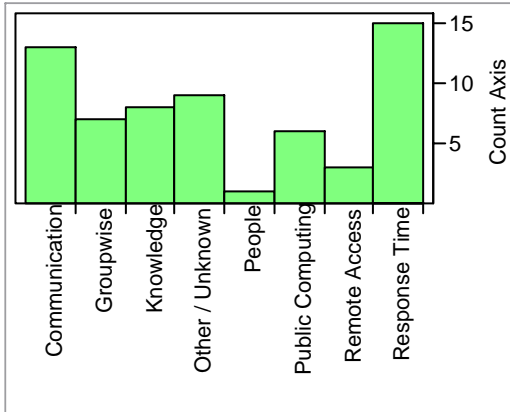
Frequencies

Level	Count	Percentage
Other / Unknown	7	0.167
People	21	0.524
Public Computing	12	0.286
Response Time	1	0.024
Total	41	1.000

4 Levels

16. If you could improve one thing about Technology Support, what would it be?

Needs Improvement



Frequencies

Level	Count	Percentage
Communication	13	0.210
Groupwise	7	0.113
Employee	8	0.129
Knowledge		
Other / Unknown	9	0.145
People	1	0.016
Public Computing	6	0.097
Remote Access	3	0.048
Response Time	14	0.242
Total	61	1.000

8 Levels

Technological Factors Implementing Informatics Support Tools for RIOS Net, An AHRQ Practice-Based Research Network

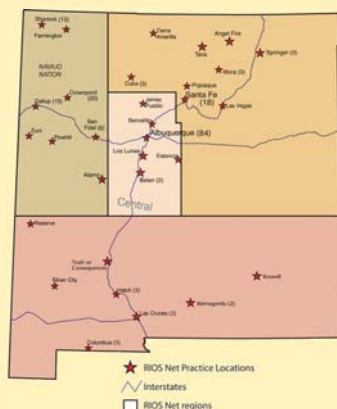
Philip J. Kroth, M.D., M.S., Holly Shipp Buchanan, MLn, MBA, EdD
THE UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, NM



Abstract

RIOS Net (Research Involving Outpatient Settings Network) is an AHRQ Practice-Based Research Network in New Mexico composed of clinicians practicing in Community Health Centers, Indian Health Service/Tribal facilities, and University of New Mexico academic settings.

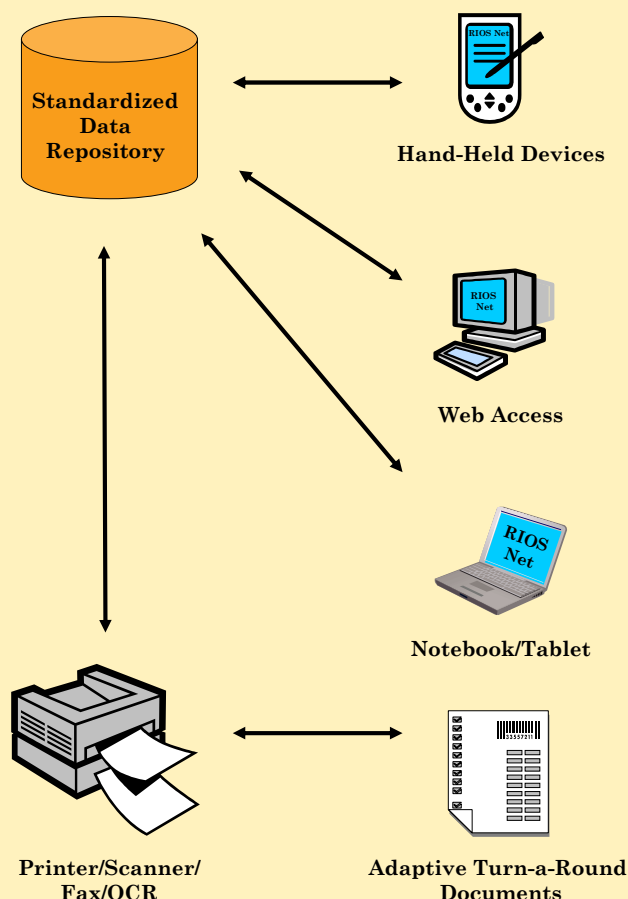
RIOS Net



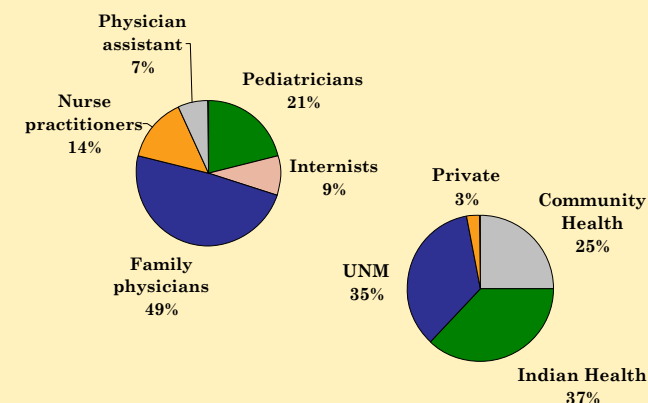
Informatics Support Strategy

Previous RIOS Net projects have successfully used hand-held and web-access data collection technologies. However data from these projects was not stored in an easily reusable format. The UNM Health Sciences Center is creating a standardized term-based research data repository to support all RIOS Net research projects and future reuse/data-mining of the accumulated data. Because many of the network's 200+ members are located in remote areas, access to the internet or even basic computer equipment is often limited. The investigators will evaluate the use of adaptive turn-a-round documents as a strategy for automating data collection in addition to a variety of other data collection technologies.

Architecture



RIOS Net Demographics



Informatics Goals

- Support and facilitate communication among RIOS Net members.
- Create a centralized, standardized term-based clinical data repository capable of supporting all RIOS Net clinical research projects.
- Completely configurable user access control to effectively manage compliance with all security and privacy regulations.
- Long term collection of data from multiple studies that can be potentially reused for future research.
- Create a suite of supported data collection tools easily configurable for specific practice-based research projects.
- Create a core IT group experienced with the suite of tools and data repository who will support and manage all the data gathering and storage needs of the clinical researchers.

*This work is supported in part by a contract through the National Heart, Lung, and Blood Institute (BAA-RM-04-23).

**This work was presented at the IAIMS Consortium Annual Meeting in Boston, MA., on April 9-10, 2005.