NORTHLAND PIONEER COLLEGE TECHNOLOGY PLAN

FOR

ACADEMIC YEARS 2002/2003 - 2006/2007

Northland Pioneer College – Information Services Division - January 2003

I. Introduction

The primary objective of the 2002/2003 through 2007/2008 technology plan is to develop, provide, and maintain a comprehensive information technology infrastructure that encourages and supports the use of information technology for innovative instruction, effective student service and administrative productivity. This document will establish a long term plan to provide a systematic and cost effective approach to the development, implementation and management of technology at Northland Pioneer College. Other resources including the *Northland Pioneer College*

1999 Self Study Report; the *Review of Planning: History and Future 1989-2005, Northland Pioneer College*; and the *Report of a Visit to Northland Pioneer College, October 18-20, 1999 by the Higher Learning Commission of NCA; Improving Rural Access to Education: FIPSE Grant Proposal 1999-2002; Developing a Digital Learning Resource System: Title III Grant Proposal 2000-2005;* and all grant reports and studies will be used in combination with this planning document for managing technology on campus.

Building on the strengths of previous technology planning efforts, especially those activities undertaken during the past ten years, the current technology plan proposes initiatives that will be critical to Northland's effectiveness in using current and emerging technologies to support the College's mission. Through College-wide forums, student and staff surveys, and institutional studies, outside evaluations and studies, a number of specific technology planning goals, strategies and assessment procedures have been established for academic years 2002/2003 through 2007/2008. The continuing change and emergence of new innovations in educational technology obligates the College to examine and re-assess technology planning efforts periodically. This process of examination and re-structuring will provide a means for ensuring an orderly and economically sound development of the uses of information technology in instruction and other educational services.

The technology planing document for academic years 2002/2003 through 2007/2008 is organized as follows: an overview of Northland's current technology infrastructure; key technology planning goals; specific planning strategies for achieving goals; methods for evaluating the institutional effectiveness of technology initiatives; and appendices.

II. An Overview of Northland's Current Technology Infrastructure

The College's wide area network (WAN) serves as the transport infrastructure for distance learning; academic research and study; administrative data transfer; and communication within NPC's campuses, centers and community sites. Consisting of 32 T1s (standard WAN data line with data transfer rate of 1.5 megabits per second) the WAN is based on ATM (Asynchronous Transfer Mode) which supports delivery for multiple electronic formats including the video and audio distance learning systems, the telephone system, administrative system, library system, academic computer labs, Internet courses, and other supplemental systems. Network switching equipment is located on the Painted Desert Campus in Holbrook. Local area network (LAN) facilities are located on the White Mountain Campus in Show Low, the Little Colorado Campus in Winslow, the Silver Creek Campus in Snowflake, the Painted Desert Campus, the Community Education Center Complex and District Office in Holbrook, and centers in St. Johns, Springerville, Heber, Whiteriver, Polacca and Kayenta. It should be noted that the College is in the process of relocating the Painted Desert Campus to a new location within the Holbrook city limits. The technology planning implications of moving facilities from the old campus to new campus location will be discussed in section H of this document. In addition, some community sites connect to the network via low bandwidth telephone lines. The Holbrook, Show Low and Winslow Campuses maintain direct network connections from these sites to major Internet Points of Presence (POPS) in Flagstaff and Phoenix. All other sites connect via the College WAN to the Holbrook Campus and from there to the Internet. Permanent campus and center buildings, as well as most temporary buildings, are internally wired with category 5 and/or category 6 ethernet cable which supports data transfer rates of 10 megabits per second. Campus buildings are connected within respective local area networks via fiber optic cable, which supports data transfer rates of 100 megabits per second. The following diagrams illustrate the network layout and primary features for a typical Northland campus/center computer classroom and video classroom.

Diagram 1 – Computer Classroom Network Layout

← One or more T1 Data Circuits (WAN)

A

Fiber Optic →

B

Category 5 Data Cable →

As shown in the diagram above, computer workstations, printers, telephones and other client devices are connected to the campus or center LAN via patch cables to wall plates. Category 5 and/or 6 data cable, which supports data transfer rates of 10 megabits per second, is punched down between wall plates in the classroom and the facility's telecommunications room/closet (B). Buildings within the LAN are connected via fiber optic, which supports 100 megabits per second data transfer rates, to the campus or center telecommunications room (A). The campus or center LAN is connected to the College WAN via one or more T1 circuits which support 1.54 megabits per second data transfer rates.

