WAUBONSEE COMMUNITY COLLEGE

INFORMATION TECHNOLOGY PLAN
FISCAL YEARS: 1998 - 2002

by

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EXECUTIVE SUMMARY

This Information Technology Plan for Waubonsee Community College spans the fiscal years, 1998 through 2002. The plan includes both academic and administrative organizations. Input to the plan comes from the Tech Team, the Academic and Administrative Computing Committee, and administrators. The Information Technology Plan addresses needs for networks, academic programs, classrooms, computing labs, and end-user PCs.

The Information Technology Plan strategically assesses the current Information Technology environment and proceeds to set a five year strategic direction of technology integration and proactive planning for academic programs, other academic needs, general computing needs, administrative requirements, and infrastructure needs. The Information Technology plan is updated annually and maintains a five year projection. The Information Technology Plan must be aligned with the institutional strategic plan for Waubonsee Community College for effectiveness.

Waubonsee is the leader in audio/video distance learning technologies. To maintain that leadership, additional technology services are needed. Distance learning is expanding to encompass the Internet by integrating voice, video, and data. Waubonsee will need to present classes over a variety of hardware platforms including the Internet to reach the widest audience possible without becoming dependent on a particular Information Technology medium.

The Information Technology industry projects the integration of voice, video, and data. Waubonsee is aligning its strategy with industry's direction. Investments in classroom technology, multimedia, video to the desktop, and distance learning continue the alignment process that begins with a functioning campus network.

Today, Waubonsee’s Achilles heel is the campus network, WCCNet. WCCNet is not built to support the academic use it is receiving. The current foundation of WCCNet is a simple Local Area Network (LAN) attempting to fill the role of a Wide Area Network (WAN) which would support several geographic sites as part of the campus network. Several crises have already been experienced. Only an investment in a campus-wide network, a true WAN, can prevent a catastrophic event of greater magnitude. Designing and implementing an appropriate WCCNet is the first and most important step for Waubonsee.

Sustaining Waubonsee’s technology investment requires a technology replacement plan, which has been included, as part of the overall Information Technology plan. To stay current with technology requires continual reinvestment. To minimize the cost for reinvestment, a concept of cascading (older equipment is passed to areas that can effectively use the equipment when newer equipment is received) will be employed. The concept of cascading equipment retires PCs too old to function on the network, minimizes the variance in technology between academic programs, and reduces the maintenance costs for embedded-base equipment. Cascading also extends the equipment life cycle by matching appropriate technology to requested academic and administrative needs.

Technology by itself will not produce improvements. Waubonsee's employees are the critical resource. Training for employees is THE key ingredient to using Information Technology to gain and sustain competitive advantage in the education industry! Waubonsee has established sound first steps with an Instructional Technology and Information Technology trainer. In addition, the Information Technology staff requires continual training to stay current with the technology they are using and projecting to use.
The major Information Technology thrusts for the next five years are:

- A network infrastructure that services user needs and follows industry standards across all Waubonsee campuses for voice, data, and video.
- Internet service which includes Web pages, electronic mail, and appropriate Internet utilities to support the educational environment and support services.
- Instructional Technology Center that maintains Waubonsee’s leadership in distance learning.
- Active Technology Repolacement Process.
- Help Desk to support Waubonsee’s technology users.
- Reengineered administrative software system that incorporates Internet and Intranet features and meets the users needs.

This Information Technology Plan meets the initial challenge of aligning the institution and planning a technology-based environment that supports technological advancement as defined in the Strategic Directions for the Next Decade produced in March, 1996. This plan offers Waubonsee the cost-effective use of technology for achieving success as a community college.
INFORMATION TECHNOLOGY STRATEGY

INFORMATION TECHNOLOGY MISSION
The Information Technology organization in collaboration with the Tech Team sets the vision and establishes institutional Information Technology standards. In addition, the Information Technology organization plans, implements and manages Information Technology (IT) solutions based on the needs of the college. The Information Technology organization has institution-wide responsibility for supporting computing, communications, networks, institutional data, Information Technology peripherals, and interfacing equipment to the IT infrastructure. The IT infrastructure supported by the Information Technology organization includes networking systems using electronic, light, radio waves, microwaves, spread-spectrum, satellite, and other media as appropriate that deliver voice, data, and/or video information. All technology-based information which deals with college business and academic programs is managed by the Information Technology organization. The Information Technology organization acts as the software and hardware agent for the college and ensures the legal use of software at Waubonsee. Academic and administrative technology needs are serviced with quality and in a timely manner.

CUSTOMERS
All users of Information Technology associated with the college are considered customers of the Information Technology organization. Users, which groups include students, faculty, staff, and others as defined by their association with the college, have various levels of Information Technology sophistication. The most sophisticated users in the academic programs are the faculty and the students in technical programs. They need support for programming, learning operating systems, designing data bases, and using highly technical application software such as CAD/CAM. These users not only use the technology, but study it as well.

The moderately sophisticated users are those who apply technology to problem solving and/or decision making. These users apply technology as part of their curriculum offerings. Users may download information from the administrative environment for further analysis using end-user computers or client stations. Other users may download information for research and/or scholarly papers. Some users utilize Information Technology to provide access to electronic information and distribute that information.

The least sophisticated users are those who use basic computer tools such as word processing, spreadsheets and electronic mail. Also included in this group would be those who use other application software in a totally directed way.

A commonality of all these groups is their need to communicate, both locally and globally, and to compute using software and hardware. In addition, there is a need to use or share college information to fulfil their job requirements in a highly productive, low cost manner.
INFORMATION TECHNOLOGY STRATEGY

ANALYSIS ON CURRENT STRATEGY
An assessment of today’s technology environment from within Waubonsee, among other institutions and companies, and within the field of Information Technology provides data from which a sound Information Technology Infrastructure is built. Strategic questions (See Appendix O - Strategic Questions) have been posed and answered. In analyzing and other institutions and companies, Waubonsee is staying with the mainstream. What must differentiate Waubonsee is the direction we take for the next five years. To remain competitive, Waubonsee must set its goals and then achieve them.

Waubonsee
Information Technology has been organizationally split by voice, data, and video (See Appendix P - Summary of Voice, Data, and Video Services). Just as the integration of voice, data, and video is occurring in industry and other institutions, the need exists to merge these three separate departments into one group at Waubonsee. That group is organized along functional lines rather than by type of network. (See Appendix E - IT Organization.) Responsibilities of staff are based on technology functions which service both academic and administrative customers. The benefits of technology integration include optimal media choices and optimal cost management.

Currently, three core committees act as agents for Information Technology issues; they are Tech Team, AACC (Academic and Administrative Computing Committee), and SOS (Software Office Support) Committee. (See Appendix C - Committees.) The Tech Team as part of its mission, recommends policies and priorities related to information technology to the Administrative Council. The Tech Team’s focus is strategic. The AACC has a tactical mission and discusses the effective use of technology in academic and administrative settings. Recommendations which include technology, changes to processes and procedures involving technology, and technology support issues are forwarded to the Tech Team. The SOS presents training of Office Software to staff as needed. There are frequent training sessions delivered. The SOS is an excellent way for providing focused, internal training as needed.

With the use of committees and the integration of voice, data, and video technologies, Waubonsee is establishing a solid foundation for growth. The goal is to deliver voice, data, and video to our customers in the fastest and most cost-effective way. Integration of technologies allows the goal to be achieved in a straightforward, timely manner.

Industry and Educational Institutions
Industries outside education have discovered that the companies that do not take advantage of Information Technology (IT) either "close up shop" because they cannot compete or struggle to maintain their market share. Technology is pushing the demand/supply curves to new positions; some say it is a totally new dimension. Education is experiencing many of the same industry problems, just a little later in the timeline. Education has high labor costs and high operating expenses. Many institutions, just as industry, have first tried the process of cutting costs. What is discovered is that this is not enough! Some other way must be found to catapult institutions beyond the downsizing spiral. Industry has tried using Information Technology. There are many cases that show that where industry has appropriately applied technology, they have experienced success. This success, however, comes with a continuing investment price tag. When the investment stops, the competitive advantage stops. Continued success requires continued investment. More and more community colleges are becoming aware of just how necessary continual IT investment is.
At the League of Innovation Conference on Information Technology, November 13 - 16, 1996 (Attendance reached 3,300 with a mixed constituency of faculty, administrators, and IT technicians.), one of the presentors shared research that indicates 40% of community colleges have PCs for each full-time faculty member and only a third of the community colleges have a replacement plan in place to continue investment in IT. With the majority of attendees feeling that their competition will come from industries such as Disney and Microsoft, the investment in IT cannot be ignored or remain unfunded.

For academic programs using technology to stay competitive, a balanced presence of technology in all programs is needed and continual upgrades should be planned in Academic Technology Plans (See Appendix B - Five Year Academic and Administrative Technology Plans). The process has begun with this Information Technology Plan but will take several years to reach an acceptable, sustainable balance. The centralization of labs speeds the process to an acceptable balance since the equipment is shareable across several programs. Activity has begun in this area and is working.

**Information Technology**
Waubonsee has experienced exponential growth in the use of Local Area Networks (LANs). A group of LANs came to service the Sugar Grove and Aurora Campuses. Many technical problems have emerged. It is essential to design a Wide Area Campus Network that services the main campus, existing extension campuses and can accommodate the growth of additional extension campuses. Implementation of a startup infrastructure must take place over the Summer of 1997.

Information Technology customers have complained about the inability to reach an IT technician (IT has 1.5 hardware technicians to cover 93 hours of service across three campuses!) when they are having problems. A Help Desk has been started and one month of statistics have been recorded (See Appendix F - Information Technology Help Desk Statistics). With just a month’s worth of statistics, the greatest number of calls are hardware and network based. What is not shown in the charts is that IT was able to close 216 out of 279 help calls in the month of February which is excellent turnaround given current staff loads! But, it is not surprising that IT customers are frustrated! Using the statistics, sixty-three (63) customers did not get serviced in a timely way which means that their work environments were negatively impacted.

Despite the shortage of IT staff, the Help Desk gives customers one phone number to call to request Information Technology help. IT staff are assigned to a customer based on problem definition and the priority of the problem. Academic classes and registration always have the highest priority! Customers are called back to let them know when they will be serviced and/or that service is complete.

The Internet and the Web are two critical IT services that academic institutions cannot do without! Waubonsee, just to stay competitive has entered the arena. The Internet and the Web offer another marketing vehicle for the institution. Given that 40% of homes now have PCs and a good percentage of those homes have access to the Internet, Waubonsee has a very good targeted audience. Students can view information about Waubonsee, can peruse the selection of classes, and, eventually, will be able to register - all from their home at their particular convenience. As geographic boundaries disappear, Waubonsee will need to ensure it can compete effectively with other educational institutions and community colleges using this medium (It may not be long before Parkland’s Internet classes are taken by Waubonsee district community members. Parkland already has students who are located in California taking their classes over the Internet!)
Waubonsee has championed distance learning in the state of Illinois and is recognised as a leader in the state. Waubonsee must avoid losing that accolade and offer distance learning using the Internet medium. It is important to remember that distance learning is not based on a single medium, rather distance learning is based on the ability to deliver learning across distances offering the customers a choice of their preferred medium for electronic delivery. Customers will opt for convenience, low cost, flexible time, and quality. Waubonsee must ensure that their delivery choices include customer options to ensure success!
INFORMATION TECHNOLOGY STRATEGY

"For we stand at the edge of the deepest powershift in human history."

by Alvin Toffler, POWERSHIFT

VISION STATEMENT
Students are our primary customers. The educational process must relate to the students' world. Among the many expectations that students have, time is a crucial factor. Students expect the world to move fast; they want what they need NOW! Information Technology is a contributor in getting information NOW!

Information Technology delivers voice, data, and video information. Every industry, every educational institution, every individual is impacted by information. What distinguishes an institution and causes that institution to excel is HOW products and services are delivered. To have the right products and services available for customers when they need them is a distinctive competence that Waubonsee must possess.

Information Technology is a change agent working with academic and business areas to apply Information Technology, as appropriate, to:

- Enhance academic learning,
- Improve business processes,
- Increase productivity,
- Decrease current costs,
- Minimize new costs,
- Minimize any delay to the students' "NOW!".

Most important, Information Technology assists the students, faculty, all other employees, and the community to learn about new Information Technology, to assimilate the technology that is valuable to their needs, and to effectively use Information Technology to deliver a very important product, education.

Information Technology takes professional pride in serving Waubonsee and will continue to perform its role as an organization dedicated to accuracy, timeliness, consistency, dependability, reliability, objectivity, job knowledge, professional excellence, and a smile with our service!
INFORMATION TECHNOLOGY STRATEGY

FIVE YEAR STRATEGY
Information Technology continues to grow and change exponentially. The average life span for hardware is 18 months; the average life span of a software release is six months. Since the field is moving so fast, the five year strategy will require annual updates to keep pace, to watch for changes in technology direction, and to include technology enhancements. Let us begin with a premise, state assumptions, define user services, and build the deliverables.

PREMISE
Information Technology is a service organization which manages and delivers voice, data, and video, manages and maintains academic and administrative technology, and provides computing services for the institution. Information Technology is a technology force to be used for competitive advantage.

ASSUMPTIONS
1. Waubonsee chooses to use Information Technology to competitive advantage.
2. Waubonsee maintains a financial investment that keeps Information Technology current with industry standards.
3. Information Technology staff receives training as needed to stay current with the new technology.
4. Information Technology people resources are sufficient to cover the needs of the Information Technology business.
5. Work environment supports the needs of the people and the technology.

USER SERVICES
1. From the desktop, a user may access any authorized software and/or service.
2. Access to the Internet and electronic mail.
3. Communicate with subscribed electronic services such as library catalogues.
4. Develop and exchange text, graphics, pictures, video clips, and speech across Waubonsee campuses and with other institutions who are configured to manage this technology.
5. Conduct interactive classes using different media choices.
6. Ability to use voice, data, and video for interactive communication as needed without the constraints of disparate technology.
(See Appendix R - The Living Strategy)

SIGNIFICANT DELIVERABLES
1. Network infrastructure that services user needs and follows industry standards across all Waubonsee campuses for voice, data, and video.
2. Internet service which includes Web pages, electronic mail, and appropriate Internet utilities to support the educational environment and support services.
3. Instructional Technology Center that maintains Waubonsee’s leadership in distance learning.
4. Reengineered administrative software system that incorporates Internet and Intranet features and meets the users needs.
5. Active Technology Replacement Process.
6. Help Desk to support Waubonsee’s technology users.
INFORMATION TECHNOLOGY STRATEGY

STRATEGIC GOALS AND OBJECTIVES
The significant deliverables have been expanded into goals and objectives and categorized by infrastructure, which is the underlying platform for all Information Technology services, and by the primary customer which may be instructional or administrative. The goals and objectives listed below have not been prioritized. The Tech Team, as part of its mission, shall prioritize these goals and objectives and Information Technology shall develop and implement projects based on the priority.

INFRASTRUCTURE
1. Build and maintain a campus network including voice, data, and video for electronic distribution of information, for Internet access, for other media access and distribution, and for delivery of educational courses and programs that service all Waubonsee campuses.
2. Reengineer the administrative software system for industry changes and for Intranet and Internet access.
3. Complete network connectivity at all campuses and maintain electronic classrooms and open instructional computing centers at all campus sites.
4. Network traditional classrooms for voice, video, and data.
5. Connect standards-compliant computer labs to network backbone.
6. Implement centralized backup process.
7. Support end-user computing devices doing many of the maintenance activities remotely.
8. Provide Information Technology repair services using a combination of in-house and outsourced services.
9. Provide a network environment to support media services for the college using technology to make the materials more universally and dynamically available.
10. Support a Help Desk that services the customers needs for IT support in a timely fashion.

INSTRUCTIONAL
1. Complete wiring to faculty offices, classrooms, and labs for Internet access.
2. Support the academic computing environment for the college including the purchase of the appropriate number of servers and PC stations to support the academic software in service.
3. Work with faculty to provide the technology needed for programs and courses.
4. Include the new technology trends in the academic programs as planned.
5. Build and support Information Technology solutions for the Learning Resource Center.
6. Configure an Instructional Technology Center for faculty.
7. Implement multimedia solutions in classrooms and labs as needed.
8. Provide support for projected increase in classes and/or guest speakers using the distance education interactive television system.
9. Implement replacement technology as needed.

ADMINISTRATIVE
1. Implement user access to the administrative software system using Web technology both on and off campus.
2. Utilize touch sensitive PC screen technology and Internet access to make student information available whether on or off campus as appropriate.
3. Design strategy for a document management system to electronically record paper documents, retrieve documents for electronic viewing, print documents from document management system, and deliver documents electronically to other institutions (Example: Transcripts).
4. Implement, campus-wide, distributed printing, electronic delivery of faxes, and modem pooling for shared services available off-campus.
5. Enhance administrative system to include state and federally mandated requests.
6. Develop a scholarship system to be used by Financial Aid, Student Activities, and the Transfer Center.
7. Eliminate dual data entry to administrative system wherever possible.
8. Implement replacement technology as needed.
INFORMATION TECHNOLOGY INFRASTRUCTURE

CURRENT INFORMATION TECHNOLOGY ENVIRONMENT

In servicing our customers, Information Technology manages networks, servers, PCs, and software. Here is a summary of our environment today.

Voice Network

Waubonsee has a private switch, the NEC NEAX2400 IMS, which supports the sugar grove campus. The private switch is leased from and managed by Sound, Inc. The switch has a maximum capacity of 80 analog ports and 224 digital ports. Currently, 64 analog ports and 66 digital ports are in use. Fifteen slots are open for growth. There are 29 carrier lines to the switch that manage regular in-bound and out-bound calls.

Recently, a call account software package, Ultimate Software Call Accounting System, was purchased to monitor usage and traffic patterns.

The voice mail system is supported by a PC-based software product, CallXpress 3, by Applied Voice Technology. Twelve hours of storage is available for messages and 16 ports are available to manage voice messaging.

The Aurora Campus is served by a recently installed NEC 2000 with an integrated voice mail system. There are 14 trunks servicing this facility.

The Waubonsee Center at Copley has a small “key” system with seven individual telephones that is served by three outside trunks and one off-premises extension connection with the Sugar Grove campus.

The Geneva Center has two independent telephone lines.

Data Network

The Waubonsee Community College data network consists of several networked Ethernet segments. The hardware used consists of:

Fiber-Optic Cable
We currently have 24-strand multimode fiber-optic cable running between most buildings of the Sugar Grove campus and at Aurora Campus. There are two instances where 12-strand fiber optic cable is used: to the Auditorium and to Erikson Hall. The Waubonsee Center at Copley currently has fiber-optic connectivity to the Rush-Copley Hospital for future use.

Fibermux Hubs
The fiber-optic cable segments are connected to Fibermux hubs located in wiring closets throughout campus. These hubs provide the RJ-45 ports for PCs, printers, and other client hardware in the building.

Category 5 Unshielded Twisted Pair Cable
The PCs and printers are connected to the Fibermux hubs with Category 5 cabling.
T-1 Lines
The Aurora Campus and Waubonsee Center at Copley are connected digitally to the Sugar Grove campus via T-1 lines (1.544 Mbits/sec) leased to us by Ameritech.

Video Network
The Waubonsee Community College video network has two major components, the Waubonsee configuration and the Fox Valley Educational Alliance configuration.

Waubonsee Configuration
The Sugar Grove campus services the Aurora Campus with a DS-3 microwave connection and Copley with a T-1 microwave connection. The Aurora Campus also has a land-based DS-3 connection to Sugar Grove. The land-based DS-3 is divided into T-1 channels. One of the T-1 channels is used to service data traffic between Sugar Grove and Aurora.

Fox Valley Educational Alliance
The hub for the Fox Valley Educational Alliance which serves five community college, nine four year private/public members, and four association members is managed at Waubonsee Community College Sugar Grove Campus. Each of the member schools has microwave connections which may be T-1 or DS-3 based.

Servers
Information Technology is currently serving ten application servers (See Appendix S - Network Servers) and an administrative software system server. The ten application servers support the academic software (See Appendix N - PC Software Currently in Use), office productivity tools for administrative tasks, and MS Mail post offices.

The college administrative software systems such as Student Records, Personnel/Payroll, and Accounts Payable are run on a Hewlett Packard model 3000/959 computer. This computer was purchased in September 1995 and is equipped with 128 megabytes of RAM and four gigabytes of disk storage. This system currently supports about 100 users and can easily be upgraded. This system together with HP's TurboImage/SQL database is a highly reliable computer for doing high volume transaction processing type applications.

Personal Computers
Waubonsee Community College has approximately 1,200 personal computers in service across all campuses. Most software is delivered from the network servers and used in a personal computer’s memory while the software is active. Operating systems which are in use are DOS, Windows 3.X, Windows 95, and MAC.
CONSULTANTS ANALYSIS
Waubonsee Community College hired DTA Technical Services, Inc. to gather the necessary information to prepare a solid network services strategy. In addition, the Unix-based systems were reviewed. An addendum to both reports was requested which revises some of the recommendations made in the previous reports and takes into account some additions based on new needs of the institution which includes the need for standards, IP addressing, etc.

Data Network
The LAN Evaluation recommends a series of enhancements to improve the existing environment for performance improvements and a reduction in network problems. The long term recommendations focus on standardizing the entire campus network.

Unix Servers
The suggested courses of actions apply to appropriately configuring our Unix servers which will improve security and bring the servers to current releases of software.

Addendum
This report is a summary of a conversation between the DTA consultants, the Executive Director of Information and Network Services, and the Academic Network Manager (See Appendix T - Consultants Report Addendum).
PROJECTED INFORMATION TECHNOLOGY ENVIRONMENT
Incorporating the consultants analysis and fulfilling the strategic goals and objectives for the next five years requires significant enhancements to the data Campus Wide Area Network (WAN) Network or as named by Waubonsee, WCCNet. Enhancements to the Voice Network shall be minimal. Growth in the Video Network for distance learning shall grow. By far the greatest growth in the next fiscal year shall be in the Data Network.

Voice Network
1. Consolidate carrier lines into a T-1 line which will reduce monthly charges.
2. Increase the hard disk drive of the voice mail system to accommodate 50 hours of storage for messages.

Data Network
WCCNet as it is presently configured and used is very unstable as has been experienced by network failures and user disconnects from the network in fiscal year 1997. To support the current academic and administrative use of WCCNet, requires enhancements.

To minimize costs, as much of the present WCCNet data network as possible shall be used (See Appendix U - Proposed WCCNet Network Diagram). But even with a conservative look at costs, a significant investment is needed as evidenced by the project costs given in Costs by Year under Five Year Projections of this document. All components outlined in the project costs must be installed before the benefits of the investment are realized. If only some of the components are purchased, then the network problems continue occur as they do today and no academic or administrative enhancements can be made.

Servers
Adding academic servers will allow full application software packages to be installed. To an instructor this means that all textbook materials and exercises are available for classroom use. Performance slowdowns to a point of inability to teach will also go away.

The administrative servers shall gradually be replaced as the current hardware platform is discontinued. Front-end processes to the data will be built to allow Intranet and Internet access.

Unix Servers
Growth in use of the Internet can continue with the purchase of the Unix servers. Courses on web pages can be taught. Faculty will be able to add instructional web pages for students to access. One e-mail address will be available for faculty and administration rather than segmenting the network (Known today as the blue and green networks.). Waubonsee students will be able to have e-mail accounts to communicate with faculty and students.

Personal Computers
Continual investment in PC stations will prevent peaks and valleys in the need for budgeted funds and gives a smooth transition to new platforms. (Example: In fiscal year 1998, several classrooms and some open computing stations will have Windows ’95. Corporate Development, Continuing Education, Information Systems, and Office Careers will be able to conduct classes using the new platform. Much effort was expended to ensure that the necessary equipment and software would be available in the classrooms where these courses will be taught.) Support and maintenance of PC stations needs to be viewed as an utility. Constant investment must take place to ensure delivery of the necessary classes.

Video Network
The basic infrastructure is present. Grants have provided the capital investment. Maintenance costs are included through departmental budgets. A few inexpensive investments are needed (Example: Install an ISDN line to smooth weather interference that occurs when using microwave.).

**Video to the Desktop**

Delivery of voice, video, and data is occurring through the Internet. Instructional classes are being offered via the Internet. The impact is a new way of conducting distance learning that is inexpensive for the institution and for the student. Using the Internet allows a student to participate in a class from their home, office, etc. Globally, students can sign up for a Waubonsee class and receive that class into their geographic location without being within the geographic district of Waubonsee. Competition among educational institutions reaches a new level. A student is not bound by time or distance. Why would a student choose to take a course from Waubonsee rather than any other school that is conducting classes through the Internet?

Using the CU See Me software, preparation for teaching classes in this mode will begin followed by the actual presentation of classes. Waubonsee will continue its leadership in distance learning by utilizing this new form of media.

**Multimedia**

Whether conducting class or presenting exercises for learning, students require visual aids, not just auditory learning. Multimedia offers visuals that are both static and dynamic. Concepts that were difficult to explain in words can be demonstrated visually and understood by the students more quickly. Students are used to an environment of seeing and hearing and multimedia takes advantage of that environment. Here is a way to enhance learning for a very small investment. Students will see and hear material in the classroom, in the open computing labs, and have the ability to view the same information from home given that they have a PC connected to the Internet.

**Network Integration**

The next five years will see a merging of the voice, data, and video networks. The Information Technology organization is following the industry lead so that instructional classes can smoothly transition to the choice of delivery mechanisms. Waubonsee shall retain its leadership in distance learning and campus learning.
GOALS AND OBJECTIVES BY YEAR
Goals and objectives given are not in any priority order. The Information Technology organization with the approval of the Tech Team establishes a working prioritization for each fiscal year.

1997 - 1998 Goals And Objectives

1. Design and implement core infrastructure for WCCNet.
2. New POP Server for internetwork e-mail.
3. Add academic servers for complete instructional software packages.
4. Configure computing classrooms with access to appropriate academic software for each term.
5. Retire old PC equipment (386 and older)
6. Cascade and/or install new PC equipment needed for each academic term.
7. Cascade and/or install new PC equipment in administrative areas.
8. Enhance administrative software based on FY 1998 requests (See Appendix B - Academic and Administrative Technology Plans) and begin Year 2000 changes.
9. Install Web server to accommodate departmental and faculty home pages.
10. Design and test Web registration process.
11. Begin three year transition of LRC standards to Z39.50 industry standards (See Appendix B - Academic and Administrative Technology Plans).
12. Build Waubonsee Web page to include additional pages as recommended by the Internet Taskforce and approved by AACC and Tech Team.
13. Internet accessibility for staff and faculty.
14. Begin phased approach for student access to Internet and e-mail.
15. Upgrade 486 and higher machines in computing classrooms and labs to have 32 meg of ram.
16. Retire DOS operating systems except in academic areas where no windows-based solution exists.
17. Configure two CuSee ME capable PCs which can be moved to and from client locations (See Appendix B - Academic and Administrative Technology Plans).
18. Design a document imaging system for Waubonsee.

19. Add CD-ROM drives and/or servers as needed.

20. Migrate to Windows 95 platform where possible.

21. Test Windows 97 operating system and support Corporate Development and Training classes.

22. Evaluate hardware and software for long term Foundation system.

23. Implement short term and low-cost solution for Foundation support.

24. Centralized backup system for all WCCNet servers.
FIVE YEAR PROJECTIONS

1998 - 1999 Goals And Objectives

1. Augment WCCNet infrastructure.
2. Provide full student e-mail and Internet access from all campuses in open computing labs.
3. Add academic servers as needed for instructional software packages.
4. Configure computing classrooms with access to appropriate instructional software for each term.
5. Retire old PC equipment as defined for the fiscal year.
6. Cascade and/or install new PC equipment and software needed for the academic terms.
7. Cascade and/or install new PC equipment in administrative areas.
8. Enhance administrative software based on FY 1999 requests (See Appendix B - Academic and Administrative Technology Plans) and complete Year 2000 changes.
9. Enhance Web server to accommodate home pages as recommended by the Internet Taskforce and approved by the Tech Team.
10. Implement full Web registration process.
11. Continue transition of LRC to Internet-based environment which includes a Unix server (See Appendix B - Academic and Administrative Technology Plans).
12. Implement CuSee Me technology in strategic computing classrooms.
13. Implement integration of voice, data, and video networks where cost-effective.
14. Design and develop an IntraNet interface to current administrative software system.
15. Evaluate administrative software system for long term support to the institution.
16. Plan a migration to a newer hardware platform for the administrative software system.
17. Make appropriate enhancements to distance learning equipment.
19. Add CD-ROM drives and/or servers as needed.
21. Continue migration to Windows 95 operating system and Windows 95 application software.

22. Begin implementation of Windows 97 environment.

23. Implement phased approach to long term Foundation system.
FIVE YEAR PROJECTIONS

1999 - 2000 Goals And Objectives

1. Enhance WCCNet infrastructure as needed.

2. Upgrade Internet hardware and software environment as needed.

3. Implement academic server replacement technology plan.

4. Retire and replace PC equipment and software as defined for the fiscal year.

5. Cascade and/or install PC equipment and software in academic and administrative areas.

6. Enhance administrative software based on FY 2000 requests (See Appendix B - Academic and Administrative Technology Plans).

7. Maintain and upgrade Web server as needed.

8. Implement additional Web services as recommended by the Internet Taskforce and approved by the Tech Team.

9. Continue implementation of document imaging solution.

10. Evaluate distance learning technologies: voice, data, and video and plan for any required changes.

11. Upgrade administrative hardware and software as recommended.

12. Evaluate campus network environment and recommend enhancements.

13. Complete transition of LRC to Web environment (See Appendix B - Academic and Administrative Technology Plans).

14. Add CD-ROM drives and/or servers as needed.


16. Complete implementation of Windows 95 environment.

17. Implement Windows 97 environment where needed.

18. Complete implementation of long term Foundation system.
FIVE YEAR PROJECTIONS

2000 - 2001 Goals And Objectives

1. Enhance WCCNet infrastructure as needed.
2. Upgrade Internet hardware and software environment as needed.
3. Implement academic server replacement technology plan.
4. Retire and replace PC equipment and software as defined for the fiscal year.
5. Cascade and/or install PC equipment and software in academic and administrative areas.
6. Enhance administrative software based on FY 2001 requests (See Appendix B - Academic and Administrative Technology Plans).
7. Maintain and upgrade Web server as needed.
8. Implement additional Web services as recommended by the Internet Taskforce and approved by the Tech Team.
9. Continue implementation of document imaging solution.
10. Implement changes needed for distance learning technologies: voice, data, and video.
11. Upgrade administrative hardware and software as recommended.
12. Enhance campus network environment as needed.
13. Evaluate LRC needs and make appropriate recommendations.
14. Analyze new technology and make recommendations for long term Information Technology direction.
15. Add CD-ROM drives and/or servers as needed.
17. Continue implementation of Windows 97 environment.
FIVE YEAR PROJECTIONS

2001 - 2002 Goals And Objectives

1. Enhance WCCNet infrastructure as needed.
2. Upgrade Internet hardware and software environment as needed.
3. Implement academic server replacement technology plan.
4. Retire and replace PC equipment and software as defined for the fiscal year.
5. Cascade and/or install PC equipment and software in academic and administrative areas.
6. Enhance administrative software based on FY 2002 requests (See Appendix B - Academic and Administrative Technology Plans).
7. Maintain and upgrade Web server as needed.
8. Implement additional Web services as recommended by the Internet Taskforce and approved by the Tech Team.
9. Continue implementation of document imaging solution.
10. Evaluate distance learning technologies: voice, data, and video and plan for any required changes.
11. Maintain and enhance administrative hardware and software as recommended.
12. Enhance campus network environment as needed.
13. Enhance LRC hardware and software as needed.
15. Retire Windows 95 environment.
17. Test new operating systems and support Corporate Development and Training Center courses.
FIVE YEAR PROJECTIONS

STAFFING NEEDS
In positioning Information Technology to augment instructional services and to provide sufficient support for customers of Information Technology, additional staff is needed. Increases in staff are spread across two years to coincide with planned increases in responsibilities. As is evidenced from surveys conducted by CAUSE and the League for Innovation, educational institutions have the greatest need for Information Technology services in the academic areas. Waubonsee is experiencing the same situation.