Diagram 2 – Interactive Video Classroom Network Layout

T1 Data Circuit (WAN) →

A

Fiber Optic (LAN) →

B

C

Interactive video classrooms vary in terms of room size. The eight campus rooms (2 at each campus) are typically larger than the four center rooms (1 at each center). Interactive video rooms at all locations are wired with category 5 cabling/wall plates for connecting video system and other devices (telephones, computers, etc.) via fiber optic run to the campus or center telecommunications room (**A**). Video data is transmitted over the WAN via one or more T1 circuits. All video classrooms are equipped with the following: (**B**) CODEC Unit consisting of the hardware/software for compressing/decompressing the video data, two 36 " monitors, power supply and connection ports to campus or center LAN; and cabinetry (**C**) Instructor podium consisting of touch screen control panel for computer control of system components including: room (or wide angle) camera, pad camera, video recorder player, and slide to video converter. Other supported units such as notebook computers and DVD players are connected as needed.

Northland's network infrastructure is atypical to most institutions in rural Northeastern Arizona. Given the number of local area networks, the distance between LANs (over 200 miles in some instances), and the multiple systems supported, the College's WAN infrastructure more closely resembles a Metropolitan Area Network (MAN) typically found in the industrial centers of large cities. The following diagram illustrates Northland's WAN.

Diagram 3 – Northland Pioneer College WAN Layout

Solid lines connecting campus and center locations represent one or more T1 circuits. Broken lines connecting the Hopi Center represent a wireless microwave digital connection using digital radios and tower equipment. Local public telecommunications utilities have been unable to provide high-speed land lines to the Hopi Center location. The purpose of this diagram is to provide a conceptual view of the distance and scope of the WAN. It is not intended to provide a layout of the number or specific runs, point of presence locations, or other technical factors regarding the specific topology.

III. Technology Planning Goals

Goal 1
To provide a quality learning environment:
Students must be able to use information technology to locate, evaluate and use learning resources, and to communicate with academic and administrative staff. Ensuring success for every student means that adequate services and environments must be provided for students at all service area locations.

Goal 2
To promote excellence in all aspects of student learning:
The teaching/learning process must include innovative strategies and technologies that actively involve students and fully support them in achieving academic objectives.

Goal 3
To support quality teaching and professional development for staff:
Technology resources and services must enable staff to develop computer skills for professional growth, develop new teaching and learning methodologies, and create and distribute distance learning programs.

Goal 4
To improve institutional communication, productivity and student service through technology:
Technology resources and services must provide efficient and comprehensive access to accurate and timely

information from the user's client workstation, telephone or other technical devices, and enable the efficient management of this data.

Goal 5
To improve resource sharing and cooperative instructional programs with the wider educational community: Planning initiatives based on establishing and adhering to academic and industry technology standards will enable Northland to integrate with the larger academic community in academic and institutional resources sharing, fulfilling state and national statistic reporting requirements, fully supporting student transfer objectives and establishing cooperative instructional delivery programs.

IV. Technology Planning Strategies

A. Wide Area Network

In August 1999, Northland received approximately $391,000 from the Department of Education to implement technology for extending basic skills and general education curriculum to rural sites within a three year project period. In October 2000, the College also received approximately $1,226,000 from the Department of Education with a portion of that funding from the five year project to support improvement of the WAN infrastructure. Through grant project funding and the College operational/capital budget, the College has purchased data circuits, networking equipment, computers, interactive video equipment, audio class components, and other technology for improving teaching/learning resources and technology at all campus and center sites. Upgrading and replacement of WAN technology and services will be continued using funds from the remaining three years of grant project funding and money from the annual College budget.

In order to maintain the performance and reliability standards required to support instructional, student service and administrative network functions over the next five years it is expected that the College will need to invest approximately one million dollars over the five year period in WAN related equipment. This network upgrade investment will insure that WAN technology and service will remain at an adequate level to provide high performance and reliability for College-wide network service. The expected date to begin the first phase of a major network upgrade is July 2003.