Fiscal Year 1998

1. Use the Internet for educational and marketing pursuits. In the classroom, faculty have students research topics gathering information from experts and electronically search for recorded facts. The Internet also presents to our customers what is happening at Waubonsee Community College, what classes are offered, and a way to register without coming to campus.

   Staff: Webmaster to:
   - Technically manage the Web pages that emerge for faculty, administration, and staff;
   - Write interfaces to access Waubonsee information through the network;
   - Maintain the Internet presence of Waubonsee to the world.
   (NOTE: A comparable need exists in Instructional Technology and Public Relations.)

2. Integration of voice, data, and video networks requires production support across two shifts with the third shift managed by having customers leave voice and text messages that will be services at the start of the next business day. By redistributing staff for service coverage, one additional production support staff member is needed to manage all systems operations.

   Staff: Systems Operations Manager to:
   - Manage production networks;
   - Respond to customer help requests;
   - Add, change, and delete customers to the production environment;
   - Manage repair of equipment failures;
   - Monitor production network environments for voice, data, and video.

3. Faculty, students, and staff using voice, data, and video need a place to call to submit questions, log problems, and receive solutions when technical problems occur. At this time, the Help Desk is supported by student workers who do not have the technical knowledge to adequately assist callers. A full time person is needed to manage the Help Desk.

   Staff: Help Desk Manager to:
   - Service customers needs as quickly as possible;
   - Train student workers to service customers,
   - Coordinate staffing the help desk for 93 hours of coverage.

4. Most help desk calls concerning hardware and networks require significant technical expertise. Waubonsee has approximately 1,200 PC stations. Statistically, industry has 1 technician for every 75
PC stations, and educational institutions have 1 technician for every 200 PC stations. Waubonsee currently has the equivalent of 2 technicians.

Staff: PC Technician to:
- Configure and install PC stations;
- Diagnose hardware problems;
- Repair PC stations;
- Test and document solutions.

5. Waubonsee has opened the Waubonsee Center at Copley. Numerous computer-based classes are taught at this campus which has two computing classrooms and one distance learning classroom. Students are requesting an open computing lab for doing their homework. Faculty and students need an Information Technology professional present to assist and supervise the classrooms and computing lab.

Staff: Part-time Lab Coordinator to:
- Monitor open computing lab at Waubonsee Center at Copley;
- Support computing classrooms;
- Support distance learning classroom.

Fiscal Year 1999

1. Databases which hold all of Waubonsee’s information reside on a hardware platform that is projected to retire by the vendor. The database design for all the databases is more than twenty years old and resides on a proprietary platform which cannot support the Intranet access required by Internet users. The databases will need to be redesigned and reengineered to meet today’s and tomorrow’s information needs. Information Technology does not have a Data Base Administrator.

Staff: Data Base Administrator to:
- Monitor and maintain production databases;
- Design and develop new databases with accessibility through the Internet and Intranet;
- Implement databases;
- Perform testing and capacity planning for all databases.

2. With the emphasis to reengineer the administrative system to migrate the system to a new platform, redesign and redevelop new programs and subsystems to accommodate the user demands for access to information for reports and further analysis, a position of Development Manager is needed. The role of the Development Manager is to coordinate operating systems, development, data bases, and special projects into a cohesive project plan and on-going production environment.

Staff: Development Manager to:
- Analyze system needs for the institution;
- Plan projects for development and production;
- Coordinate implementation of Information Technology projects for the Institution.

3. With the growth of services, hours of support, and number of PC stations at Aurora Campus, the lab coordinator responsibility needs to grow to a full-time position.
Fiscal Year 2000

1. With the great shortage in PC technician support and the expectation that the number of PC stations will continue to growth, add one more PC technician.

TRAINING

Each fiscal year, dollars will be invested in keeping the Information Technology staff current with technology trends that are planned for Waubonsee. With the rapid changes occurring in this field, many of the staff will need training.

To maximize training dollars, a partnership between the Corporate Development and Community Education organization and the Information Technology organization will be very active. It is cost effective to have the instructors that teach our industry and community members new technology to also teach the Information Technology staff. Travel costs and individual tuitions to other providers will be minimized by employing our own educational organization.
FIVE YEAR PROJECTIONS

COSTS BY YEAR
Planned increases in operating costs and the cost of start-up projects are presented. These costs (See Appendix L - Five Year Projections - Costs per Year) must be added to current budgets for a view of total Information Technology costs.

Assumptions
1. Equipment is replaced every three to four years.
2. As new technology becomes industry standard, a move to that technology will take place.
3. Campus network equipment will be replaced every four years unless the life cycle of the equipment increases.
4. PC stations in classrooms and labs will be replaced every three years; older equipment will be cascaded to office areas as applicable.
5. Academic programs with specific needs will budget for Information Technology. (Example: CAD Lab PC stations are paid from academic budget.)
### Projected Costs for Start-up Technology and On-going Maintenance

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NOTES:
* - Paid out of Program Budget.
Included in projected costs is equipment replacement every 3 or 4 years.
APPENDICES
Appendix A - Current Information Technology SWOT Analysis

STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS (SWOT)

STRENGTHS
IT staff has designed and built a college administrative software system
IT staff has brought application systems into production
IT staff has developed application systems
Thorough knowledge of current administrative software system
IT staff has good knowledge of support services needed by users
IT coordinates master academic and administrative calendars into an annual IT production cycle
Necessary output (reports, checks, etc.) are identified and produced as scheduled
Complete knowledge of data, inputs, and outputs of current administrative system
IT staff is PC literate
IT staff wants to learn new technology and receive training
Users are reliant on IT for accuracy of data
Most users are comfortable with PC and Windows
IT computer trainer works with users and delivers training sessions as needed
Users happy with current administrative system
Help Desk has been started (One number for users to call)
Centralized general academic computing center and computer classrooms
Centralized Information Technology Planning
Academic technology programs are moving to state of the art status
Campus hardware is inventoried
Working with faculty to utilize the Internet for academic purposes
Working with LRC to define and support their Information Technology needs
Established leader in distance learning

WEAKNESSES
Users reliant on IT for accuracy of data
New technology for IT staff without sufficient training
Data network growth without a master plan
Data network problems
Limited number of servers and their capacities
Network outages affect academic classes and other users of data technology
Software inventory is not a formal process
Wealth of academic versions of software require significant server space
Wealth of academic versions of software require a high knowledge base for limited staff
Missing IT functions and corresponding IT staff
Current IT functions understaffed
IT customers unhappy with delayed Help Desk responses or lack of responses
Lack of widely distributed Information Technology standards
Lack of sufficient IT standards
Outsourced telecommunications delays phone changes and phone repair for customers
OPPORTUNITIES
IT leads the campus community in the Waubonsee Information Technology direction
Enhance quality of courses with appropriate and working technology
Increase number of corporate and community education courses that can be offered using state of the art technology
Keep technology-based courses at leading edge status
Review and improve productivity in administrative business processes
Minimize paper-driven processes (cost savings on paper!)
Use electronic mail for communication instead of paper (It has begun!)
Use electronic delivery of data to and among users (database server to PC, PC to PC, etc.)
Increase capability to analyze data - "what if" analysis
Support an Instructional Technology environment for faculty
Support a Distance Learning Center
Partnership with businesses to help them implement Internet, videoconferencing, and other technology (independent study class)
Partnership with professional associations such as the Association of Information Technology Professionals (AITP) deliver continuing education courses to attain/maintain certification
Business Consortium with annual membership fee to assist businesses with issues associated with Information Technology
(Meetings, seminars, user groups, etc.) - The Waubonsee IT Center for Business
Offer "How to use" videoconferencing classes to businesses
Offer classes on how to construct and manage a videoconferencing room to businesses
Offer courses and programs over the Internet to any number of interested clients and students
Maintain the distance learning leadership in the state

THREATS
Not enough staff to implement solid opportunities
Window of opportunity not right (too early, too late)
Commercial and/or educational competitors take our customer base
Not enough dollars and/or time to successfully implement opportunities
TO: Chris Leja    DATE: February 27, 1997
Executive Director Information Systems

FROM: Dr. Diane Graf

SUBJECT: Meeting Minutes - Information Systems, Office Careers, Business
1997-98 Software Needs
5-Year Plan - Future Software Needs

The following is a summary of the Information Systems, Office Careers, Business Software Needs / Future Needs meeting we had with Charlotte Atkins, Maya Bharath, Pam Chapman, Carol Duckwiler, Carolyn Gilla, Chuck Lucas, and Kathy Lewis on Wednesday, February 26, 1997. As outlined in my February 17, 1997 memo, the purpose of this meeting was to discuss software versions, operating system platforms, and textbook issues.

**Word Processing**

- **WordPerfect 6.1 / Windows 3.1**
- **WordPerfect 7 / Windows 95** Textbooks are available
- **MicroSoft Word 6 / Windows 3.1**
- **MicroSoft Word 7 / Windows 95** Textbooks are available

<table>
<thead>
<tr>
<th>Classes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OC267, OC269, OC270</td>
<td>Beginning, Intermediate, Advanced Word Processing</td>
</tr>
<tr>
<td>(1 credit classes)</td>
<td></td>
</tr>
<tr>
<td>OC154, OC155</td>
<td>Beginning, Advanced Document Formatting</td>
</tr>
<tr>
<td>(3 credit classes)</td>
<td></td>
</tr>
<tr>
<td>OC190</td>
<td>Computer Software for the Office</td>
</tr>
<tr>
<td>(3 credit class)</td>
<td></td>
</tr>
<tr>
<td>OC277, OC278, OC281</td>
<td>Beginning, Advanced Transcription</td>
</tr>
<tr>
<td>(3 credit classes)</td>
<td></td>
</tr>
<tr>
<td>OC181, OC253, OC275, OC288</td>
<td>Office Procedures/Systems</td>
</tr>
<tr>
<td>(3 credit classes)</td>
<td></td>
</tr>
<tr>
<td>Open Lab</td>
<td>(All Accounting, Business, Information Systems, Office Careers)</td>
</tr>
</tbody>
</table>

It was recommended that Chris Leja evaluate the budget for supporting both Windows 3.1 and Windows 95 versions of WordPerfect and MicroSoft Word. Ms. Leja will contact the Associate Dean of Business & Social Sciences with the results of her analysis in time to make corrections to the fall 1997 printed schedule (March 14).

It was also recommended that the faculty evaluate the curriculum and determine how many versions of WordPerfect and MicroSoft Word be supported for the spring 1998 semester and future academic years.
All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

**Spreadsheet**

Lotus 5 Windows 3.1  
Excel / Windows 95

Classes:  
IS183, IS184 Beginning, Intermediate Spreadsheet (1 credit classes)  
AC153 Payroll, AC167 Microcomputer Accounting (3 credit classes)  
(Excel)

OC190 Computer Software for the Office (3 credit class)  
IS253, IS293 Beginning, Advanced Visual Basic (3 credit classes) (Excel)  
Open Lab (All Accounting, Some Business, IS101 Introduction)

It was recommended that the Information Systems Division test Lotus 5 in the Windows 95 environment and inform the academic units which platform to use for Lotus 5. Also, all faculty and Information Systems staff will watch for the Lotus upgrade for the Windows 95 platform - future software need.

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

**Datamanagement**

dBASE IV / DOS  
Access / Windows 95  
Allbase/ISQL / HP3000

Classes:  
IS185, IS186 Beginning, Intermediate Database Software (1 credit classes)  
OC190 Computer Software for the Office (3 credit class) (dBASE)  
IS253, IS293 Beginning, Advanced Visual Basic (3 credit classes)  
(Access)

IS 254 Data Management Concepts (3 credit class) (dBASE, Access, Allbase)  
OC283 Records Management (3 credit class) (dBASE)

It was recommended that the information systems faculty evaluate Oracle as a future database for the IS254 Data Management Concepts class.

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

**MicroSoft Works**  
Windows 3.1
Classes: PC158 Using Personal Computers (3 credit class)

It was recommended that the faculty evaluate the software need for PC158; future curriculum directions implemented in spring 1998.

MicroSoft Professional Office
Word 7 / Excel / Access / PowerPoint Windows 95

Classes: IS110 (formerly BU110), OC190, PC158 Application Software (3 credit classes)

NOTE: Other classes using the MicroSoft Professional Office / Windows 95 programs have been listed separately (Word Processing, Spreadsheet, Data-management, and Power Point).

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

MicroSoft E-mail Windows 95 / MicroSoft Schedule
Class: OC288 Office Telecommunication Systems (3 credit class)

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

Electronic Calendar Windows 95
Class: OC288 Office Telecommunication Systems (3 credit class)

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

Power Point Windows 95
Classes: OC286 Presentation Graphics (1 credit class)
OC288 Office Telecom, OC296, OC298 Desktop Publishing (2 - 3 credits)

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

Netscape 3.0 / Internet & Netscape Gold E-mail

Classes: OC195 Internet (1 credit class)
OC196 Creating a Web Page (1 credit class)
OC288 Office Telecommunication Systems (3 credit class) (Netscape)

1997-98: Units of instruction on Internet & Netscape Gold E-mail
OC289 Administrative Office Systems (3 credit class)
IS110 Business Information Systems (3 credit class)

1998-99 Internet access for units of instruction expanded to other Waubonsee Community College classes.

For fall 1997, Netscape 3.0 / Internet and Netscape Gold E-mail will be available at all 3 campuses for instruction (Sugar Grove, Copley, Aurora Campus).

Netscape 3.0 / Internet and Netscape Gold E-mail will be tested by the faculty during the spring 1997 semester.

**HTML / Creating Web Pages / Windows 95 Environment / Wordpad**
Classes: OC195 Internet and OC196 Creating Web Pages (1 credit classes)

**PageMaker 7** Windows 95
Classes: OC293, OC294, OC296 Desktop Publishing (2 credit classes)

All software on the Windows 95 platform will be tested by the faculty during the spring 1997 semester.

**Coral Draw 5**
Class: OC296 Desktop Publishing Computer Graphics (2 credit class)

**MAC**
**ClarisWorks 4.0**
Class: PC158 Using Personal Computers (3 credit class)

**MicroSoft Professional Office**
Class: PC158 Using Personal Computers (3 credit class)


**Adobe PhotoShop**
Class : OC299 Special Topics
It was recommended that the desktop publishing faculty (currently only part-time) evaluate the need for an Adobe Photo Shop class in the curriculum.

**PageMaker**

Classes: OC293, OC294, OC296 Desktop Publishing

The PageMaker software is a new package recommended for the MAC classroom.

The possibility of a full-time faculty member with a microcomputer application software specialization which includes desktop publishing/graphics and internet/Web Page Creation and maintenance was discussed. The future of the desktop publishing/graphics software in both the IBM and MAC environments would be impacted by recommendations from faculty members with a background in this area of specialization.

It was recommended that Chris Leja meet with Dr. Ed Forst, Associate Dean for Communication and Humanities. The art programs in this division utilize many of the MAC microcomputer software packages.

**Office Careers / Southwestern Keyboarding / DOS**

Classes: OC151 Keyboarding (1 credit class)
OC181 Automated Office (3 credit class)
OC154, OC155 Beginning, Advanced Document Formatting (3 credit classes)

It was recommended that the faculty evaluate keyboarding software for a windows environment. If suitable software is available, it was recommended a change be made for the 1998-99 academic year at the earliest.

**Operating Systems**

**MS/DOS 6.2** - Provided through IS Division on floppy diskettes (lab assistants)
Classes: IS180, IS181 Beginning, Intermediate DOS (1 credit classes)
IS252 Computer Operating Systems (3 credit class)

**UNIX**

Classes: IS190 UNIX (1 credit class)
IS252 Computer Operating Systems (3 credit class)

**OS400 / AS400**

Classes: IS160, IS165 AS/400 Introduction and Command Language (3 credit classes)
IS252 Computer Operating Systems (3 credit class)
It was recommended that upgrades be evaluated for future instruction (1998-99 academic year).

**Windows 3.1 and Windows 95**

Classes: IS182, IS192 Beginning, Intermediate Windows (1 credit classes)
IS110, OC190 Application Software (3 credit classes)
Open Lab: IS101 Intro to Computers (2 credit class)

It was recommended that Windows 3.1 be evaluated for future instruction - should it continue to be part of the curriculum in the 1998-99 academic year?

It was recommended that Windows NT and Windows 97 be evaluated for future instruction beginning in the 1998-99 academic year. Besides the above classes, IS256 Introduction to Networks, would incorporate Windows NT as part of the class instruction.

It was recommended that the information systems faculty evaluate the need for DOS as an operating system in the curriculum (programming, microcomputer specialist and WebMaster). Chris Leja's long-range plan would be to phase out DOS. It was discussed that this long-range plan impacts hardware needs in the classrooms, open lab and all faculty and staff offices.

It was recommended that the information systems faculty determine operating system needs for programmers for the year 2000. Possible considerations include: JCL included in the computer operating systems class, a class on CICS, or other production languages. If a new option is possible, the curriculum needs to be presented to the Waubonsee Curriculum Council, spring 1997, to be offered in spring 1998.

**Programming**

**Borland C++ 4.5**

Classes: IS282, IS292 Introductory and Advanced C++ (3 credit classes)

It was recommended that C++ 5.0 for Windows 95 be evaluated for instruction as soon as possible. As soon as a decision is made to migrate to the new version, the information systems faculty would be informed (Kathy Lewis and Maya Bharath).

**COBOL / HP 3000 Platform AND AS400 Platform**

Classes: IS170 Beginning (HP Platform), IS284 (HP and AS400 Platform)
(4 credit classes)
Chris Leja has recommended an upgrade to HP 9000 for the future. On this new platform it was recommended that the information systems faculty investigate HP COBOL 97 as well as MicroFocus COBOL.

**FORTRAN**
Classes: IS174 FORTRAN Programming (3 credit class)

It was recommended that the information systems faculty consider phasing out this programming language from the curriculum by the 1998-99 academic year.

It was recommended that Chris Leja meet with Dan Ensalaco, Associate Dean Technology/ Mathematics/and Physical Sciences, regarding FORTRAN software for MA115 Scientific Programming.

**MicroFocus Assembler / DOS**
Classes: IS250 Assembler (4 credit class)

In preparation for fall 1997 instruction, it was recommended that the part-time faculty member teaching this class meet with Chris Leja during the spring 1997 semester in order to test the programming language. It was noted that MicroFocus Assembler runs successfully at Harper College.

**Pascal / HP Platform**
Classes: IS172 Pascal Programming (3 credit class)

It was recommended that the information systems faculty consider phasing out this programming language from the curriculum by the 1998-99 academic year.

**Qbasic - DOS**
Classes: IS102 BASIC Programming (1 credit class)
IS153 Programming Using BASIC (3 credit class)

It was recommended that the Information Systems Division investigate a Windows 95 basic programming language to be considered for instruction during the 1998-99 academic year at the earliest.

**RPG/400 / AS400 Platform**
Classes: IS263, IS283 Beginning, Advanced RPG Programming (3 credit classes)

It was recommended that upgrades for RPG/400 and the AS400 platform be investigated for the future.
**Visual Basic 4.0**  Windows 3.1 and Windows 95  
Classes:  IS153, IS253, IS293 Programming and Visual Basic (3 credit classes)

Chris Leja will investigate the possibility of running both Windows 3.1 and Windows 95 Visual Basic 4.0 for the 1997-98 academic year. It was recommended that Visual Basic 5.0 be investigated for the 1998-99 academic year.

**Microcomputer Hardware**  
Lantastic 6.0, Norton PC Anywhere  
Class:  IS189 Microcomputer Hardware (1 credit class)

The hardware and software for the Microcomputer Hardware class is maintained by the full-time faculty member, Kathy Lewis.

**Networking**  
Novell 3.12, Lantastic 6.0, Virus Protect - on Network File Server  
Class:  IS256 Introduction to Networks (3 credit class)

It is recommended that Novell 4.1 be investigated for the 1997-98 academic year for testing and integration into the curriculum. Class instruction will use Novell 3.12 for the 1997-98 academic year.

The hardware and software for the networking class is maintained by the full-time faculty member, Kathy Lewis.

**OTHER BUSINESS & SOCIAL SCIENCE SOFTWARE**

**Business / Fashion Merchandising**  
The Buying Game Textbook Software  
Class:  BU265 Retail Buying / Fashion Industry (1.5 credit class)

**MINITAB**  
Class:  BU107 Business Statistics (3 credit class)

**Criminal Justice** - Open Lab + Faculty Offices (Neal Lippold (BDE 128), Robert May (BDE 127))

Murder One - CD-Rom  
Drug Bust - CD-Rom
In the 1997-98 Criminal Justice budget, hardware upgrades will be included so the CD-Rom software is available in the faculty offices.

Political Science
MICROCASE American Government Textbook Software
Class PS100 American Government (3 credit class)

MICROCASE Marriage & Family Textbook Software
Class: SO130 Marriage & Family (3 credit class)

Psychology
PSYCSIM for Windows - Interactive Graphic Simulation for Psychology
Classes: PY100 Intro to Psychology (3 credit class)
R. Gilkerson and J. Rothschild - full-time faculty

SNIFFY The Rat
Classes: PY200 Psychology Research (3 credit class)
R. Gilkerson - full-time faculty

OTHER ISSUES

Future Curricula Plans
Advanced Networking Class - Novell 4.1 and Windows NT

New courses for 1998-99 academic year

Internet / WebMaster Certificate - Curriculum Review 1997-98
New courses include: UNIX Administration
Programming Languages: JAVA, COOL, PERL
Review existing classes: Telecommunication (OC and ET)

Programming Needs / Year 2000: JCL, MicroFocus CICS, Production Languages

State-of-the Art Integrated Computer Classroom

Student Logins - 1997-98 Generic Logins / Class Specific

Projection System in Computer Classrooms
Projection System in Lecture Classrooms (AKL, WGL, BDE, AC, CPL)
Proxima - high quality projection
Classrooms and HCC: Can't see unless all lights are off
Design at Copley is very good
Need both Proxima and Robotel in classrooms

On-line Testing: Proficiency Exams through Assessment Center
   Information Systems and Office Careers skill classes

Process for Requests - Through Associate Dean

Install entire software package so advanced features are there for advanced class instruction

Survey of Software Needs & Platforms / Business - Information Systems - Office Careers
   Experimental Learning Project:    C. Duckwiler and C. Gilla - full-time faculty
   1997 Summer

Recommend that games be deleted from the network

Future Meetings:     November - Software Needs
                     March     - Year-end Review and Future Plans

c/C. Atkins, C. Duckwiler, C. Gilla
   M. Bharath, P. Chapman, K. Lewis, C. Lucas
   Dr. C. Sobek
TO: Chris Leja     DATE: February 27, 1997
Executive Director Information Systems

FROM: Dr. Diane Graf

SUBJECT: Meeting Minutes - Accounting
1997-98 Software Needs
5-Year Plan - Future Software Needs

The following is a summary of the Accounting Software Needs / Future Needs meeting we had with Karen Stewart, accounting instructor, on Wednesday, February 26, 1997. As outlined in my February 21, 1997 memo, the purpose of this meeting was to discuss software versions, operating system platforms, and textbook issues.

**Spreadsheet**
- Lotus 5 Windows 3.1 OR Windows 95
- Excel Windows 95

**Classes:**
- AC153 Payroll Accounting (3 credit class)
- AC167 Microcomputer Accounting Applications (3 credit class)
- Open Lab - All Accounting, Some Business Classes

**Spring 1998**
- AC151 Beginning Accounting I
  Had to discontinue "Sounds Abounds" Practice Set; software affected hard drive. Plan to develop exercises using spreadsheets.

**ACCOUNTING SOFTWARE**

**Checkmark Payroll / Windows 3.1**
- Installed on Hard Drive - Not network software
- Student access with special passcode
- Integrates with Peachtree Accounting and QuickBooks software
- **UPDATE:** Payroll Tables $100

**Class:**
- AC153 Payroll Accounting

**QuickBooks / Windows 3.1**
- **UPDATE:** Payroll Tables
Karen Stewart needs software manuals.

Classes:  
AC153 Payroll Accounting  
AC167 Microcomputer Accounting Applications  
Corporate Development & Training Seminars

**Peachtree Accounting / Windows 3.1**
- Industry Software  
- License Agreement / Network Version  
- Free Software with use of Textbook  
- Currently - not working

**SPRING 1997:** Software needs to be reinstalled on network and tested.  
Target Test Timeframe: April / May  
UPDATE: Payroll Tables Free

**1998-99** Windows 95 version  
Free software dependent on textbook update.

**Class:** AC167 Microcomputer Accounting Applications

**Integrated Accounting / Windows 3.1**
- Educational Package  
- Installed on Hard Drive - Not network software - Reloaded each semester  
- Student access with special passcode  
- Students purchase software - Some run in Windows 95 environment

**Class:** AC167 Microcomputer Accounting Applications

**CA Simply Accounting**  
DELETE - No longer used.

**Pacoli**  
DELETE - No longer used.
FUTURE CURRICULA PLANS

New Accounting Classes / Software Based
- CPA - Auditing
- Systems
- Stats
- Financial Communications
- New class designed for the WEB

Netscape
- Units on Accounting Research

1997-98  Pilot Test with Tom Hrubec and Karen Stewart's accounting classes.
1998-99  All Accounting Classes

New Technology
- Computer Based Training (CBT) Modules
  Used to develop curriculum
- CU-See-ME
  Wants to incorporate into instruction
- Authorware
- On-line Testing
- Distance Learning Environment
  Tom Hrubec and Karen Stewart

OTHER ISSUES DISCUSSED

Student Logins - 1997-98  Generic Logins / Class Specific

Process for Requests - Through Associate Dean
  Order Software / Ship to: C. Leja, Executive Director IS
  Communication with K. Stewart
  Software received
  Software tested
  Software ready for class

Projection System in Computer Classrooms
Projection System in Lecture Classrooms (AKL, WGL, BDE, AC, CPL)

Future Meetings
  November - Software Needs
  April    - Year-end Review and Future Plans

c/T. Hrubec
  K. Stewart
  Dr. C. Sobek
TO: Chris Leja DATE: February 28, 1997
Executive Director Information Systems

FROM: Dr. Diane Graf

SUBJECT: Meeting Minutes - Travel & Tourism
1997-98 Software Needs
5-Year Plan - Future Software Needs

The following is a summary of the Travel & Tourism Software Needs / Future Needs meeting we had with Dr. Martha Price on Friday, February 28, 1997. As outlined in my February 21, 1997 memo, the purpose of this meeting was to discuss software versions, operating system platforms, and textbook issues.

Travel & Tourism
VIAINC

Airline Ticketing Simulation (SABRE, APOLLO, World Span)
Classes:
TR250 Reservations & Ticketing Computer Simulation (3 credit class)
TR251 Airline Computer Ticketing Simulation (1 credit class)

Hotel Reservation Simulation (Mariott System / MARSHA)
Class:
TR252 Hotel Reservation Systems (3 credit class)

The VIAINC software is used in the open lab. The instructor teaches part-time; Dawn Anderson (630-393-7122 home phone). Also, travel and tourism lab assistants are scheduled to assist the students with using the software.

The software is time-dated according to each semester. When the Information Systems Department renews the license each year, it is important that the start date for each semester provides Information Systems staff sufficient time to maintain the software and have it available for the part-time instructor one week prior to the start of academic instruction. This pre-semester week is used by the part-time instructor to work on curriculum enhancements. The ending semester date (stop date) needs to be the end of the exam week for each semester. In the past Mike Baker, Information Systems Department, has handled installation and maintenance responsibilities.

OTHER ISSUES DISCUSSED

Process - VIAINC Software Updates
Chris Leja will be sending VIASINC a letter in order to establish an agreed upon process with the software vendor. It was recommended that the process include two points of contact: Technology Contact Chris Leja, Information Systems Department
Academic Faculty Dawn Anderson (630 - 393-7122 home phone)

MEMORANDUM February 28, 1997
SUBJECT: Meeting Minutes - Travel & Tourism
1997-98 Software Needs
5-Year Plan - Future Software Needs

Future Updates
Software updates will be handled by the Information Systems Department. When updates are received, the process will be:
1. Information Systems Department will contact Dr. Martha Price (Bodie 131, ext. 2315)
2. Dr. Price will investigate when the update should be installed.
3. Installation and textbook selection will be handled as agreed upon between Dr. Price and the Information Systems Department.

VIASINC Textbooks
The textbook is the VIASINC software manual. When a software update is sent to Waubonsee Community College and new textbooks (manuals) are ordered, VIASINC automatically sends the latest version to match the software update. Consequently, the future update process outlined above will be important to our instructional success.

In the past, although textbook (manual) orders are always placed through Waubonsee Community College Bookstore, VIASINC sends the invoice to the Information Systems Department. If this should continue in the future, the Information Systems Department should send the invoice to the Bookstore. These textbooks (manuals) are purchased by the students.

Future Curricula Plans
Beginning with the fall 1997 semester, Netscape 3.0 / Internet will be available for instruction in TR151 The Hospitality Industry. Internet use is for instructor only and in a typical classroom with internet connection capabilities.

Student Logins
1997-98 Generic Logins / Class Specific

The log-in process with VIASINC software will be investigated by the Information Systems staff.

Travel & Tourism Supplies

Because this class is held in the Henning Academic Computing Center open lab, there is a drawer at the lab station for the travel and tourism supplies.