While implementing additional T1 lines will provide solutions for the short term, the College will explore cost and feasibility of replacing multiple T1 circuits connecting campuses on the WAN with single data circuits capable of accommodating a greater degree of network traffic within four to five years. Convergence of multiple T1 circuits into a single broadband data circuit such as an OC3 circuit will increase the performance of networked applications and support a larger number of users. During academic year 2003/2004, the College will conduct a cost analysis of converting T1 to OC3 circuits in order to determine the most effective schedule for conversion.

In order to improve efficiency of the College WAN, all network servers and switching equipment will be re-located within a single building on one NPC Campus. Currently, the main administrative and telecommunication servers and associated networking equipment are located on the Holbrook Campus, while the main network server and data transfer components for supporting the College's computer technology and electronics curriculum are located on the Show Low Campus. In addition, a number of other smaller network servers are located on the various campuses. The centralization of networking services within a single facility will enable the College to deploy technical support staff, network components and data circuits more efficiently, to support users and troubleshoot problems more quickly, and to establish a more effective long term College-wide building plan. By fiscal year 2003-04, Northland will determine the location and specification for a permanent facility on a single campus for housing all College primary network and server technology. Section H describes the process for identifying the location and movement of primary central site network and server technology.

To insure that the College is using data bandwidth in the most productive and cost-efficient manner, Information Services will continue analysis of network usage patterns and document statistics and observations. Annual reports will focus primarily on the scheduling of academic and administrative network activities and the effect on the

performance and reliability of the College WAN. Information Services anticipates that the continued demands for interactive distance teaching and learning applications, data collection for research and study assignments, and electronic communication will lead to "bursts" of network traffic at specific time periods. At times, "bursts" of network activity can precipitate a significant decrease in network performance or, in some instances, system failure. In order to reduce the occurrences of network "bursts", the College will develop a plan for prioritizing and scheduling academic and administrative network activities to best reduce saturation of network bandwidth. Strategies will include automating specific administrative tasks to occur during times when classes are not in session, avoiding scheduling classes with a high level of networking activities simultaneously, incorporating technology to re-route network traffic through different pathways based upon the availability of bandwidth at a given time, and implementing technology that will more effectively compress data before being transferred and decompress the data upon delivery.

B. WAN to Internet Connection

Northland currently maintains five T1 data circuits for enabling students, faculty, staff and community members to access the Internet from a College computer. These circuits are also used to support users from outside the College WAN to access Northland WEB resources including WEB or online courses, digital library and study materials, online student service materials, and other academic or administrative resources located on Northland computer servers. The College contracts with two Internet Service Providers (ISPs), Cybertrails and Northern Arizona University, for connectivity to major Internet Points of Presence (POPS). During this planning period, the College will evaluate the feasibility of using other ISPs.

While the current level of Internet bandwidth provides a sufficient level of performance and reliability, the annual increase in the number of Internet users and resources will require more Internet data circuits to support future growth. Therefore, the College plans to implement one or more new T1 data circuits and service per year at an approximate annual operating cost of $40,000 per year for each new circuit.

C. Interactive Video and Audio Classrooms

Although minor hardware and software upgrades to the current interactive video technology are anticipated, the College expects no significant change in the core system hardware and software components during this planning period. However, campus and center classroom equipment will require upgrading or replacement within this planning period. In addition, the video bridge or main control unit may require upgrading and replacement. Upgrade and/or replacement of two classrooms per year is anticipated during the next five years, and the College has scheduled implementation of a new video classroom, or second video classroom, at the Whiteriver Center in 2003. By fiscal year 2003/2004, we expect to have the most current level of classroom equipment at each site, which includes the following components:

- CODEC Unit, cabinetry, cabling and miscellaneous connectors
- room camera
- touch screen display panel
- pad camera
- VCR and slide to video converter
- ceiling mounted microphones
- room speakers
- notebook computer

Cost for upgrading classrooms will range from $10,000 to $20,000 per site, while replacement costs will range from $35,000 to $50,000 per site.

At this time, instructors rely on shared notebook computers for presenting computer multimedia programs on the video system. In order to meet the increasing demand for these resources, the College currently provides 12 notebook computers and other peripherals for faculty teaching support. Beginning in FY 2003-2004, a minimum of four notebook computers and four multimedia projection units will be purchased each year to replace or supplement portable teaching technology. These units will be available for checkout from the campus/center library facilities. During the remainder of the planning period, circulating notebook computers will be upgraded or replaced to meet College notebook computer standards, and usage studies will be conducted to evaluate the performance, reliability and availability of this equipment.

During 2000-2002, the College improved the interactive audio system by upgrading the local site teleconferencing equipment. In the next two years, the College will examine the cost and value of adding computers, fax machines and other communication devices to all audio classrooms. The following diagram shows the proposed equipment layout, list of items, and features for enhancing audio classrooms.

Diagram 4 – Enhanced Audio Classroom

The audio classroom illustrated above is equipped with the following:

- full-duplex telephone conferencing unit (currently implemented in audio classrooms);
  computer workstation with one or more monitors, moveable keyboard/mouse, printer (not implemented at this

- time)
- fax machine (implemented in some audio classrooms at this time)

Instructor and students can use the computer to transmit still images, charts and other visual graphics to supplement interactive audio teaching and learning. Documents and graphics can also be transmitted via fax machine or printer. As is the case with Northland's interactive video system, all audio conference participants immediately see the data presented, and the instructor can allow presentations from any participant or limit the system to instructor control.

D. Client Workstations

As of March 2003, about 65% of College computers met the current minimum standard specification recommended by Information Services. The College will upgrade and/or replace approximately 200 or 20% of computers in production each year to achieve a working environment by 2006 in which 75% or more of units meet the Northland computer standard specifications. The remaining units, while still a few years older, will fully support all College instructional and administrative functions.

As the College has achieved the goal of connecting all full-time staff and faculty who have computer work areas or offices to the network, emphasis will be on increasing the number of networked computers in public or lab areas. During the past three years, the College has increased computers in libraries and labs by about 40% adding or replacing about 425 new units. However demand for computer use has also increased dramatically. Therefore, the College will continue to increase the number of computers in student research and study areas with Internet connectivity and email capabilities. Information Services will examine other methods including outsourcing email services, contracting with network consultants and recruiting a full-time Webmaster/Postmaster to improve the efficiency in providing Internet and email services to users. The College will improve the process for implementing Internet access and email service to staff and students to achieve a rate of 90% of all College computers by 2003, and 96% by academic year 2004/20005. The remaining 4% of computers will represent units that are portable in nature, that will not be permanently located in an office or lab but, will be used for non-network functions. All portable units will have modems for connecting to the Internet when needed.

D. Telephony System

Currently, all full-time staff and approximately 60% of part-time staff use the basic functions of the College's telephone service including inter-office extension calling, password authorized long distance services, call forward and transfer, voice mail, and group messaging service. While minor system software upgrades may be needed during the next five years, the College does not anticipate a need for significant changes to the core system hardware and software.

The single most important planning activity related to telephony service for the 2003 through 2007 period is to enhance the functionality of Northland's center and community service sites within the College's telephony system. While significant improvement in the efficiency, quality and reliability of telephone communication between personnel on campus and center locations has been achieved by implementing the new system, community site facilities, where many of Northland's students attend classes, are not able to use system functionality such as call forwarding, conferencing or transfer. In order to improve system performance at these locations, we will explore investing in additional remote services for sites not on the College WAN. During 2003-2005, a study will be conducted to examine the cost and feasibility of enhancing the College telephone system to support local community service sites not connected to the College WAN.

E. Technology for Curriculum Development and Support

As of 2003, the College offers approximately 72 Internet courses and enrollment has risen steadily. In order to more

fully support curriculum development, especially in WEB-based delivery formats, the College will increase hardware and software resources and services available to faculty for developing, managing and applying instructional multimedia. Resources and services will include faculty lab areas containing computers, software and peripherals for creating and managing multimedia; network and Internet access from office computers to instructional multimedia research, image and application databases; and a schedule of routine developmental workshops.

Using Title III grant and college operational funding, several technology projects for developing and implementing digital resources for teaching and learning, library, and student services will be conducted. Appendix A provides the process for faculty and staff to request funding for the development, implementation and evaluation of such projects.