Future Meetings

November - Software Needs
April - Year-end Review and Future Plans

c/Dr. M. Price
Dr. C. Sobek
WAUBONSEE COMMUNITY COLLEGE

MEMORANDUM

TO: Chris Leja
FROM: Robert W. Baker
DATE: February 21, 1997
SUBJECT: Student Development- Information Systems 5-Year Plan

Enclosed are the recommended information systems needs for the Student Development Unit. As we discussed, these are forwarded for you to include in the 5-year plan for Information Systems. You will note that FY97 represents our current projects that need to be completed this year. FY98-FY2002 comprise the 5-year cycle. If you have any questions or need further clarification, please contact me on extension 2375.

RWB/lmg

f:compneed
Admissions and Records

1. Create programming to electronically send student enrollment information to the National Student Loan Clearinghouse. **Needed - February 1997.**

2. Create programming to produce date calculations for enrollment changes to be sent to the National Student Loan Clearinghouse. **Needed by June 1, 1997.**

3. Complete maintenance changes to the touch-tone registration system for the Children’s Program. **Needed by June 15, 1997.**

4. Modify all programs to reflect new definition of “W” grade as per the Task Force recommendations from 1996. **Needed by July 1, 1997.**

5. Add several new tracking programs to report enrollment data for Student Support Services (TRIO grant). **Needed by July 1, 1997.**

6. Add new program information to accommodate the new IPEDS graduation rate reporting. **Needed by July 1, 1997.**

7. Update changes to the touch-tone registration system for the student information system. Review scripting and branching. **Needed by November 1, 1997.**
Admissions and Records
1. Add screens and programs to merge Transfer Center tracking information with the Student Right to Know and IPEDS tracking systems. Needed by January 1, 1998.

2. Review and update programming for mid-term grade reporting. Mid-term grades may be completely replaced by early warning system. Needed by July 1, 1998.

3. Add new tracking programs to report information on first-time freshman enrollment using the Common Data Set. Needed by May 1, 1998.


5. Review programming for corporate development and training (Q) course registration. Maintenance updates needed by April 1, 1998.

6. Modify several current reports to further separate student data by grant projects (Project Equity). Needed by December 1, 1997.


8. Expand SPEEDE/ExPRESS beyond exporting transcripts to NIU. Would like to link to central Illinois project (ISU) and also include importing. Needed by January or July, 1998.

9. Write several new programs to track and report enrollment data based on course (section) information. (See course information matrix project -- Enrollment Steering Committee). Needed by January 1, 1998.

10. Expand current reports for Aurora Campus enrollment to include new items per Norm Paul. Needed by January 1, 1998.

11. Modify the self-registration programs to allow multiple semester access. (Should be the same as the touch-tone system.) Needed by April 1, 1998.

12. Modify and expand the high school feedback reporting to include all high schools within the WCC district. Needed by April 1, 1998.
Student Development
FY1998 Information Systems
(continued)

13. Add new screens and new reports for Access Center for Students with Disabilities data collection and reporting. **Needed by May 1, 1998.**

14. Enhance and technologically upgrade registration screens to accommodate student information delivery.

**Assessment Services**
1. Upgrade computing hardware capabilities to handle Assessment needs.
2. Develop multimedia exams for faculty.
3. Complete the Green System screens being developed for Assessment.
4. Connect all staff to WCCNet.
5. Increase use and accessibility of Henning Center for large group COMPASS testing.

**Counseling and Student Life**
1. Update annually the GIS and Discover programs
2. Redesign programming to accommodate students taking sequential courses without mandated signoffs.
3. Develop a Scholarship Database to be used by Financial Aid, Student Activities, and the Transfer Center.

**Student Support Services**
1. Complete the five databases required for this program.
2. Create the ability to communicate/load information off the Green System without required double entry.
Admissions and Records
1. Add new programs to implement the Illinois Articulation Initiative for both incoming and outgoing students. Changes in transfer credit documentation and transcript documentation. **Needed by January 1, 1999.**

2. Modify current programs to include century notation in course numbering and documentation. **Needed by January 1, 1999.**

3. Add new programs to enhance the academic advisement system as per the Task Force model from 1993 (Phase Four). **Needed by April 1, 1999.**

4. Expand SPEEDE/ExPRESS to export applications to four-year schools for WCC transfer students. **Needed by July, 1998 or January, 1999.**

5. Duplicate the self-registration programs to a Kiosk-based system. Eventually this will replace the current self-registration system. **Needed by May 1, 1999.**

Assessment Services
1. Upgrade computing hardware capability to handle assessment needs.

2. Develop capability of assessment via the internet.

Counseling and Student Life
1. Update annually the GIS and Discover programs.


3. Establish Academic Advising and Educational Planning on-line as part of our internet initiative.
Student Development  
FY2000 Information Systems

Admissions & Records
1. Add ability to import registration information from the internet or home page. 
   **Needed by November 1, 1999.**

Assessment Services
1. Upgrade computing hardware capability to handle Assessment needs.
2. Explore the viability of a separate server to meet Assessment demands.

Counseling and Student Life
1. Update annually the GIS and Discover programs.
Student Development
FY2001 Information Systems

Assessment Services
1. Upgrade computing hardware capability to handle Assessment needs.

Counseling and Student Life
1. Update annually the GIS and Discover programs.
Assessment Services
1. Upgrade computing hardware capability to handle Assessment needs.

Counseling and Student Life
1. Update annually the GIS and Discover programs

f:compneed/WW
DRA/Inlex 3-Year Migration Plan

Fiscal overview of hardware/software migration

year one (FY98) - Replace dumb terminals with networked PC workstations
Add Z39.50 server software to HP3000

year two (FY99) - Replace HP3000 with NT or UNIX server

year three (FY2000) - Replace Inlex software with DRA software product

FY98

Replace dumb terminals with networked PC workstations (Clients)

Client/server technologies are replacing the dumb terminal/centralized processing units
technologies of the past. Proceeding with the implementation of client/server technology is the
next step for our library. We do this by replacing our old terminals with fully networked PC
clients running either the Windows NT or the Windows 95 operating system. New library
software products are being designed for use with client/server technologies.

PC workstation minimum requirements:
13 workstations with:
- 133 MHz processor
- 32 MB of Ram
- 2 GB hard drive
- High resolution monitor
- Windows NT or Windows 95 operating system

Add Z39.50 Server Software to the HP3000

Z39.50 is an industry standards, a set of rules, which makes computer-to-computer information
retrieval possible from other computer systems that have implemented the Z39.50 standard,
eliminating the need to know the search syntax used by such other systems. With the purchase
of DRA Z39.50 server software, we purchase an integral piece of the puzzle in the quickly
changing world environment of library automation. Conforming to industry standards can
provide our library catalog access over the Web, another goal for the LRC in FY98. Once DRA
Z39.50 is purchased, we will receive the basic DRA Web product. The DRA Web product is
software loaded on an NT based server which allows patron access to library holdings via the
Web through Netscape. With established Internet connections, both our PC clients and server
would quickly process queries with search results available from many Z39.50 compliant
databases at the end user’s fingertips. For searching neighboring libraries and/or commercial
databases Z39.50 compatible, the addition of this product is highly recommended.

A typical Z39.50 search uses 1.5 times the resources as the same search through the Inlex
OPAC, however, an OPAC terminal is up and logged in continually taking up resources whether
in use or not. A Z39.50 search logs on, queries, returns results, and then times out. DRA Web
can be configured so that we can control the number of users allowed access. The DRA Z39.50
client license is a bundled product that adds two major features to our HP 3000 system: 1) A full
site license for DRA Find which we can load on all our PCs -- 2) Adds advanced search
capabilities to the Web server. With the client license, the web server will be upgraded to enable it to do simultaneous searches of multiple Z39.50 databases. DRA recommends that the DRA Z39.50 server hardware should be located on a segment as close to the 3000 as possible with the NT or UNIX server outside the firewall so that the world does not have access inside our walls, based on the thought that if someone crashes the UNIX or NT server, it will be more easily restored than if someone gets inside our network.

**FY99**

**Replace HP3000 with NT or UNIX Server**

The HP3000 which our library system currently runs on is a model 932. HP models have been developed as follows: 920, 922, 932, 948, 958 series, 9x7 series, 9x8 series, 9x9 series. Our 932 is very old in computer terms. For those interested in a transformation process, a step between their current system and a full NT or UNIX server platform, DRA/Inlex will be structuring a transitional HP9000 platform for those libraries using the 9x7, 9x8, 9x9 series HPs, however they will not support anything other than the 9x series HPs, therefore eliminating this option.

In its plans for moving on to current technologies, DRA will support three separate operating systems, any of which we may use to run the server hardware. We choose which system will work best for us at Waubonsee. These operating systems are Windows NT, UNIX, and VMS. They will introduce one system on a single hardware platform at a time to ensure product stability before moving to the next operating system. To proceed with client/server technology, we will need a server. DRA/Inlex is recommending the HP NetServer (the first platform they will introduce, the NT server) or a UNIX server. Information Systems will contribute to this hardware platform choice, as I am sure there are several factors to take into consideration, such as existing hardware which may be utilized in this plan or new campus network hardware.

The size server we will need to handle the library system is yet undecided, depending on the amount of functionality we will run through each station, however, when actual sizing is needed, DRA/Inlex will consult with both Information Systems and the library, ensuring we obtain hardware which will accommodate current products and growth.

**FY2000**

**Replace Inlex Software with DRA Software Product**

Over the past two years DRA has conducted a series of complete functionality audits on the three individual (all 1980s-designed, all text-based, all dumb terminal/central processing unit reliant) library systems currently operated under DRA: Inlex 3000 (about 120 sites), MultiLIS (Canadian sites), and DRA Classic.

DRA is currently developing a new product slated for release early 1998 which combines functionality of these three systems and incorporating them into one new product to serve all DRA/Inlex/MultiLIS customers. This new product is a GUI system based on client/server architecture using object-oriented design in a distributed processing environment. The technology requires clients communicating with a server. The HP3000 is not a suitable platform for the new product and will not have the power to run it. I attended the Inlex Users’ Group Conference in December and viewed a demonstration of this new powerful Windows product and have nothing but enthusiasm for its functionality in the circulation, editor/cataloging, administration, serials, acquisitions, and reports modules. DRA/Inlex will charge no additional
licensing fees for functionality already purchased with our existing product. All additional fees will be related to the preparation for the product, not the product itself.

DRA is taking care to be sure that their customers are able to evolve gradually to the new system, moving to the full client/server product when it makes fiscal sense for us to do so. This will happen when the terminals are gone, the HP3000 has outlived its usefulness, our network infrastructure is in place, and our library is ready to move ahead to new technologies. This document is a structured a hardware platform migration from current products and hardware to the new product running on new hardware over the next three years, which will enable us to put these new technologies into place and keep up with the changing library environment.
CD-ROM Product 3-Year Growth Plan  
*FY98-FY2000*

**Current CD-ROM databases on network server**

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Chicago Tribune</td>
<td>4</td>
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<tr>
<td>Ebsco Academic Abstracts</td>
<td>4</td>
</tr>
<tr>
<td>Medline</td>
<td>1</td>
</tr>
<tr>
<td>CINAHL</td>
<td>1</td>
</tr>
</tbody>
</table>

10

**Projected Growth of CD-ROM databases on network server**

<table>
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</tr>
</thead>
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<tr>
<td>*PsycLIT</td>
<td>2</td>
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<tr>
<td>*Matter of Fact</td>
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<td>*CINAHL</td>
<td>2</td>
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<tr>
<td>*ERIC</td>
<td>3</td>
</tr>
<tr>
<td><strong>Ebsco Academic Abstracts</strong></td>
<td>8</td>
</tr>
</tbody>
</table>

24

*These databases are supplied by the SilverPlatter Company through Internet access. If Internet subscription costs are comparable with CD-ROM subscriptions, we may change to Internet access for these products and obtain site licenses for the academic network. We are now providing our Info-Trac service this way and it has worked out well, the advantage being products are updated constantly and we are able to provide a more timely product to patrons.

**Similarly, we may do the same with our Ebsco Academic Abstracts product, also offered through Internet access. Internet access to these products should be considered when planning hardware growth for Information Systems."
MEMORANDUM

TO: Chris Leja
FROM: Norm Paul
DATE: February 20, 1997
SUBJECT: Computer Needs for Corporate Development & Training and the Aurora Campus

We have tried to project our needs for the following areas and time frames:

- 1997 Corporate Development & Training Center
- 1998 Corporate Development & Training Center
- 1997 Aurora Campus
- 1998 Aurora Campus
- 1997 Corporate Clients
- 1998 Corporate Clients

It should be noted that the 1998 year refers to that year and at least one additional year beyond. We were simply not comfortable trying to project out for four or five years.

1997 Computer needs for the Corporate Development & Training Center:

- 6 new computers to replace older existing computers.
- Internet access for all Account Representatives.
- Windows E-mail for support staff and Account Representatives.
- Bring computers for all staff up to a minimum of 16 meg of ram.
- Establish Windows 3.11 as the main software package and eliminate all non-Windows software unless needed for special applications.
- Add a dictionary to the file server to function in addition to spell checkers.
Purchase automatic phone dialing software which will allow Account Representatives to dial clients phone numbers and supports taking notes regarding each call.

Purchase MapInfo or other geographic package showing each house, business and industry within our district.

Install two CuSee Me software packages including cameras and appropriate boards, etc, and have an additional two units which can be located at and moved to and from significant clients.

**1998 Computer needs for the Corporate Development & Training Center:**

Move to Windows 95 or 97

Move to Microsoft Office 97 software for support staff and Account Representatives.

Purchase a color scanner, software and desktop publishing software that will allow the department to produce camera ready color copy suitable as color brochures, flyers or even booklets.

Convert our client contractual trainer evaluation system so that we can scan the data directly from the student evaluation forms into the computer.

Develop a closed e-mail system so that I can communicate with the Account Representatives, they can communicate with me, and the transmissions would be secure, that is, not open to anyone else.

Purchase read and write cd roms for the support staff to use in the office.

Purchase a minimum of four color printers.

**1997 Aurora Campus:**

Add a dictionary to the file server as stated above for the users to access in addition to any spell checkers that they may use.

Move the file servers to a secure location.

Page Three
Computer Needs

Add additional ventilation, if needed, to control the ambient temperature in the closet areas on each floor where computer equipment is installed.

Review the programs on the network and remove those no longer needed.
Establish an area on the network where software can be loaded and tried out/tested by the Corporate Development staff, or other program areas, which is not accessible to others. We want to try out the software for our own possible departmental use, or possibly for use in our in public seminars, or as a possible seminar which we could take to our clients work sites.

Load Quick Books Pro Version 5, Windows 95, Microsoft Office Suite 97 including Access, and the most recent version of Lotus, on the file server.

Review the condition of all computers at the Aurora Campus and eliminate those with clock speeds with are no longer acceptable or which have been service problems. Prepare a replacement schedule based on a technology useful life cycle of three years or some other agreed upon fixed time.

Conduct an analysis of the software loaded on the file servers to determine that the loaded software is actually needed.

**1998 Aurora Campus**

If possible and approved by the Board of Trustees establish a single computer lab at the Aurora Campus.

Purchase one high end color printer for every 10 computers in the main centralized computer lab.

New computers for the site should come with cd rom (read and write) units, multimedia, and with speakers, etc.

**1997 and 1998 Corporate Clients**

This area was very difficult for us to even attempt and we simply could not come up with anything other than some very general observations such as shown below:

We will purchase more laptop computers once MMX technology becomes available in the laptops. They should have cd rom, with read and write capabilities, multimedia, and removable hard drives.

Clients are likely to continue buying suite type software packages which will probably begin to have Internet, Intranet, e-mail, etc. along with sophisticated word processing packages, which may border on high end desktop publishing software as part of the package.
Windows in its various versions will continue as the software of choice for many company’s and we must maintain at least one or two copies of whatever the most recent version is so that we can load, test, and run a version, if a client requests a program from us.