F. Staff Development for Using Technology

Northland Pioneer College conducts three to four staff technology development and training workshops per semester. Workshops cover a wide range of technology applications, from using basic client PC components to authoring WEB pages, and consist of two four-hour, “hands-on” sessions.

It is clear that the College must improve the process for encouraging staff to enroll, providing meaningful subject matter and open accessibility to all staff. Training opportunities must be available to support all technology initiatives in a timely and equitable manner, placing reasonable demands on staff to become proficient in using new technologies.

During the first year of this planning period, the College will achieve the following:

- continue to assess strategic training technology needs of staff;
- develop and implement a needs assessment methodology to determine the primary needs for staff in technology training;
- prioritize the needs and their relationship to overall instructional and administrative duties.

During the second year, the College will achieve the following:

- design a technology curriculum for staff based on a general technology competency level;
- establish and maintain an effective delivery system for technology training;
- provide adequate hardware/software and support/instructional personnel for technology training.

Throughout the entire five year period, the College will

- continue to develop and disseminate technology training opportunities each semester;
- assess and improve technology training;
- document the results of assessment studies, surveys and observations.

G. Continuation of Technology Guidelines and Standards

Standardization of College hardware and software, established in 2000, has proven to be an effective method for ensuring that students and staff at all College sites can share data and operate similar software applications. The

reduction of multiple hardware platforms has reduced problems in maintaining disparate types of equipment.

In addition to standardizing local client technology, the College has established specific documents for LAN/WAN bonding, grounding and structured cabling specifications. These documents will be consulted and specifications incorporated into all College construction projects undertaken during the next five years.

The single most important issue regarding standards facing Northland at this time is the development of College guidelines and standards for WEB page publication and online course development, and to insure that these standards cover ADA requirements and support all students. In order to provide staff with the opportunity to contribute to Northland's WEB page, the College is developing a formal policy regarding WEB publication. Several areas of this policy have been agreed upon and are currently being followed. However, completion of all aspects and administrative approval will accomplished by Fall 2004 This policy will include: criteria for publishing pages on the official Northland WEB; recommended guidelines and specifications for the properties, design and attributes of the WEB publication; a procedure for approving the publication content as an official Northland document; methods for enabling management of the WEB publication; and all other aspects to insure consistency and most effective implementation.

H. Movement and Deployment of Technology on the Relocated Painted Desert Campus, Holbrook

During planning period 2002/03-2007/08, the College will be moving all technology facilities from the current Painted Desert Campus location at 933 Hermosa Drive to the new campus location on Navajo Boulevard. The following section outlines the plan for moving specific technology equipment and services during each phase of the re-location.

Phase I – 2002-2003:

- Two T1 data circuits connecting to the College WAN will be implemented in June 2003.
- All cabling, network, and telecommunications equipment will be implemented in offices, classrooms, the library and other designated areas for the first new building, the Learning Center in July 2003. All cabling, conduit and equipment will meet the current college specifications.
- Computer workstations, fax machines and other peripherals will be implemented in August 2003. Some of this equipment will be new and some will be units already in service at the old location.
- By August 2003, LANs in each of the two buildings, the Community Education Center and the Learning Center, will be completed; both buildings will be connected to the College WAN; and all computers and other network devices will be fully connected to the network.

Phase II – 2003-2004:

- Two T1 data circuits connecting to the College WAN will be implemented on or before June 2004.
- The two interactive video classrooms and other specified offices, work areas, or classrooms will be relocated to the new campus.

Phase III – 2004-2007:

- The Information Services offices, work areas and telecommunications facilities, including all central site equipment will be re-located to a building at the new location.
- All technological resources and services will be vacated from the old location.

IV. Assessment of Technology Planning Strategies

Outcome assessment data for evaluating planning activities will be compiled through student and staff surveys, Information Services performance and reliability statistics, and other routine technology systems studies. Participants charged with providing leadership and direction in the implementation, modification and assessment of technology planning initiatives include: Dean of Information Services, President's Staff, Management Council, Internet Guidance Committee, other college-wide advisory groups or committees dealing with technology, and outside evaluators/consultants associated with technology grants or other ongoing projects.