We are likely to develop some publishing capabilities of our own and will need to be able to maintain, probably only one station, in our department with a high end color scanner, and sophisticated publishing software package which has already been discussed.

Companies purchasing new computers will find software upgrades on their new machines and we must be able to provide training to those clients for their employees. Fast turn around is essential in these situations. One company that just called has 23 brand new computers that came with Windows 95 and not one of their 23 employees who use these computers has ever worked with Windows 95. They needed immediate training and even a delay such as a week or two could be very costly to them and could automatically cost us the work, even if we could compete effectively on the cost for the training.

Operating systems and possible changes with them are simply not clear to us at this time. A new operating system could be brought out which could really take off and could change the whole mix of software packages, but the issue remains a moot point.

Software issues associated with the Internet and Intranet are also difficult for us to project other than we feel that the Intranet will be developed and offers us a chance along with Internet training to serve our clients. Possible changes such as a recently announced new modem which can deliver video and digital computer data, medical imaging, and other information over existing copper telephone wires could have an immediate and dramatic impact on the area.

c:     Dr. Ken Allen
file
To: Chris Leja

From: Lew Cushing

Subject: Business Office and Five Year Technology Plan

I am responding to your request for input from the business office as to our technology needs over the next five years. I'll try to answer your request by describing the functions currently performed by the business office personnel, and the current equipment in place in the business office.

The business office has nine (9) full time employees. These include myself, Judy Iverson our Asst. Comptroller, Judy McCoy our purchasing agent, Dianne Vogt our grants and foundation accountant, Niki Lindner our payroll clerk and cashier, Connie Bergquist our accounts payable person, Sally Luman our receptionist and floater, Lynda Brummett our accounts receivable clerk, and Linda Vaughan our trust & agency accountant and imprest cashier.

Each person has their own PC and printer. Each person has access to the WCC green system to include the financial system and the student information system. They also can access the trust & agency program which operates separately from the colleges financial system. Lynda Brummett uses a stand alone accounts receivable package to process non-student billings such as Corporate Training and Development billings, Copley rental billings, etc.. This system is not integrated with the general ledger system on the green system. We also have two high capacity printers for printing payroll checks and accounts payable checks. Purchase orders, which are printed in multiple copies, are printed at night in Information Services. The college is on-line to a Visa/Mastercard/Discover processor which has been set up through Merchants Bank.

The payroll system and the accounts payable systems are integrated with our financial system with charges recorded against the individual line items within a given fund.

Our Bookstore, which I also have responsibility for, operates with the Follet First System, point of sale and inventory control package. This is relatively new having been installed in 1995 and 1996 at a cost of about $58,000. The system runs on the RISC 6000 housed in the Information System area. We have three (3) point of sale registers at the Sugar Grove store and one at the Aurora Campus store. Our Bookstore manager, Jo Collins, also has a PC in her office.

Over the next five years I can see all the PC's and printers in the business office being replaced. The bookstore system will probably last five more years with regular upgrading of the software and regular maintenance on the point of sale terminals.

As we look to the next five years, several areas will provide opportunities for system improvement. We can develop a new accounts receivable system which integrates with the general ledger. Trust & agency can be brought into the regular financial system, instead of existing as a separate entity. The collection of part-time hourly payroll information can be automated with the help of a system such as the KRONOS or some other data collection system. The student accounts receivable processing can be improved to provide an up to date balance for student receivables. We may want to look at the installation of a completely new general ledger system, incorporating integration between all the systems previously mentioned and also including the restructuring of Waubonsee's account coding to bring it into better agreement with the new ICCB Uniform Financial Reporting System.
All of the above are based on what we know now about our systems and the technology currently available. Five years from now who knows what we will want or need. I hope this helps you as you put together the overall college technology plan.
Appendix C - Committees

TECH TEAM
The Tech Team is a strategic committee designed to establish the Information Technology vision in collaboration with the Information Technology organization and to address technology policies and to set technology priorities as it relates to the institution’s strategic plan. The committee is comprised of the Executive Vice President of Educational Affairs, Vice President of Finance and Operations, Dean of Learning Resource and Instructional Technology, Assistant Vice President of Instruction, Executive Director of Information Technology, Executive Director of Campus Operations, and a faculty representative. The Tech Team reports directly to the President.

ACADEMIC AND ADMINISTRATIVE COMPUTING COMMITTEE (AACC)
The AACC is a tactical committee addressing computing issues across all functional areas of the institution. Recommendations of the AACC are forwarded to the Tech Team. Members of the committee represent an administrator from each functional area within the college. Co-Chairs of the committee are the Executive Director of Information Technology and the Assistant Vice President for Instruction.

SOFTWARE OFFICE SUPPORT (SOS) COMMITTEE
SOS is a forum for support staff to ask questions and learn about technology for their office environment. The Human Resources Manager and Computing Trainer co-chair the committee.
Appendix D - Integrated Information Technology Planning Process

The following process has been devised to facilitate the integration of academic and administrative technology needs with the budgeting process and institutional strategic planning:

1. In November, the Executive Director of Information Technology will meet with the academic deans and their respective faculty to develop technology needs for the next budget year. Each academic dean will submit to the Executive Director of Information Technology an Academic Technology Plan showing a five year projection and the immediate first year technology needs. With the approval of the Tech Team, the Academic Technology Plans will be included in the next revision of the Five Year Information Technology Plan.

2. The Tech Team will review academic technology needs and approve them for the next budget year. Any changes derived from the academic technology needs for the Information Technology organization shall be noted. The Executive Director of Information Technology shall modify the next revision of the Five Year Information Technology Plan to reflect the changes that emerge from the Academic Technology Plans.

3. The Executive Director of Information Technology and the Assistant Vice President for Instruction shall determine prioritization of academic technology needs for the next fiscal year. The prioritization shall be presented to the Tech Team for approval. Upon approval, the Information Technology organization shall use the prioritization as it establishes its projects for the next fiscal year.

4. Information Technology shall recommend equipment for retirement from the current standards list. Upon approval from the Tech Team, Information Technology shall budget for replacement of the equipment.

5. The Executive Director of Information Technology and the Assistant Vice President for Instruction shall submit a plan for cascading equipment for Tech Team approval. (Cascading is the concept of placing new technology where it will most affectively be used and taking the older technology and placing it where it will receive extended life while meeting the technology needs.)

6. Concurrent with the academic process, the Executive Director of Information Technology meets with administrative heads and discusses their needs for the next fiscal year and future years. Each administrative head, as appropriate, submits an Administrative Technology Plan to the Executive Director of Information Technology showing a five year projection and the immediate first year technology needs. With the approval of the Tech Team, the Administrative Technology Plans will be included in the next revision of the Five Year Information Technology Plan.

7. The revised Information Technology Plan which sets technology strategy for the institution is presented to the Tech Team for their approval. The revised Information
Technology Plan is completed prior to the budgeting process for the next fiscal year and is distributed to all administrators.

8. In April, the Executive Director of Information Technology shall meet with Academic Deans and faculty to discuss new technology and future applications of that technology into curriculum. Recommendations from these meetings shall serve as input for the next revision of the Information Technology Plan.

9. In April, the Executive Director of Information Technology shall meet with administrative heads to discuss new technology and future applications of that technology for their organizational environments. Recommendations from these meetings shall serve as input for the next revision of the Information Technology Plan.

10. The Executive Director of Information Technology shall present recommendations from academic deans and administrative heads sessions for discussion at Tech Team meetings for their input into technology directions.

NOTE: Administrative heads include: Controller, Executive Director of Campus Operations, Director of Buildings and Grounds, Assistant Vice President for Resource Development and Extended Programming, Dean of Student Development, Dean of Learning Resources and Instructional Technology.
Appendix E - Information Technology Organization

INFORMATION TECHNOLOGY

DEVELOPMENT

SYSTEMS TECHNOLOGY

SYSTEMS ANALYSIS & PROGRAMMING

WEB MANAGEMENT

DATA BASE ADMINISTRATION

SPECIAL PROJECTS

SYSTEMS OPERATIONS

TELECOMMUNICATIONS

VIDEO COMMUNICATIONS

DATA COMMUNICATIONS

INFORMATION TECHNOLOGY CENTER

NETWORK MANAGEMENT

NETWORK ADMINISTRATION

CLIENT HARDWARE AND SOFTWARE

CLIENT TECHNOLOGY MANAGEMENT

LIBRARY TECHNICAL MANAGEMENT

INFORMATION TECHNOLOGY SERVICES

HELP DESK

COMPUTING LABS

COMPUTER TRAINING
DEVELOPMENT
Development is responsible for new application solutions, and major modifications of existing systems. Application Development works closely with users to define requirements, review business processes, design solutions, work with other IT groups on integration and production issues, and, develop and implement of application solutions. Development is also responsible for handling user requests for modifications, reports, views of information, queries to database, and "what if" analysis.

SYSTEMS OPERATIONS
Systems Operations is responsible for executing administrative production computing operations, network monitoring for the campus and its satellites, administrative computer printing services, computer scanning for grades and other administrative inputs, and, for servicing hardware problems with voice, data, and video networks.

NETWORK MANAGEMENT
Network Management is responsible for the Waubonsee campus data network, all LANs, and Waubonsee WANs. Network Management interfaces with Development, Systems Operations, IT Service, and Client Hardware and Software Management to design, develop, implement, and maintain network solutions that provide Waubonsee with electronic delivery of information. Network Management is responsible for any networks which interface with voice and distance education. Network Management researches industry network directions and makes recommendations for upgrading and enhancing Waubonsee’s network environment, and, for setting and maintaining network standards, policies, and procedures.

CLIENT HARDWARE AND SOFTWARE MANAGEMENT
All end-user computing for academic and administrative users is serviced by Client Hardware and Software Management. New configurations, maintenance, and problem resolution is managed by this group. Client Hardware and Software Management interfaces with other IT groups as needed.

INFORMATION TECHNOLOGY SERVICES
Information Technology (IT) Services supports computing labs, help desk for IT problem resolution, and computer training. IT Services interfaces with other IT groups as needed. A close working relationship exists between the Help Desk and Client Hardware and Software Management. Computing Labs support academic programs by providing students and instructors with classroom and open lab support.
Appendix F - Information Technology Help Desk Statistics
Appendix G - Computing Labs Usage

OPEN LAB COUNT AVERAGES

Henning Academic Computing Center

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday-Friday</td>
<td>7:00 A.M.-11:00 P.M.</td>
<td>Average = 30 per hour</td>
</tr>
<tr>
<td>Saturday</td>
<td>8:00 A.M.-4:30 P.M.</td>
<td>Average = 25 per hour</td>
</tr>
<tr>
<td>Sunday</td>
<td>Noon - 5:30 P.M.</td>
<td>Average = 25 per hour</td>
</tr>
</tbody>
</table>

NOTE: Classes are brought in to the open lab on reserved rows throughout the week and are not included in the above averages. Adding the classes would increase the count to an additional 20 users per hour.

Aurora Campus Open Labs

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Average</th>
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<tbody>
<tr>
<td>Monday-Friday</td>
<td>9:00 A.M.-11:00 P.M.</td>
<td>Average = 10 per hour</td>
</tr>
<tr>
<td>Monday-Friday</td>
<td>5:00 P.M.-9:30 P.M.</td>
<td>Average = 15 per hour</td>
</tr>
</tbody>
</table>

NOTE: Classes are also brought into the open lab which would increase the count on those days.

Averages have not been kept for this activity.
Appendix H - Logical Network Platform

Logical Network Diagram

Internet

WCCNet

Aurora Campus

Waubonsee
Center at Copley

Sugar Grove Campus
Appendix I - End-user Computer Configurations

PC HARDWARE SPECIFICATIONS FOR FISCAL 1998

- Pentium 200
- 32 MB RAM
- 512 Kb RAM Cache
- 2 Gigabyte Hard Disk Drive
- 3.5 1.44 MB Floppy Drive
- 15” High Resolution Display
- Keyboard and Mouse
- 3 PCI/3 ISA slots
- Creative Labs 32 bit Sound card
- Windows 95
- 3 COM 10 BaseT Network Interface Card
- McAfee Virus Software

MACINTOSH HARDWARE SPECIFICATIONS FOR FISCAL 1998

- 604E Processor 180
- 32 MB RAM
- 2 Gigabyte Hard Disk Drive
- 3.5 1.44 Floppy Drive
- 17” High Resolution Display
- Keyboard and Mouse
- 3 PCI/3 ISA slots
- System 7.0 or higher
- Integrated 10 BaseT Network Interface Card
- Zip Drive
- Virus Software

PRINTERS

- HP 5SI MX (prefered for distributed printing)
- HP 5L for personal printing
NOTEBOOKS FOR FISCAL 1998

Pentium 166 MMX
32 MB RAM
2 Gigabyte Hard Disk Drive
3.5, 1.44 Floppy Drive
1 PCMCIA slots - Type III
2 serial ports and 1 parallel port
SVGA High Resolution Display - Active Matrix Screen
Keyboard and Mouse, built-in trackball
Windows 95
3 COM 10 BaseT Network Interface Card
AC adapter and port
Rechargeable NiMH Battery pack (3 hours per pack)

MULTIMEDIA NOTEBOOKS FOR FISCAL 1998

Same as regular notebooks plus:

CD-ROM 8X speed Drive
32 bit stereo sound, Sound Blaster-compatible
Integrated speakers - 40 Watts or greater
Headphone/stereo-out port
Microphone port
Stereo-in port
Appendix J - End-user Software Standards

OPERATING SYSTEMS
  Windows 95
  Windows NT (4.0 Workstation)
  System 7.0 or higher for the Mac
  Solaris Unix 2.4

WORD PROCESSING
  Wordperfect 6.1 for Windows 3.X
  Wordperfect 7.0 for Windows 95
  Microsoft Office 95 for Windows 3.X (Word 6.0)
    or Microsoft Office 97 (Word 7.0) for Windows 95

SPREADSHEET
  Lotus 1-2-3 Release 5.0 for Windows
  Microsoft Office 95 for Windows 3.X (Excel 4.0)
    or Microsoft Office 97 (Excel 5.0) for Windows 95

PRESENTATION
  Powerpoint 2.0

DATA BASE
  Microsoft Office or Access 2.0
  dBase IV
  dBase 5 for Windows 95

DESKTOP PUBLISHING & MULTIMEDIA
  Astound (low to medium multimedia complexity)
  Director Multimedia Studio by Macromedia (high multimedia complexity)

INTERNET
  Netscape Gold

E-MAIL
  Netscape Gold
Appendix K - Emerging Hardware and Software Standards

**HARDWARE**
Continue purchase of Pentiums
Evaluate P6 machines and make recommendation
Watch for hardware shifts that support Windows 95 and Windows NT
Upgrade Unix stations as appropriate
Increase memory sizes to 32 MB RAM
Increase hard disk drives to 2 GIG
Add CD-ROM as a standard peripheral
Watch MAC direction and make recommendation
Make appropriate shifts in notebook computer configurations
Upgrade multimedia computer configurations as appropriate

**SOFTWARE**
Upgrade operating systems
Plan migration to Windows NT and/or Windows 95 as appropriate
Upgrade office productivity tools
Stay with Microsoft Office suite current releases unless industry standards and trends change
Establish multimedia software standards
Upgrade and maintain Internet infrastructure
Add listserv and other Internet services as appropriate
## Appendix L - Five Year Projections - Costs Per Year

### Projected Costs for Start-up Technology and On-going Maintenance

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Total costs for five years: 310,400.00
### Administrative Needs

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Subtotal: 131,500.00 90,000.00 105,000.00 41,500.00 35,000.00

### PC Replacement

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Subtotal: 362,700.00 323,500.00 418,000.00 421,000.00 346,000.00

TOTAL: 27,000.00 1,079,230.00 663,650.00 808,775.00 765,975.00 917,475.00

NOTES:

* - Paid out of Program Budget.

Included in projected costs is equipment replacement every 3 or 4 years.
Appendix M - Aging PC Equipment List

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<td>Aurora</td>
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<td><strong>TOTAL</strong></td>
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NOTE: Of the sixty-five 386s in Sugar Grove, ten of them are in the Henning Computing Center
Appendix N - PC Software Currently in Use
370 Assembler emulator
3D Home Architect
Access W95
Access 2.0 Win
Acrobat Reader Win
ACT Dos
ACT Win
Adam Comprehensive*
ArcServe 6.0 Win
ARMS Win
AS400*
AutoCAD v12 Win
AutoCAD v13 Win
AutoCAD v13.4 Win
AutoVision v2.0 Win
Biology Programs
Blackbaid
Books Accounting PKG
Borland C v4.5 Win
C emulator
CA Simply Accounting
Calendar Creator 4.0 Dos
Castelle Fax Server Win
CDP
CES Programs
CheckitPro
ChgBK
Chicago Tribune *
Compass
Corel v5.0 Win
Courses
dBASE 5 Win
dBASE III+ Dos
dBASE IV Dos
Designer v1.2 Win
DHNFox
Discover
Discview
DisplayWrite 4.2 Dos
Drugs Programs
EasyFlo v7.0 Win
EBSCO Abstracts*
Electronic Workbench
Eudora Win
Fastback
Formmaker 1.62
Formmaker 1.70 Win
German Language Tutor
GIS
GradeBookPlus
Harvard Graphics 2.3 Dos
Harvard Graphics 3.0 Win
HP Jetdirect Software (various versions)
HPUX
Informs
Keyboarding Programs
Keys
Lanalyzer for Win
LanSkool
Laserrom
Linux
Lotus 1-2-3 v2.3 Dos
Lotus 1-2-3 v2.4 Dos
Lotus 1-2-3 v5.0 Win
MCAFee virus scan
Medline*
MEDS
MicroCase Government
Microfocus Assembler
Minitab v10 Win
More Nursing Programs
Mphisto*
MS Office 4.2
MS Office 95
MS Office Pro 4.3
MS Office Pro 95
MSExcel 5.0 Win
MSExcel W95
MSMail 3.2 Dos
MSMail 3.2 Win
MSSchedulePlus 1.0 Win
MSWord 4.0 Dos
MSWord 5.0 Win
MSWord 6.0 W95
MSWorks 3.0 Win
MSWorks 4.0 W95
NBSOFT*
NetG PowerBuilder Win
NetG WP6.0 Win
Netscape 2.1 Win
Netscape 3.0 Gold Win
Netscape 3.0 Win
Netset
Netware 3.12
Netware 311
Netware 4.1
NLN Cat Programs
Norton Textra Connect Dos  
Nursing Programs  
OIS  
Oracle for Windows  
Oracle for Windows  
Pacioli Accounting  
PageMaker 5.0 Win  
PageMaker 6.5 W95  
Paradox 4.0 Dos  
Partspec  
Pass RN Programs  
Payroll Accounting Win  
PCS  
PCTools  
PeachTree Win  
Pegasus Mail Win  
PH Tutor  
Pharmacolgy  
Pharmacology  
PHD v4.0 Win  
ProPhone  
Pspice  
Psychsim  
PWRchute  
QuickBooks Pro v4.0 Win  
Quicken  
QuickTime Win  
Reflections for Dos  
Reflections for Win  
Saber  
Shiva  
Shopware AIDS Programs  
SideKick  
SmartCAM v9.1 Win  
SMT Programs  
Sniffy the Virtual Rat Win  
Softrack Win  
Software  
SPC  
Step  
Telnet Win  
TLC General Hospital  
Viasinc v13 Dos  
Visio  
Visual Basic 3.0 Win  
VisualdBASE 5.0  
WinSpirs  
WordPerfect 5.0 Dos  
WordPerfect 5.1 Dos  

WordPerfect 5.2 Win  
WordPerfect 6.0 Dos  
WordPerfect 6.0 Win  
WordPerfect 6.1 Win  
WordPerfect 7.0 W95  
WS FTP Win  
WS Gopher Win  
zimage
Appendix O - Strategic Questions and Industry Facts

STRATEGIC QUESTIONS
The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis (See Appendix A) highlights issues based on the current strategy. Before moving to a vision statement and the Five Year Strategy for Waubonsee and its Information Technology direction, key questions need to be addressed:

INFORMATION TECHNOLOGY AS AN ORGANIZATION
What is the distinctive competence of Information Technology?
What is our information policy?
What management cultures exist with respect to Information Technology?
What academic cultures exist with respect to Information Technology?
What Information Technology changes are taking place in the education industry?
How is Waubonsee positioned to take advantage of Information Technology?
How does Waubonsee compare in technology and academic programs to other community colleges?
What Information Technology services do our internal users want and/or need?
Is the Information Technology organization prepared to effect change?
What resources in people and technology are available?
Does the community we serve need Information Technology assistance?
Do businesses in our community need Information Technology assistance and/or sharing?
Can business in our community assist Information Technology in delivering an effective IT platform?

INFORMATION TECHNOLOGY CUSTOMERS, PRODUCTS, AND SERVICES
Who are Information Technology customers?
What are their Information Technology needs?
What products and services will Information Technology deliver?
Can Information Technology do what needs to be done with the resources we have?

INDUSTRY FACTS
Here is a list of facts showing the state of Information Technology services nationally:

1. Computing power is moving from the mainframe to the desktop.
2. High quality student services delivered in a cost-efficient manner.
3. Incredible number of choices as to how information is captured, stored, and delivered.
4. More and easier access to information.
5. More security for confidential information.
6. Consistent use of data within institution.
7. Integration of voice, text, graphics, and video.
8. New hardware and software standards for the institution.
9. New technology for Information Technology department.
10. Networking is the foundation for Information Technology.
11. Traditional way of working with technology vendors has changed.
12. Client/server solutions cause user departments to spend more on technology.
13. Outsourcing is an alternative constantly assessed.
14. Training and job description changes are continuous.
15. Collaborative and team-oriented work projects are the norm.
16. People skills for Information Technology (IT) professionals continue to grow.
17. Need to loosen or remove boundaries within IT organization.
18. Connectivity between institutions is increasing.
19. Concurrent, continual learning within the IT organization.
20. Continual improvement of processes.
21. Frequent upgrades of standards, policies, and procedures.
22. Audits of institutional Information Technology practices.

SUMMARY
The SWOT analysis and the above generic questions and industry facts form the basis for the vision statement and the Five Year Strategy that follow. Given the high rate of change in the Information Technology industry, the SWOT analysis and the above strategic questions should be asked annually followed by an appropriate revision of the Five Year Information Technology Plan. The Five Year Information Technology Plan must be a living strategy that is formally revised annually.
Appendix P - Summary of Voice, Data, and Video Services

Telecommunications (voice) has been viewed as a commodity service and as such has been outsourced. When phone service is needed, it must be scheduled for a visit from the vendor. Real time changes cannot be done. With telecommunications outsourced, it is very difficult to test options, gather information for integrating voice, data, and video without paying for the extra services of an outside vendor. Telecommunications is becoming a more vital technology component which may demonstrate a need to change the outsourcing package and bring some of the services in-house while outsourcing other services.

Distance Learning has been a showcase technology with Waubonsee demonstrating strong leadership within Illinois. As the technology delivery mechanisms change, the instructional techniques and classroom settings remain quite similar. With respect to the technology, there is evidence of data and voice using video media. There is evidence of voice and video using data media. And, there is evidence of video and data using voice media. An optimum combination of services can produce savings for the institution. Distance Learning needs to stay focused on the learning styles and instructional techniques required to deliver classes via a distance rather than focus on technology media choices. It is the role of Information Technology to manage the use of optimal media choices with optimal cost parameters.

Computing technology now includes delivery of data over a distance. With the innovation of data networks and especially the Internet, data is not tied to a given machine in a given location. Research can be done over the Internet. Students, faculty, and administrative staff can communicate across campus and between campus and the outside world via text-based software. Now, audio signals can be sent over data wires by translating the radiowaves. Video signals can be translated so that they may be sent over data wires. From a PC, one can read text, view slides, hear music, speak with individuals, watch broadcasted-video, and interactively speak, see, and hear someone from a distance. To date, Waubonsee has begun to lay the technology infrastructure to deliver all forms of media over a data network.

Administrative computing has a custom designed system that has serviced the college since 1985. The users have been quite pleased with the system and feel that the system continues to service their needs. Requests for new information, however, are quite intensive for the next five years (See Appendix B - Five Year Academic and Administrative Technology Plans). Although the computers are relatively new, the hardware platform (HP 3000s) is quite old. Much discussion is taking place among customers and industry analyzers about how much longer Hewlett-Packard will continue to support the current hardware models and their proprietary operating system. The heavy industry discussion concerning the Hewlett-Packard hardware platform is a signal for Information Technology to plan a migration path to a more current platform. It is extremely important that the migration to a new hardware platform be done PRIOR to Hewlett-Packard discontinuing support of their HP 3000s.

Customer needs for academic computing are at different levels. Technology-based programs require current hardware and software just to stay competitive with other academic institutions. Other academic programs use technology to assist with skills building, research, and learning to use a particular software package or computer. In all cases, the hardware and software platforms...
must correspond to textbooks and their use of particular versions of software. Sometimes, the number of active releases of software being used at the same time constrains the space available for new software and/or storage of data associated with using the software packages. Planning space requirements to accommodate breadth and depth of software per package increases computer configurations which also increases the cost of computers. Faculty and Deans have begun to address versions of software and are working with the Information Technology organization to keep costs down while servicing community needs (See Appendix B - Five Year Academic and Administrative Technology Plans).
Appendix Q - Information Technology Service

Information Technology has been on a vertical learning curve while implementing change. New technology to build networks, systems, and applications is in progress. IT staff is strained to manage the existing system and proceed with the additions to the existing and new environments. With the exception of an Academic Network Manager, no new headcount has been added to the organization, yet the following on-going services have been added: access to the Internet, workgroup e-mail for campus employees, a Web server has been started, Web pages have been contracted and put into production, multiple LANs at different sites have been implemented, a campus-network has begun, and all of the proceeding require production maintenance. The number of PCs in service have risen to approximately 1,200. In addition, Waubonsee customers want 24 X 7 network support, but are amenable to having support during the same hours of service as the computing labs. During non-supported hours, users may leave voice mail or send e-mail to describe their problems which will be addressed at the start of the next business day. The IT staff is present primarily on a one shift basis with several staff opting to come in later to provide coverage until 7:30 P.M. There is no network coverage for 65% of the desired time frame. Staff are continually called after hours to come back to campus and fix problems.

Appropriate training and outside support during the learning process for IT has not transpired. Consequently, IT staff are learning on the job with no professional guidance present which usually means many more hours to diagnose a problem, many learning mistakes, and therefore frustration from the users who just want it to work as quickly as possible!

IT is managing growth with new technology while continuing to service on-going production needs. The IT workload is running at, and many times beyond, capacity! The excitement of new technology is wearing off and leaving a lot of stress. Yet, the IT staff attempt to service their customers with a smile.

The Henning Computing Center is a centralized, networked facility located on the west side of the Sugar Grove campus. Here, computerized classrooms surround the perimeter of the building. In the center of the building, there are general open computing stations for students. A lab assistant is able to monitor the open computing stations and watch for any faculty assistance that may be needed in the classroom. Although some faculty and students are inconvenienced with the need to go to the Henning Computing Center, most faculty and students are pleased with the capabilities and services. A similar, but smaller open computing design is understudy for the Aurora Campus. Waubonsee Center at Copley may soon require an open computing area based on growth.

With the introduction of the Internet, classrooms and open computing stations will have access to the Internet, first in Henning, and then gradually to all the classrooms, labs, libraries, and offices across all campuses as prioritized. Internet access for students is planned for the Fall of 1997 and students will have access in the Henning general open computing area.
Appendix R - The Living Strategy

Waubonsee is moving to a campus-wide network environment. Gone are islands of computing except for special testing and research. Everyone will want connectivity from the desktop to:

- access the Internet,
- send and receive faxes,
- send and receive electronic mail,
- share printers and copiers,
- access institutional data,
- access software programs from various locations on campus,
- communicate electronically with outside services such as library catalogues,
- connect to other computer systems off-campus using shared modem pooling,
- exchange text, graphics, pictures, video, and speech.

Gradually, just as we communicate via telephone, we will communicate interactively via computers. Educational computer-based courseware will move to an interactive, multimedia platform. Many homework assignments will be shared electronically.

Example: Students, please ftp the file, homework, to your PC, do the assignment and ftp your results to the homework directory, h:\waub\english101\sectionb, by September 15, 1997.

(Now, you may not understand all the acronyms or computer jargon, but please notice that no paper is exchanged in either receipt of the assignment or delivery of the completed homework! And, if you could see the contents of "homework090897", you would experience a presentation that shows the written assignment, a background voice explaining what is expected, and pictures showing examples of what is needed and the format to follow.)

From a business perspective, Waubonsee in the next five years will see administrative software that allows more people more access to information, and gives people tools to put data in a presentation form that represents their needs. Educationally, courseware will use interactive and multimedia techniques to enhance the learning process. Computers will grow in features using voice, video, and pictures which moves significantly beyond the written word.

To build the above view of technology, the following environment must emerge.

Complete a campus network backbone that provides connectivity to all computers and LANs following Information Technology standards. Management and backup of the network will be done from a central site. Authorized users wishing to access computers across campuses will connect electronically to these computers through the network and do their work as if the information was located on their PC. Users connected to the campus network will be able to access the Internet and interface with multimedia solutions from their desktop. These same electronically connected users will be able to receive faxes to their desktop and connect to authorized computer services off-campus.
Electronic memoranda has started to take place at Waubonsee which replaces a significant portion of paper memoranda. A by-product of electronic memoranda is faster communication and cost savings. Typical areas where cost is reduced is: paper usage, laser printer cartridges, and campus mail delivery.

Paper documents which must be kept for long periods or forever will be retained in electronic format for querying and the paper copy archived. Paper documents which can be kept legally on electronic media will be stored electronically and the paper discarded. Paper reports which can be delivered electronically will be routed to the designated person's electronic work environment and it will be the decision of the individual to print the report, save the report, electronically work with the report, and/or send copies of the report to other individuals electronically.

Infrastructure, the technology and computing services needed to connect the Waubonsee family, is the foundation for using Information Technology. The campus network, WCCNet, is already being built. It will service electronic delivery of information from the Internet, from the administrative software system, and from one computer to another on all the Waubonsee campuses.

Computing machines to service the campus are being added to perform the roles of data servers, application servers, and network servers. Waubonsee will have a centralized data warehouse where authorized personnel can retrieve information, perform "what if" analysis, and produce reports customized to their needs. Processes will be refined to fit the needs of the business and ensure that the administrative software system matches the needs.