The College will provide, through regular and on-going forums, opportunity for all staff to share the efforts and concerns related to technology, and make recommendations for improvement of services. Designated staff, in particular those identified as participants
in the section above, will monitor the implementation of the Technology Plan and recommend changes as appropriate. Other assessment activities for this period will include:

- prioritization of major operational changes related to the delivery of instruction and services in the area of information technology;
- review and evaluation of information technology resources and services and recommendation of changes to provide more efficient and effective operations;
- consideration and suggestion of recommendations related to standards for both hardware and software to be adopted College-wide;
- assistance in the resolution of problems arising out of the functioning of the infrastructure, and offering of suggestions for change as appropriate;
- consideration of budget issues and coordination of divisional expenditures in order to provide the most effective procurement of information technology.

IV. Conclusion

The five-year updated Technology Plan outlined in this document was developed over the past three years with input from a variety of college sources, as well as recommendations from a Report of Visit to Northland Pioneer College prepared by the evaluation team for the Higher Learning Commission of NCA (October, 1993). This document focuses on developing, implementing and managing technology for teaching/learning activities, student services, institutional data management and communication. The College recognizes that careful planning of technology goals and initiatives can enable Northland to provide and maintain a high quality, open architecture, service-based information technology infrastructure. The process of planning for, evaluating and re-structuring technology will provide a means for ensuring an orderly and economically sound development of the uses of information technology at Northland Pioneer College.

Appendix A – Process for Developing a Title III Technology Project

Title III Project Request Format

Faculty and staff are encouraged to propose projects that support the development of digital resources and services as described in the Title III grant proposal. Anything that appears to be funds for ongoing activities that are not developmental and are not innovative are usually not funded. Most projects fall into these two basic categories:

- Teaching/learning - instructional support resources in the digital (or multimedia or computer) format that increase access to higher education and/or improve student academic performance, understanding or interest in higher

education; and/or increase number of persons enrolling or participating in higher education.

- Student Services – resources in digital format that improve student service in access to, utilization of, and/or success with institutional services in higher education.

The written request should include the following:

A. Description of project, so we understand exactly what you are doing. Don't be afraid of being persuasive and compassionate. If we don't understand what the heck you're talking about or it doesn't sound very helpful to students or actually workable, it's hard to fund.

B. How project will improve instructional and/or student service at NPC in measurable terms (x% increase in enrollment, x% improvement in student's academic performance, x% increase in access to courses, etc.) The grant requires some measurable proof that the $ spent improved, enhanced, etc., someone's academic life by some amount, percentage, etc.

C. Itemized cost of project (per each year funding is sought) including college contributed funding (for example, you will be spending time managing the project, selecting courseware, and evaluating its progress, so a portion of your salary could be college contributed, as well as departmental/divisional supplies, etc.) Contributed funds can be a rough estimate, don't need real specific detail. Grant items should be very specific, such as software = $x, training/consultation = $x, equipment = $x., etc

D. How you will evaluate the project, (student surveys, instructor's analysis of student performance in course assignments, grades, number of students enrolled based on past years' enrollment, and other assessment studies).

E. How will project be sustained after grant funding ends (increase in enrollment will pay for ongoing costs, other college funding sources, etc.) Typically you can explain this in a paragraph or two, but it should be convincing.

F. Lessons learned - Narrative that describes how things went, including successes, failures, unexpected outcomes. This is the part we share with NPC colleagues as well as other educators to help them with such projects.

G. Other characteristics of the project that can be used to assess the benefit to the Title III grant and the College.

Faculty or staff present the idea first to dean or supervisor for approval, then Dean shares with VP. VP or Dean sends their recommendation on to Brian McLane, Title III Project Director. Projects are examined during Title III meetings and feasibility, adherence to grant objectives, and the impact of the project on meeting Title II goals are determined. Most projects that fall within acceptable guidelines are funded, only sometimes we have to negotiate on the budget, or implement the project in more than one funding year.

YOU WILL BE ASKED TO SUBMIT A PROGRESS REPORT AT LEAST ONCE A YEAR BASED ON THE PROPOSAL FORMAT ABOVE AND ASSIST THE PROJECT DIRECTOR WITH THE FINAL PROJECT REPORT DEVELOPED IN 2004-2005.

PLEASE CONTACT BRIAN MCLANE bmclane@npc.edu ext. 7400 for more information or to discuss a proposal.