Electronic classrooms will continue to be networked allowing software to be more easily upgraded, shared, and used in the classroom. Gradually, each of these electronic classrooms will have access to the Internet. Traditional classrooms will be wired for voice, data, and video which will provide the capability for audio-visual computers to be delivered to the classroom and connected to the network. Audio-visual tapes, CD-ROMS, and software can be accessed through the network giving the ability to secure media and physically deliver only the device for viewing through the network. As viewing devices become more portable and less expensive, faculty will bring the device to the classroom, connect it to the network, and access the media they need. Some classrooms will be fully configured to deliver multimedia materials, connect to the Internet, and access information and/or software located on different servers on campus.

Integrated labs will have access to the internet, centralized media such as audio-visual tapes, CD-ROMs and software, shared printing, library catalogues, and student information about Waubonsee and Waubonsee events. Backups will be done for the integrated labs and the networked PCs during the evening at a scheduled time. As voice, data, and video become available on the Internet, and, as integrated labs provide voice, data, and video solutions, the integrated labs will be able to deliver the solutions to anyone on the campus network, WCCNet.

An Instructional Technology Center will emerge as a place for faculty to evaluate hardware and software for the classroom and to design and develop educational presentation materials for the classroom. Designated existing computing labs will be outfitted with multimedia capability that provides data, computing, voice, and video. The Learning Resource Center will have
multimedia capability. Here students and faculty can extend learning, use learning aids, and work with students using skills-based software. The Learning Resource Center will also have access to the Internet, utilize shared printers in the area, and offer handicap accessible workstations. The extended library area, as planned, would experience heavy usage at the beginning of each term during orientation of students. Appropriate infrastructure must be implemented which includes electricity, voice and data connectivity, and sufficient stations to accommodate usage.

The Henning Computing Computer Center will have multimedia capability at designated locations. Already, the building is highly used for computer technology. Plans are already in place for offering enhanced multimedia courses.

Distance learning classrooms have the potential to allow guest speakers to come into the classroom without physically being present. Faculty can enhance their classes by bringing professionals into the classroom from across the U.S. Cost and time are minimized. The classroom can and has been used for videoconferencing. It is a great way to meet with colleagues and not have to travel! The enhancement of the distance learning classrooms to included PC technology will effect more utilization of the room and offer diversity in the presentation of classroom instruction. Technology-based courses can be touch via a distance with hands-on training. As the delivery media change for offering distance learning classes, the classrooms will be ready to accommodate the change with minimum cost.

There are two lab environments separate from the Henning Computing Center and the Aurora Campus Open Computing environment; they are the Writing Centers (a center at Sugar Grove Campus and a center at Aurora Campus) and the Foreign Language Center that use computers in a standalone fashion. Some of these PCs are so old that they are original 8088s that cannot be networked and cannot be repaired. These centers need to be connected to the campus network, WCCNet, so that sharing of software can be accomplished. Design and Computer Graphics classes use these dependent labs which means that, today, that software cannot be shared beyond the room in which they are housed.

The ITD center has received national acclaim, yet their equipment trails in the very areas where they are expected to deliver. The Aurora Center computing areas are under revision and the plan is that the Henning Computing Center concept will be followed.

Based on an inventory analysis of equipment, there are approximately 127 PCs that are 386 and older (See Appendix M - Aging PC Equipment List). In addition, there are numerous 486s that are not configured to handle network connectivity and Internet access. These machines need to be retired and the cascading of equipment must be implemented. Cascading of equipment is the technique of buying new computers for state of the art academic programs and taking the older equipment and relocating in areas that need a computer, but do not need a state of the art machine. Cascading makes effective use of limited dollars for technology and expands the technology across the greatest customer base.

Faculty, representing their curriculum program, have expressed their five year technology needs and the Library has included its five year technology needs (See Appendix B - Five Year Academic and Administrative Technology Plans for a summary of these needs.). Creating an
integrated academic technology plan is crucial for the college. Why? Technology is changing fast and limited dollars are available to service all academic needs. By reviewing academic curriculum technology needs, common needs, and directions, synergies emerge. For example, many academic programs need access to the Internet. Employing a campus-wide academic technology plan brings that Internet access to the classroom and leads to the connectivity of standalone PCs, isolated local area networks, and independent labs. Following consistent hardware and software standards and sharing access among programs deliver a campus-wide technology available for many faculty and students.

With a campus-wide network, several other technology thrusts become possible. PCs can be networked in a standard way, multimedia stations as they emerge will follow a standard and integrate into the campus network, notebooks computers can be configured to interface with the campus network and take advantage of all the technology on campus, and classroom projection devices and audio-visual devices can interface with the campus network and carry voice, data, and video to classrooms and networked PCs. Most important, more academic needs are delivered and shared campus-wide while minimizing overall costs!

Data and video technologies have been kept separate. In industry, there is a swift movement to integrate three technologies: voice, video, and data. The infrastructure for the classroom is voice, video, and data. Audio-visuals are now available for PCs and for integration with campus networks. As discussed in the Analysis on Current Strategy, Waubonsee needs to integrate the IT infrastructure to continue its leadership in distance learning. The next few years will see industry establishing a standard as IT businesses compete for their future. Waubonsee must respond in kind.

An integrated infrastructure of technology gives Waubonsee a new way to market itself. Already, most colleges and universities use the home page (first screen of information received) to state their programs, seminars, special events, to allow students to register for class, and to access designated software tools over the Internet. High school students can learn about an institution, send faculty and admissions personnel mail, and register for class without ever coming to campus. The big savings is on mailings! All the information is available on-line and the student can carry on a dialogue via electronic mail with Waubonsee representatives.... all this from the convenience of a PC.

The potential of using Information Technology expands beyond the institutional walls. Outreaches to our remote sites, to community officials, to business partners, etc. grow as the technology becomes commonplace. Already 40% of all homes have a PC, nearly all businesses have a PC, and most academic institutions have a good number of PCs. About 90% of the homes have a TV and a telephone. Soon all three of these technologies will be integrated to the home. The rush is on as seen by industry mergers and acquisitions.

Many of the high schools in our area have Internet access. Perhaps, Waubonsee can take a leadership role to integrate our campuses and cost-effectively communicate district-wide. Internet Service Providers (ISPs) are offering their services to each of the schools in our district. A consortium of schools can effect good carrier prices based on the volume of business all the schools deliver as one entity. In addition, our ability to electronically talk with potential students increases.
Elementary schools are actively incorporating Internet into their students' learning experience. Education-focused companies are building virtual reality solutions for the classroom. Soon students can put on their head gear, choose a creature of the prehistoric era, and experience what that creature experienced during that time period! Already, students are able to electronically communicate with students of other countries over the Internet. Radio programs demonstrate voice over the Internet. Within the next five years, a vast integration of voice, video, and data will bring a new form of competition. The competition will be between firms offering the integrated networks as one complete service with choices to the customers in the form of programs, services, and other products. Educational institutions will face this same competition.

The education industry is actively pursuing distance education, multimedia, authoring tools, and, yes, virtual reality to enhance the learning process. Today, multimedia and authoring tools are available for elementary, secondary, and higher education in a variety of subjects. Learning assistance tools and computer-based training are growing rapidly. Faculty and Information Technology need to evaluate and learn tools that will be used in our classrooms and labs. The creation of an Instructional Technology Center can fulfill that need and serve as a trial classroom. Nationally, many community colleges who are active in multimedia and authoring tools, have established just such a center. To trial software, train faculty, and assist with the design and implementation of multimedia courseware, an instructional technologist will work with faculty.

A place for the Instructional Technology Center is needed. The room would require a PC, peripherals that can accommodate multimedia, and large screens/monitors for distance education. And, since distance education takes place in two forms, large screen classrooms and networked PCs, the distance education classroom would serve to demonstrate both forms and assist in developing the appropriate classroom configurations. As the distance education industry selects the optimal visual presentation of distance education (big screen versus PCs), the Instructional Technology Center would be positioned to quickly follow industry lead.

There will be some projects with other education institutions, but the majority of our work is with academia, students, and administration. Our deliverables are defined; they include:

- Expand Internet access to all computers on campus,
- Service end-user PCs,
- Support electronic classroom computing,
- Support academic programs using a standard technology platform,
- Maintain centralized and integrated computer labs,
- Sustain distance learning leadership with appropriate technology,
- Work with faculty to deliver and support technology needs,
- Re-engineer the administrative software system.

Once the internal environment is stable, Information Technology must build and sustain partnerships with other educational institutions and industry within the community. Other areas for partnership include: offer businesses "the" meeting place to discuss Information Technology issues, partner with academic technology programs to deliver state of the art courses, offer continuing education technology-based courses that meet the needs of business and the
Waubonsee community, and continue delivering productivity enhancements, cost-avoidance solutions, and where possible, revenue generating solutions.

Information Technology is a tool waiting to be used! Waubonsee must respond to the industry's direction and focus. The long term move for Waubonsee must be voice, video, and data to the classroom.

The technology foundation can be built by following this Five Year Information Technology Plan. The next move is to enhance the learning process and expand beyond our traditional ways of doing business. Complete Internet courses can be offered electronically. Then, we look for creative ways to use technology and make it Waubonsee's competitive advantage! Let us begin!
## Appendix S - Network Servers

<table>
<thead>
<tr>
<th>SERVER NAME</th>
<th>MODEL</th>
<th>PROCESSOR</th>
<th>RAM</th>
<th>ACAD./ ADMIN.</th>
<th>NETWORK SOFTWARE PROGRAMS AVAILABLE</th>
<th>FLOPPY DRIVE</th>
<th>CD ROM Y/N</th>
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<td>486/33T</td>
<td>40</td>
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<td>N</td>
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Appendix T - Consultants Report Addendum

This report is an addendum to the Site Evaluation delivered to Waubonsee Community College in December of 1996. This report will revise some of the recommendations and take into account some additions based on new needs of the institution.

STUDENT WEB SERVERS
There is a need to teach students how to design and implement a web server. Providing this capability in itself is not difficult, however, a live internet site does require some planning. Security is the largest concern that must be addressed.

A secure web site is really not the issue here. That should be addressed in the classroom. Providing a secure infrastructure to accommodate this need is an issue. To ensure that the rest of the WCC network is secure from the potential risks, it is necessary to locate the student servers on the internet side of the proxy host. This means that the physical servers and the students should reside between the CISCO connected to the internet and the two UNIX hosts that provide current internet services. Locating the servers at this point in the topology, reduces risks for the internal network. If a hacker tries to hack into a student machine, they would still have to force their way through the proxy host.

There are really a couple of choices for operating systems for this project. Windows NT being the easiest to set up and hardest to gain access to. However, there are numerous bugs that can bring down a server by a novice hacker. UNIX is a time tested platform, and performs well as a corporate web platform. Unfortunately, UNIX provides a nice platform to hack into. If UNIX is to be used, prepare the machine for internet use. It should be as secure a platform as possible before a student is allowed to use the system. A hacker bringing down a student web site is not as critical as providing a diving board to the internal network.

POP/SMTP E-MAIL
POP/SMTP mail is a service that is provided by UNIX systems and is the standard for internet based e-mail. This type of system has many benefits, especially for larger operations. POP/SMTP is a non-proprietary, an internet standard, relatively inexpensive, and a very stable e-mail system.

POP/SMTP provides e-mail service to any client package that supports this protocol. Many internet browsers are supported, and there are many free and relatively low cost options as well. The newer packages such as MS Exchange and CC:MAIL will also support POP/SMTP. The post office itself is non-proprietary unlike a product such as MS:Mail. This means that different clients can send and receive email using the same post office. This system is also MIME compliant which will handle attachments easily.

A separate UNIX host should be used to provide e-mail service to the client. This distributes the load of applications to alleviate a single point of failure and provide a stable and efficient e-mail system.
UNIX SECURITY
Increasing the security on the UNIX system hosting the campus web site is imperative. The machine is very vulnerable to attack from within as well as from the internet. It must be assumed that the system is already compromised. The best way to solve this problem is to build a solid infrastructure around the machine. Offload some of the tasks, such as e-mail. All of the recommended patches from HP should be installed. Remove all unnecessary SUID and clean up the user databases. Install password shadowing and acquire a MD5 system and check MD5 signatures on all binaries. To completely secure the machine, a number of weeks would be necessary.

On the client side, consider use of a secure shell for telnet. This would provide encryption for all telnet sessions throughout the campus. This would mean purchase of a new client, however, it should be investigated.

INFRASTRUCTURE
The current infrastructure does fine for the current and near term needs of the institution, however, the current network would not be able to support any high bandwidth applications such as video conferencing or teaching. The current infrastructure can be categorized as a mixture of different hardware, lack of network management, and lack of central design and planning. The current network should be upgraded to provide a base for future needs.

To achieve this goal, a solid plan must be devised, planned and implemented. The technology is an ever moving target that makes planning for the future a difficult process. For the purpose of this document, only general requirements will be outlined and a more thorough study should be commissioned to complete a design.

Wiring is the foundation of any solid network system. The cabling can be thought of as a road. If the road is dirt, the path is slow and unstable. If the road is an expressway, the path is highly reliable and fast. All campus buildings should connected to the operations center by multiple strands of fiber to provide the redundancy and bandwidth necessary for future needs. All interior buildings should be cabled with category five wiring to provide a theoretical maximum of 00mbs to the desktop. This should be more than adequate to support video and other future high bandwidth technologies for the foreseeable future.

Communications equipment should be standard throughout the enterprise. This increases the effectiveness of a network management system and reduces the number of components in a complex system. This also reduces vendor contacts for service and upgrades. In general terms, using a single vendor for all communications equipment is a positive. Research the technologies and vendors that are available. Many vendors will assist in the layout of your network and are a valuable information tool.

Topology refers to the physical network specifications that are to be used to transport data between host computers. Ethernet on shared media is the current configuration. There are several options for upgrade. A 10mb switched media increases throughput by eliminating contention.
Fast Ethernet increases the bandwidth by ten and 100mb switched media is a combination of both, the latter being the most expensive option. The industry is moving towards switched networks as a means to increase throughput. Switched internetworks are still more expensive than shared media, however, those costs are dropping and the benefit in most cases is worth the expense. A combination of routing and switching will be necessary because of the nature of the enterprise network. Further study will be necessary to provide a detailed plan for implementation of a switched network system.

**RESTRUCTURE IP ADDRESSING**
Redesigning the IP addressing scheme is not a project that should be undertaken until an infrastructure plan has been devised. An IP addressing scheme is heavily dependent on physical components such as routers. Using a standard addressing scheme as outlined in the RFC to provide a registered non-routable class A address is a sensible plan.

**STANDARDS**
Standards dictate a structure to follow in order to construct and maintain a network system. They provide a commonality among systems reducing learning curves and increasing productivity. Standards should be drafted and implemented as soon as possible. This is a fundamental component for the proper management of a network system. Hardware, software, configurations, procedures, and maintenance are all items that can and should be standardized. Preparing standards will require some time, however, the standards will then provide a strong direction and reduce cost of ownership over the long haul.

Netware 4.11 should be the standard network operating system for the college. Windows 95 or Windows NT workstation should be adopted as desktop operating system standards when all applications are tested for computability. Desktop productivity applications should be standardized. A standard suite of applications should be used by the non-academic population. This will reduce file format incompatibilities, maintenance and the learning curve for users and support staff.

**NETWORK MONITORING AND MANAGEMENT**
Managing an internetwork is not an easy chore. The ability to monitor and manage a distributed system from a central location is necessary in today’s computing environment. There are many different management packages available. Hardware vendors usually sell their software to manage their equipment. This is the best option, however, to be effective, all of the communications hardware should be from that vendor. This can be an expensive undertaking. If there is to be an upgrade to a new topology, this would be the opportune time to standardize on equipment and software. Further study would be necessary to devise a strategy for implementation.

...............................................................................Bill Anderson, DTA
Appendix U - Proposed WCCNet Network Diagram